THE CAMBRIDGE ECONOMIC HISTORY OF THE GRECO-ROMAN WORLD

In this, the first comprehensive one-volume survey of the economies of classical antiquity, twenty-eight chapters summarize the current state of scholarship in their specialized fields and sketch new directions for research. The approach taken is both thematic, with chapters on the underlying determinants of economic performance, and chronological, with coverage of the whole of the Greek and Roman worlds extending from the Aegean Bronze Age to late antiquity. The contributors move beyond the substantivist-formalist debates that dominated twentieth-century scholarship and display a new interest in economic growth in antiquity. New methods for measuring economic development are developed, often combining textual and archaeological data that have previously been treated separately. Fully accessible to a broad readership, the volume represents a major advance in our understanding of the economic expansion that made the civilization of the classical Mediterranean world possible.

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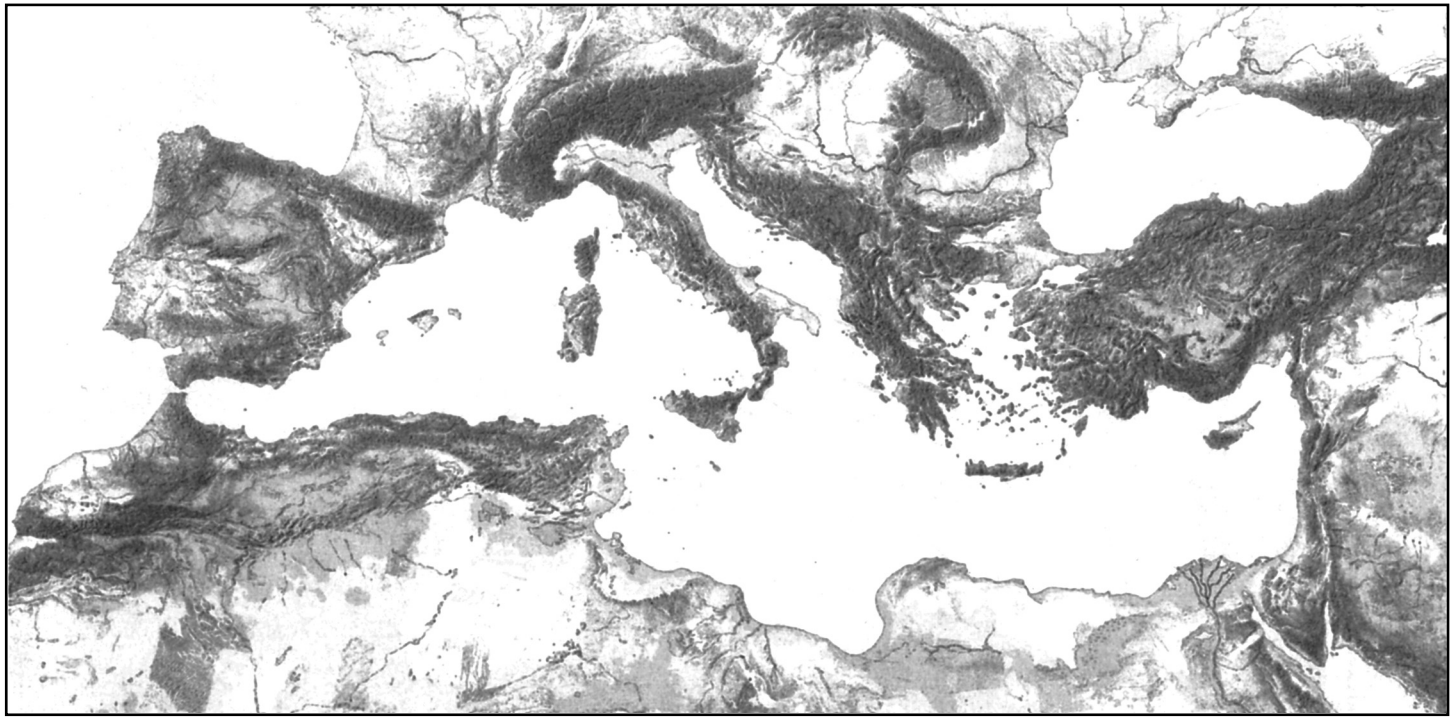
Walter Scheidel
Ian Morris
Richard Saller

ABBREVIATIONS

AE	*L'Année Épigraphique*, published in *Revue Archéologique* and separately, 1888–.
ATL	B. D. Merritt, H. T. Wade-Gery, and M. F. McGregor, *The Athenian Tribute Lists* 1–4, 1939–53.
BL	*Berichtigungsliste der griechischen Papyrusurkunden aus Ägypten*, 1922–.
CIL	*Corpus Inscriptionum Latinarum*, 1863–.
CSEL	*Corpus Scriptorum Ecclesiasticorum Latinorum*, 1866–.
CT	*Cuneiform Texts from Babylonian Tablets in the British Museum*, 1896–.
DDBP	*Duke Data Bank of Documentary Papyri*. Searchable online at http://www.perseus.tufts.edu/Texts/papyri.html
DK	H. Diels and W. Kranz, *Fragmente der Vorsokratiker*, 6th edn., 1952–.
EK	L. Edelstein and I. G. Kidd, *Posidonius, The Fragments*, 1972, 1988–9.
FGrH	F. Jacoby, *Die Fragmente der griechischen Historiker*, 1923–.
FHG	C. Müller, *Fragmenta Historicorum Graecorum*, 1841–70.
FIRA	S. Riccobono, *Fontes Iuris Romani Anteiustiniani*, 1941.
GGMI	C. Müller, *Geographici Graeci Minores*, 1855–61.
ID	F. Durrbach, *Inscriptions de Délos*, 1926–72.
IG	*Inscriptiones Graecae*, 1873–.
IGCH	M. Thompson, O. Mørkholm, and C. M. Kraay, *An Inventory of Greek Coin Hoards*, 1973.
IK	*Inschriften griechischer Städte aus Kleinasien*, 1972–.
ILLRP	A. Degrassi, *Inscriptiones Latinae Liberae Rei Publicae*, 1957–65.
ILS	H. Dessau, *Inscriptiones Latinae Selectae*, 1892–1916.
I.Magn.	O. Kern, *Die Inschriften von Magnesia am Maeander*, 1900.
ISE	L. Moretti, *Iscrizioni storiche ellenistiche. Testo critico, traduzione, e commento*, 1967–75.

Lindos	C. Blinkenberg, *Lindos. Fouilles et recherches, 1902–1914. Volume 2. Inscriptions, publiées en grande partie d'après les copies de K. F. Kinch*, 1941.
MAMA	*Monumenta Asiae Minoris Antiqua*, 1928–.
ML	R. Meiggs and D. Lewis, *A Selection of Greek Historical Inscriptions to the End of the Fifth Century BC*, rev. edn., 1988.
MRR	T. R. S. Broughton, *The Magistrates of the Roman Republic*, 1951–2. Suppl. 1986.
OGIS	*Orientis Graeci Inscriptiones Selectae*, 1903–5.
ORF	H. Malcovati, *Oratorum Romanorum Fragmenta Liberae Rei Publicae*, 4th edn., 1976.
PCG	R. Kassel and C. Austin, *Poetae Comici Graeci*, 1983–.
PG	J. P. Migne, *Patrologiae Cursus Completus, Series Graeca*, 1857–66.
PSI	*Papiri Greci e Latini*, 1912–.
REG	*Revue des Études Grecques*, 1888–.
Sardis	W. H. Buckler and D. M. Robinson, *Sardis VII: Part I, Greek and Latin Inscriptions, 1932.*
SB	F. Preisigke et al. *Sammelbuch griechischer Urkunden aus Ägypten*, 1915–.
SEG	*Supplementum Epigraphicum Graecum*, 1923–.
SIG	W. Dittenberger, *Sylloge Inscriptionum Graecarum*, 3rd edn., 1915–24.
StV	*Die Staatsverträge des Altertums*, 1962–.
Syll.	See *SIG.*
Th.	W. Theiler, *Poseidonios Die Fragmente*, 1982.
TPSulp	G. Camodeca, *Tabulae Pompeianae Sulpiciorum. Edizione critica dell' archivio puteolano dei Sulpicii*, 1999.
UET	*Ur Excavation Texts*, 1928–.

Papyri and ostraca are cited in accordance with J. F. Oates et al. eds., *Checklist of Editions of Greek, Latin, Demotic, and Coptic Papyri, Ostraca and Tablets* (5th edn., 2001). This can be searched online at: http://scriptorium.lib.duke.edu/papyrus/texts/clist.html. Ancient authors are cited in accordance with *The Oxford Classical Dictionary* (3rd edn., 1996). In the bibliography, the titles of periodicals are abbreviated primarily in accordance with *L'Année Philologique* (1928–).



Map 1.1 The Mediterranean basin
Reproduced with permission from the Interactive Ancient Mediterranean Web site (http://iam.classies.unc.edu)

CHAPTER 1

INTRODUCTION

IAN MORRIS, RICHARD P. SALLER AND WALTER SCHEIDEL

We have two goals in this book: to summarize the state of knowledge in ancient Greek and Roman economic history, and to contribute to shaping future research. The book is the first of its kind. The original *Cambridge Economic History of Europe* began with the decline of the Roman empire; and in the seventy years since its first volume appeared there has been no single-volume overview of Greco-Roman economic history to complement it. From one perspective, that is hardly surprising. Most ancient historians rely on literary sources produced by and for a leisured elite. These say notoriously little about economics, and the corpus of texts has barely expanded since the *Cambridge Economic History of Europe* was published. But experts in the field know that this perspective is misleading. The publication of huge numbers of inscriptions, papyri, coins, and mute archaeological data has transformed scholarship in the last two generations, and Greco-Roman economic historians are now asking new questions and using new methods to answer them. But their advances are as yet barely known outside the specialist community. We hope that this *Cambridge Economic History of the Greco-Roman World* will simultaneously help students of classical culture understand the material forces that made the Greeks' and Romans' cultural achievements possible and allow economic historians of other times and places to fit the Greco-Roman experience into the broader sweep of world economic history.

Douglass North, a Nobel laureate in economics, began his influential book *Structure and Change in Economic History* by explaining that

> I take it as the task of economic history to explain the structure and performance of economies through time. By "performance" I have in mind the typical concerns of economists – for example, how much is produced, the distribution of costs and benefits, or the stability of production. The primary emphasis in explaining production is on total output, output per capita, and the distribution of income of the society. By "structure" I mean those characteristics of a society which we believe to be the basic determinants of performance. Here I include the political and economic institutions, technology, demography, and ideology of a society.

"Through time" means that economic history should explain temporal changes in structure and performance. Finally, "explanation" means explicit theorizing and the potential of refutability.[1]

Greco-Roman economic historians have not always thought about their field in this way. When serious modern debate began in Germany in the 1890s, it focused almost exclusively on performance. Some scholars (nowadays usually called "primitivists") suggested that closed, self-sufficient households characterized Greece and Rome. This small-scale economy only yielded to larger city-level economies in the Middle Ages, and to national economies and large-scale trade in the sixteenth century. Other historians, the "modernists," insisted to the contrary that ancient economies were like those of early-modern Europe, and performed at a similar level.[2] According to Eduard Meyer, the leading modernist, "in the history of Greece, the seventh and sixth centuries BC correspond to the fourteenth and fifteenth in the modern world, the fifth corresponds to the sixteenth."[3]

While this debate was still raging, Max Weber suggested that locating the Greco-Roman economy's performance along a primitive-to-modern scale mattered less than understanding the economy's structure, above all how ideas about social status determined the production, circulation, and consumption of goods.[4] But few professional ancient historians paid attention to Weber's sociological observations, and by the First World War classicists had formed a rough consensus in favor of modernism. The best work, like Mikhail Rostovtzeff's magisterial surveys of Hellenistic and Roman history, combined a broad emphasis on how markets made possible a sophisticated urban civilization with awareness of the discontinuities of those same markets and the extreme poverty of the mass of peasants.[5]

Between the 1950s and the 1970s, the limitations of this focus on performance became increasingly clear, particularly to a group of ancient historians at Cambridge University, where A. H. M. Jones and Moses Finley successively held the chair of ancient history. Finley had taken part in Karl Polanyi's famous seminar on economic institutions in New York, where Polanyi developed his substantivist economics.[6] Polanyi argued that there were three mechanisms through which goods could circulate: reciprocity, redistribution, and markets. Only in market economies, Polanyi suggested, did individuals interact as disembedded social actors interested only in gain. In systems of reciprocity and redistribution, economics was always embedded in other social institutions. Polanyi believed that in the 330s BC Athens had been on the verge of becoming a market economy, but that the first true market economy only developed in England

[1] North 1981: 3. [2] Finley 1979a collects the major texts.
[3] Cited from Austin and Vidal-Naquet 1977: 5. [4] Particularly Weber 1891; 1909.
[5] Rostovtzeff 1941; 1953; with Saller 2002: 251–7. [6] Polanyi et al. 1957.

around AD 1800. Finley disagreed with many of Polanyi's interpretations,[7] but substantivism deeply influenced his approach to Greco-Roman economics.

Dismissing the mid-twentieth-century modernist consensus as "a schoolboy version of Adam Smith,"[8] Finley relentlessly emphasized structure over performance. In *The Ancient Economy* he argued that in Greece and Rome between 1000 BC and AD 500, concern for citizen status determined the forms of economic activity: "the citizen-élite were not prepared, *in sufficient numbers*, to carry on those branches of the economy without which neither they nor their communities could live at the level to which they were accustomed . . . They lacked the will; that is to say, they were inhibited, as a group (whatever the responses of a minority), by over-riding values." To Finley, making sense of the ancient economy meant understanding its value system, and consequently "The economic language and concepts we are all familiar with, even the laymen among us, the 'principles', whether they are Alfred Marshall's or Paul Samuelson's, the models we employ, tend to draw us into a false account."[9]

As Finley saw it, concern for citizen status acted as a brake on the development of markets in land, labor, and capital, and therefore on technology and trade. This severely limited the ability of the rich to buy the labor of their poorer fellow citizens, forcing them to alienate exploitation outside the citizen community, above all onto chattel slaves. The bonds of egalitarian male citizenship made even profitable practices like lending, trade, and financial services seem morally dubious. According to the literary texts they wrote, classical Athenian citizens relegated these activities to the margins of legitimate society, where foreigners, women, freedmen, and slaves dominated them, and in Republican Rome senators generally left them to equestrians. Living off rents was idealized as morally superior to market activity: Greek and Roman cities were consumer cities, exploiting the countryside through tax, tribute, and rent rather than by selling urban goods to rural consumers. War and imperialism rather than trade policies dominated states' pursuit of revenues.

Finley transformed our understanding of ancient economic structures. In the 1980s and 1990s many historians followed his lead, debating whether the consumer-city model best described ancient urbanism, whether Roman farmers were economically rational, whether Aristotle understood how markets worked, etc. Finley focused attention on economic sociology, locating production, distribution, and consumption within larger networks of power. He never specified what such a degree of economic embeddedness meant for performance, which was not prominent in his accounts; but

[7] E.g., Finley 1970. [8] Finley 1965a: 12.
[9] Finley 1973a: 60, 23, with further discussion in Morris 1999.

a decade after *The Ancient Economy* came out, Keith Hopkins – Finley's successor as Professor of Ancient History at Cambridge – suggested that

> The new orthodoxy [of Jones and Finley] stresses the cellular self-sufficiency of the ancient economy; each farm, each district, each region grew and made nearly all that it needed. The main basis of wealth was agriculture. The vast majority of the population in most areas of the ancient world was primarily occupied with growing food. To be sure, there were exceptions (such as classical Athens and the city of Rome), but they were exceptions and should be treated as such. Most small towns were the residence of local large-landowners, centres of government and of religious cult; they also provided market-places for the exchange of local produce and a convenient location for local craftsmen making goods predominantly for local consumption. The scale of inter-regional trade was very small. Overland transport was too expensive, except for the cartage of luxury goods. And even by sea, trade constituted only a very small proportion of gross product. That was partly because each region of the Mediterranean basin had a roughly similar climate and so grew similar crops. The low level of long-distance trade was also due to the fact that neither economies of scale nor investment in productive techniques ever reduced unit production costs sufficiently to compensate for high transport costs. Therefore no region or town could specialize in the manufacture of cheaper goods; it could export only prestige goods, even overseas. And finally, the market for such prestige goods was necessarily limited by the poverty of most city-dwellers and peasants.[10]

In the 1970s this was, Hopkins concluded, "by far the best model available. It provide[d] a matrix of coherent proposals about the structure, character and operation of the ancient economy." But Hopkins also noted that "The price we must pay for having a single model cover [the Greco-Roman world from 1000 BC through AD 500] is that it may appear too uniform, almost static in composition." Hopkins proposed "an elaboration of the Finley model," which would "accommodate modest economic growth and subsequent decline." In Hopkins' view, "the size of the surplus produced in the Mediterranean basin during the last millennium BC and the first two centuries AD gradually increased . . . The growth in the surplus produced and extracted was largely the result of two factors, political change and the spread of technical and social innovations."[11] He broke this proposition down into seven clauses:

> First, total agricultural production rose during classical antiquity, as more land in the Graeco-Roman world as a whole was brought under arable cultivation . . . Secondly, the population of the Roman world in the first and second centuries AD was greater than the population of the same area (a) 1,000 years earlier and (b) 500 years later. Thirdly, the proportion of the total population engaged in non-agricultural production and services increased . . . Fourth, because of the increased division

[10] Hopkins 1983b: xi–xii. [11] Hopkins 1983b: xiv.

of labour, total non-agricultural product rose . . . Fifth, average productivity per capita, the average amount produced by each person engaged in agriculture and in non-agricultural production, rose . . . sixth . . . (a) the total amount and (b) the proportion of total production extracted from primary producers in taxes and rent increased . . . Finally, the seventh clause. In the first and second centuries AD the Roman state exacted a large amount of taxes in money and then spent them, predominantly along the frontiers where the armies were stationed and in the city of Rome where the emperor normally kept Court. The expenditure of taxes (and similarly of money rents paid to absentee landlords) at some distance from where they were raised stimulated a large volume of long-distance trade, as tax-payers secured money with which to pay taxes in successive years by the sale of produce.[12]

Developing Hopkins' arguments, Richard Saller has suggested that per capita economic growth averaged around 0.1 percent per annum in the western Roman empire between 200 BC and AD 100, raising per capita consumption 25 percent or more higher than it had been before 200 BC – trivial by modern standards, which anticipate economic growth two orders of magnitude higher; but surely a tremendous boon for people who experienced it.[13]

Since the 1980s Roman historians have put economic performance back at center stage, although Hellenists still focus more on structure.[14] It might be naïve to assume that this intellectual history has been driven solely by internal forces, with better theories driving out worse ones as evidence improved and scholars engaged in searching mutual critiques. After all, the ancient economy first emerged as an academic issue, focusing on performance, at the height of the so-called "first globalization" in the generation before World War I. International trade and industrial output were booming, and (though we are not aware of any statements to this effect by the participants in the primitivist-modernist controversy) this historical context may well have made economic performance an obvious and important issue for classical scholars to address. The shift toward structure and what Hopkins called the "cellular self-sufficiency" model took place against the background of mid-twentieth-century barriers to international movements of capital, goods, and people, growing statism, and increasing concern over market failures and redistributive welfare economies; and the swing of interest back toward performance and markets coincides with the "second globalization" since the 1980s.[15]

Each generation gets the ancient history it deserves. But it would also be naïve to reduce the 115 years of debates to mere reflections of underlying socioeconomic forces. The changing world we live in surely makes certain questions about the past seem more interesting than others, and may direct

[12] Hopkins 1983b: xv–xx, and more fully in Hopkins 1980.
[13] Saller 2002: 257–67.
[14] See discussion in Morris 1994b.
[15] Cf. Morris 2003.

our attention to bodies of evidence that previous generations of scholars have overlooked; but it does not shape the data themselves, or the logic of our methods. If contemporary developments got some Roman historians interested in economic growth in the late 1970s, their questions won support because they drew attention to the fact that Rome's emergence as a supercity in the last centuries BC must have transformed the Mediterranean into a network to feed it. No plausible margin of error in estimates of Rome's population could get around this. The static cellular model had diverted attention away from the transformation, but when Romanists faced the numbers, they had to conclude that the economy expanded. Subsequent research produced evidence for the processes involved.[16] Greek history had no single motor like Rome's size to compel scholars to focus on growth, which may explain why performance remained a minority interest through the 1990s.[17] But the example of the Romanists' work fueled the search for evidence, and it now seems that first-millennium BC Greece also experienced sustained increases in per capita consumption, averaging perhaps 0.05–0.1 percent per annum between 800 and 300 BC.[18] The accumulating evidence for changing performance has also required new theories linking Greco-Roman demography, urbanization, and real wages in a single pattern.[19]

The new focus on performance necessarily raises new questions. The ancient economy did not just support a small elite in luxury; it raised living standards well above subsistence level for tens of millions of peasants and city-dwellers. People lived longer, ate better, occupied more comfortable homes, and enjoyed more numerous, more varied, and higher quality goods than their prehistoric forebears or early mediaeval successors. Yet they never came close to the post-mediaeval breakthrough to capitalism, industrialization, and world domination. Why?

Since the 1980s modern economic historians have moved toward increasingly complex models of the industrial revolution, recognizing that even before they unleashed the power of fossil fuels, early modern "advanced organic economies" (E. A. Wrigley's term) made major gains in performance.[20] Other scholars have identified a series of premodern economic efflorescences in Eurasia, in which both aggregate and per capita consumption rose slowly for centuries, only eventually to stagnate and decline.[21] These efflorescences may hold the key to explaining northwest Europe's economic takeoff in the eighteenth and nineteenth centuries, by allowing historians to identify which variables were present in early modern England but absent in Song China, Athens, or Rome. However, there is as

[16] See Hitchner 2005, with references.
[17] Important exceptions include Cohen 1992 and Bresson 2000.
[18] Morris 2004; 2005. [19] Scheidel 2004b, and Chapter 3 below.
[20] See particularly Wrigley 1988; 2000; de Vries and van der Woude 1997.
[21] See Jones 2000; Goldstone 2000; 2002.

yet no agreement on what these variables were. Some historians see long-term demographic differences between northwest Europe and Asia going back to the Middle Ages, giving western Europe a decisive edge;[22] others argue that European institutions and political fragmentation, again going back to the Middle Ages, made the difference;[23] while others still suggest that northwest Europe in most respects lagged behind other advanced organic economies – particularly China – until exploitation of the New World transformed the scale of the system.[24]

The cultural achievements of classical Mediterranean civilization rested on a remarkable economic efflorescence. We see the main challenges facing Greco-Roman economic historians in the early twenty-first century as being (i) to find ways to document performance more accurately; (ii) to build on twentieth-century advances in understanding institutions and ideology by clarifying the relationships between structures and performance; and (iii) to pursue comparative analyses of why the Greco-Roman economy broke down. The first challenge calls for more systematic analysis, particularly of archaeological evidence. It will never be easy to use coarse-grained archaeological data to chart slow average growth rates (perhaps just .05–.1 percent per annum) that probably involved large fluctuations, and the results will probably be controversial; but a long-term approach, allowing time for tiny increments to compound into measurable change, may provide a way forward. The second challenge, we suggest, requires ancient historians to continue Finley's and Hopkins' engagements with the social sciences. Finley changed the field's direction by developing Weberian concepts, and Hopkins built a broadly Keynesian macroeconomic general equilibrium model of the Roman Empire. Social-scientific thought of the past thirty years – particularly in development economics,[25] institutional economics,[26] human capital,[27] and economic sociology[28] – may help ancient historians develop more robust theories and methods. The third challenge may be the toughest of all, but recent work on demography, ecology, and the disease pool suggests promising avenues.[29] One of the editors' major hopes is that the *Cambridge Economic History of the Greco-Roman World* will provide a solid base for thinking about these challenges.

We define our subject matter as the regions occupied by peoples identifying themselves as Greek and Roman, or ruled by these people, in the first millennium BC and the first three centuries AD. This area expanded from nuclei around the Aegean Sea and Tiber valley to encompass the entire

[22] Hajnal 1982; most recently, Hartman 2004. [23] E.g., Wallerstein 1974–89; Braudel 1981–4.
[24] E.g., Frank 1998; Wong 1998; Pomeranz 2000.
[25] Ray 1998 and Hayami 2001 provide good introductions.
[26] See North 1990; Furubotn and Richter 1998.
[27] Becker 1993. [28] Smelser and Swedberg 2005.
[29] Scheidel 2001a; 2001c; 2002; Sallares 2002; Greenberg 2003; and Chapters 2–3 below.

Mediterranean basin, much of northwest Europe, and parts of the Middle East. This definition is conventional, but not without its problems.

Since the eighteenth century, scholars in Europe and Europe's settler colonies have tended to identify two sources of European identity: the Greco-Roman world, studied by classicists, and the Biblical world, studied by orientalists. Most scholars have seen the classical Mediterranean and Near East as having very different economic systems. Finley summed up the prevailing view in the 1970s by saying that "the Graeco-Roman world was essentially and precisely one of private ownership, whether of a few acres or of the enormous domains of Roman senators and emperors, a world of private trade, private manufacture." By contrast, "The Near Eastern economies were dominated by large palace- or temple-complexes, who owned the greater part of the arable, virtually monopolized anything that can be called 'industrial production' as well as foreign trade (which includes inter-city trade, not merely trade with foreign parts), and organized the economic, military, political and religious life of the society through a single complicated, bureaucratic, record-keeping operation for which the word 'rationing', taken very broadly, is as good a one-word description as I can think of." In consequence, "were I to define 'ancient' to embrace both worlds, there is not a single topic I could discuss without resorting to disconnected sections, employing different concepts and models."[30]

Beginning in the late 1980s, this bifurcated Mediterranean model came under sharp attack. For example, historians showed that Near Eastern and Greek citizenship had more in common than classicists and orientalists commonly assumed; that Hellenistic Egypt owed much to Saite and Persian institutions; and that the sheer variety of west Asian economic institutions defies sweeping generalizations like Finley's.[31] The stark east/west division accepted through most of the twentieth century seems overstated. But that said, there were very real differences between most of the economic systems of Egypt and the Near East, in which temples, palaces, and redistributive bureaucracies performed crucial functions,[32] and those of Greek and Roman societies, where they generally did not. It seems to us that the Greco-Roman world remains a useful analytical category,[33] and we hope that the detailed presentation of Greco-Roman economic history in this volume will facilitate more systematic comparisons with similar reviews of Egypt and the Near East.

Our definition of the Greco-Roman world is nonetheless broader than many twentieth-century versions. Chapters on the Aegean Bronze and Early Iron Ages, Persian west Asia, and the pre-Roman west Mediterranean frame

[30] Finley 1973a: 28–9. [31] Bedford 2005; Manning 2005.
[32] See general surveys in Kuhrt 1995a, Joannès 2004, and van de Mieroop 2004.
[33] See Morris and Manning 2005 for a fuller account.

the thousand years of archaic, classical, and Hellenistic Greece and Rome in the Republic and early empire. Even so, we are acutely aware of the topics this book does not cover. Staying within the confines of a single volume prevented us from including separate chapters on money, or cities, or the Phoenicians, despite their obvious importance. But we hope that the volume's positive contributions outweigh its omissions.

Part I of the book has five chapters on core analytical categories that are relevant to every chapter in the book: ecology, demography, the household, institutions, and technology. Parts II–IV describes Greek societies; parts V–VIII, Roman. We begin part II with four chapters on the background to archaic-Hellenistic Greek economic history. The first pair of chapters establishes the historical context, reviewing conditions in the Aegean in the Late Bronze (c. 1600–1200 BC) and Early Iron (c. 1200–700 BC) Ages, while the second pair provides geographical context, looking at the west Mediterranean and the western Persian empire. We devote one chapter to archaic Greece (c. 700–480 BC), and three chapters each to the fuller evidence from the classical (480–323 BC) and Hellenistic (323–30 BC) Greek worlds. The classical chapters examine production, distribution, and consumption, while each Hellenistic chapter focuses on a region in the vastly expanded Greek world (Egypt, western Asia, and the Aegean). Parts V–VII opens with two chapters on economic developments during Rome's early-middle (509–133 BC) and late (133–31 BC) Republican periods, but focuses on the early Roman empire (31 BC–AD 284). Paralleling the structure of parts III–IV, we devote one chapter each to production, distribution, and consumption, and four chapters to regional reviews of the western provinces, the eastern Mediterranean, Egypt and the frontier zones, along with one chapter on the economic role of the state. The volume closes where the original *Cambridge Economic History of Europe* opened, with a chapter looking ahead to the transformations of late antiquity.

We asked the authors of each chronological/regional chapter to address both economic performance and structure, and issues of interest to all economic historians: demography (including its bases in ecology and disease and its consequences, such as urbanization), institutions (including the structure of property rights, the nature of transaction costs, and the role of the state), and the stock of knowledge (including technology and communication and transport costs). The twenty-eight contributors bring varied perspectives to bear, reflecting differences in the evidence available for each subject as well as their wide-ranging disciplinary backgrounds. But a general picture is emerging.

The economy grew. Population is the most obvious measure. Around 800 BC, perhaps twenty million people lived around the shores of the Mediterranean. A thousand years later, there were probably forty million. Some regions – notably the Aegean and Italy – saw much more rapid

growth, and the size of the largest cities increased still more sharply. Athens probably had 40,000 residents in the 430s BC, and Syracuse perhaps twice that number in the fourth century.[34] Alexandria grew rapidly to perhaps 300,000 people in the third century BC;[35] and two hundred years later, Rome most likely had a million residents.

Changes in climate and a benign disease pool played a part in this expansion,[36] and there were improvements in agriculture (particularly the spread of increasingly intensive dry-grain farming and animal husbandry). But the main way Greeks, Romans, and other Mediterranean peoples held off positive Malthusian checks of declining living standards and starvation was through institutional change.[37] Since prehistory, interannual variability in rainfall had required communities to develop risk-buffering strategies such as fragmenting landholdings, diversifying crops, and trading surpluses. As population grew, the peoples of the ancient Mediterranean elaborated these techniques.[38]

Falling transport and communication costs allowed seaborne trade of staples (food, metals, stone) in unprecedented quantities. The rising volume of trade allowed some exploitation of comparative economic advantages around the Mediterranean, accomplished largely through private enterprise and markets. As always, we should keep this in perspective: states remained major economic actors; markets were fragmented and shallow, with high transaction costs; investment opportunities were limited; money and markets generated intense ideological conflicts; and the economy remained minuscule by modern standards – the budget of a major American private university (converted to wheat equivalent) is several times larger than that of the Roman emperors' in the first century. But despite all these caveats, in the thousand years this volume covers, goods moved around the Mediterranean more efficiently than ever before, and more efficiently than they would do again for several centuries to come. Anthropologists speak of Stone Age economics, characterized by a domestic mode of production, and Bronze Age economics, in which chiefs and kings created a political economy to finance institutions of rule.[39] The Greco-Roman world generated a distinct Iron Age economics, involving much larger movements of staples through markets, concentrations of people in cities, extensive monetization, and investment in the stock of knowledge. Puny as these developments were compared with what has happened since the eighteenth century, they were unprecedented.

Eric Jones suggests that "growth can occur only within an 'optimality band' where factor and commodity markets are freed and the government

[34] Morris 2006. [35] Scheidel 2004a. [36] Chapter 2 below.
[37] See Scheidel 2004b, and the broad theoretical framework in Wood 1998.
[38] Garnsey 1988 remains the classic study. [39] E.g., Sahlins 1972; Earle 2002.

is neither too grasping nor too weak."[40] Greek and Roman states on the whole stayed within a Jonesian optimality band, strong enough to protect property rights, but too weak to predate on their subjects so viciously that they smothered economic activity. As Weber and Finley insisted, the structures of citizenship were critically important, albeit in complicated ways. On the one hand, free male citizens controlled their own fates to a degree that few ancient societies matched. In classical Greece, the male citizens often ran their states as democracies; and even in the Roman empire, free citizens maintained strong rights against arbitrary behavior by the state or the rich. On the other hand, the ideology of egalitarian male citizenship drove many forms of economic activity to the margins of respectable society, sometimes creating a demi-monde dominated by aliens, women, and slaves; the high cost of citizen labor created strong demand for chattel slaves in some periods and places;[41] and powerful notions about gender functioned as a brake on women's ability to act outside the household (a major factor in underdevelopment in modern economies).[42]

The freedom of male citizen society also contributed to the Greeks' and Romans' extraordinary intellectual and scientific achievements, and archaeologists have recently suggested that the scale of technological innovation was higher than has been supposed.[43] Their evidence comes largely from the Roman empire, and there is no sign of the kind of social networks that forged "useful knowledge" in eighteenth-century England,[44] but again by comparison with most ancient societies, the Greco-Roman achievement was remarkable.

Most impressive of all, for a millennium the Greco-Roman world did not just hold positive Malthusian checks to population growth at bay: it actually experienced rising per capita consumption between 800 BC and AD 200. Slow as the improvements were, they lifted the standards of living of ordinary people all around the Mediterranean basin and in northwest Europe. If the typical peasant's consumption level was close to the minimum necessary for subsistence around 800 BC, by AD 200 it had risen by at least 25 percent, and probably more like 50 percent. To be sure, the gains were unevenly distributed, and the inequality of property and income distribution probably increased steadily across the period; but within every part of the Greco-Roman world, most social groups benefited to some degree.

This emerging account of the Greco-Roman economy, we believe, is an advance over twentieth-century interpretations. It improves on substantivist approaches by providing crude statistics on economic performance,

[40] Jones 2000: 187. [41] Scheidel 2005b; forthcoming, a.
[42] England and Folbre 2005; below, Chapter 4.
[43] E.g., Greene 2000; Wilson 2002. [44] Cf. Mokyr 2002.

but it also goes beyond both sides in the old primitivist-modernist debate by developing general theoretical models of ancient economic behavior and putting them in a global, comparative context. It recognizes that classical antiquity saw one of the strongest economic efflorescences in premodern history, but keeps this in perspective, refusing to confuse the ancient economy with the modern. In short, it takes seriously Douglass North's injunction to explain the structure and performance of economies through time.

PART I

DETERMINANTS OF ECONOMIC PERFORMANCE

CHAPTER 2

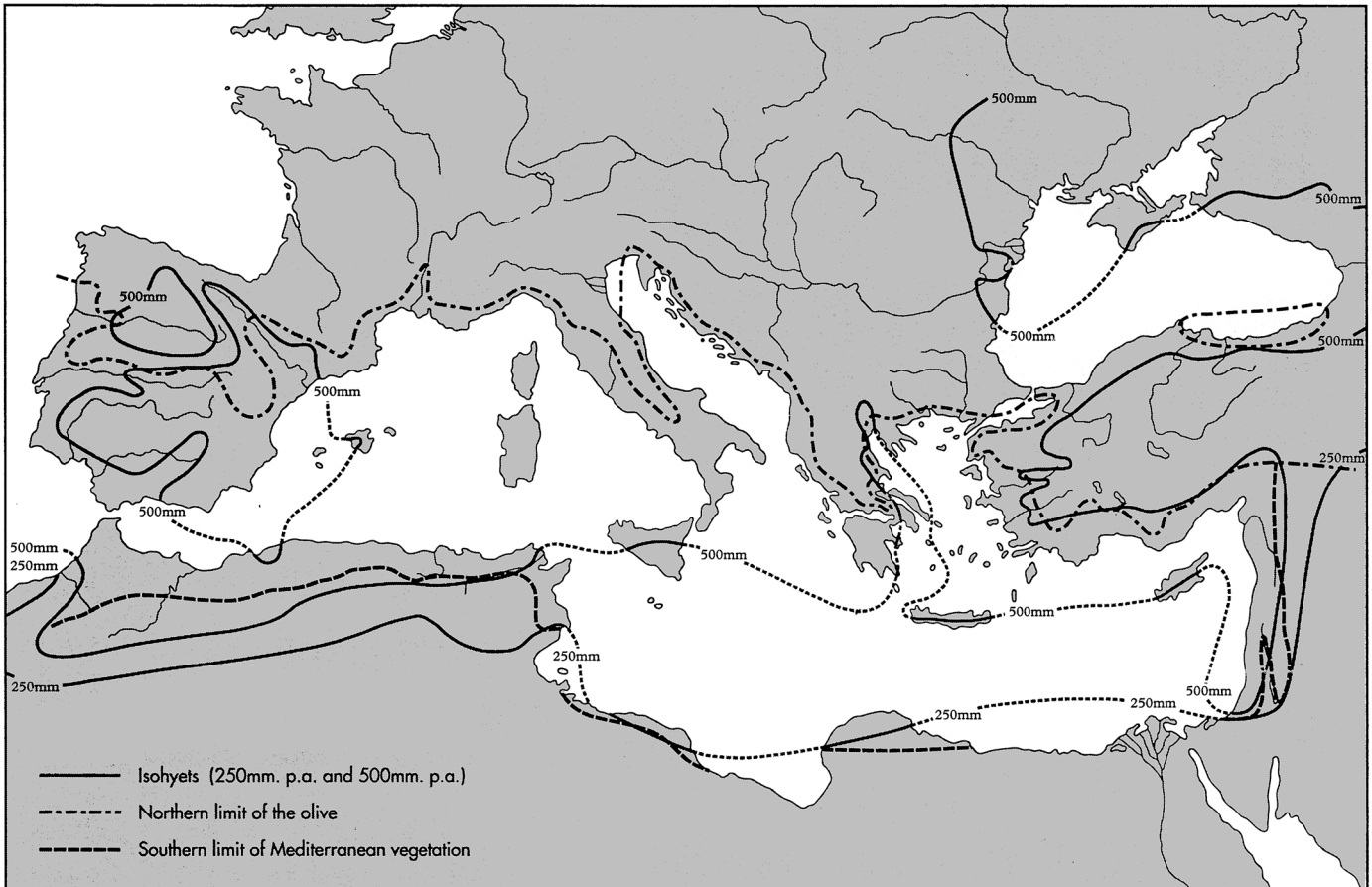
ECOLOGY

ROBERT SALLARES

I PHYSICAL GEOGRAPHY

The focus of the region of interest is the Mediterranean Sea, the world's largest inland sea, about 3800 kilometers long. The Mediterranean Sea requires a constant influx of water from the Atlantic Ocean to maintain its level, since evaporation is much greater than the inflow from rivers. It has a low productivity and most parts of the Mediterranean coast have a very narrow continental shelf. These factors reduce the size of offshore fishing grounds and lead to small fish populations. The Mediterranean is relatively poor in fish. However the sea has always been extremely important for interregional contact because of the proximity of mountain ranges to a large part of the Mediterranean coastline, and also for access to the numerous islands in the sea.

The lands surrounding the Mediterranean Sea are more often than not hilly or mountainous. This is the result of intense tectonic activity and uplift caused principally by the interaction of the Eurasian and African plates, which are moving towards each other at the rate of about two centimeters per year. Mediterranean geology is largely based on limestone, which is easily eroded by the catastrophic floods and rainstorms that are characteristic of the Mediterranean climate, creating extremely uneven topographies. Large flat plains are rare in Mediterranean countries. A large number of rivers and streams descend from the uplands to the sea; the Nile is the only major river whose water supply originates almost entirely outside the vicinity of the Mediterranean basin. The water courses are fed by winter rainfall. Many of them gradually dry up during the summer, as do many of the wetlands in coastal regions. The countries surrounding the Mediterranean are lands of great contrasts, frequently over very short distances. The degree of local ecological variation is so large that it is quite possible to have subtropical vegetation on the south side and temperate vegetation on the north side of the same mountain, with different processes at work (e.g. Monte Circeo south of Rome, cf. Monte Argentario north of Rome). However one generalization that is valid is that the lands around the Mediterranean are rich



Map 2.1 Physical definitions of the Mediterranean region
Reproduced with permission from Horden and Purcell 2000: 14

in biodiversity of flora and fauna, although population sizes of plant and animal species are frequently very small, a consequence of poor habitats.[1]

II THE MEDITERRANEAN CLIMATE

The character of the Mediterranean environment is largely determined by its weather, the well-known seasonal pattern of hot, dry summers and mild, wet winters. (In some areas there are two rainfall peaks in autumn and spring; spring rainfall is important, where it occurs, for cereal cultivation, as Theophrastus noted for Sicily.[2]) The summer drought favors annual at the expense of perennial vegetation and also results in fire (both natural and man-made) being an important agent of natural selection on both individual plant species and vegetation communities. Bioclimatic indicators such as the distribution of the olive or holm-oak trees are sometimes used to provide alternative definitions of Mediterranean-climate regions.[3] The distribution of the olive tree, which is killed by severe frost but requires temperatures to drop to a certain level to initiate flowering the following year, actually defines the Mediterranean winter rather than the Mediterranean summer. The total volume of predominantly winter rainfall in areas with a true Mediterranean climate is high enough to support evergreen sclerophyllous trees, but too low for deciduous trees.

Dendrochronological evidence from the Parthenon in Athens provides evidence for a pattern of climatic variability in the fifth century BC which resembles the modern pattern. The fragments of information available in ancient literary sources confirm that the climate of Greece was basically the same in the fifth and fourth centuries BC as it is today. The statement of Theophrastus, the founder of plant biogeography, that date palm trees could grow in Greece, if planted, but could not set fruit there, matches the situation today.[4] It indicates that mean temperatures in the summer months in the southern Aegean c. 300 BC were within a degree of the modern values. Precipitation also exhibits extreme interannual as well as seasonal variability, which often created shortfalls in agricultural production in the past. Runs of several successive good or bad years were not uncommon. Thus in Greece in the fourth century BC there were periods of food shortages probably caused by drought c. 360 and c. 330 BC, but Theophrastus recorded heavy rainfall in between which raised Lake Copais in Boeotia to an unusually high level

[1] Braudel 1966 created the concept of Mediterranean history, with reference to the sixteenth century AD. However it is only recently, despite isolated earlier efforts (Huntington 1917; Semple 1932; Cary 1949), that environmental history has begun to be fully incorporated into the mainstream of ancient history. The most important recent general works are Sallares 1991; Blondel and Aronson 1999; Horden and Purcell 2000; Grove and Rackham 2001; note also Fedeli 1990; Traina 1990; and Hughes 1994.

[2] Theophr. *Hist. pl.* 8.6.6. [3] Blondel and Aronson 1999: 13–18.

[4] Eginitis 1908 on Theophr. *Hist. pl.* 3.3.5.

in the years preceding the Battle of Chaeronea in 338 BC.[5] In Italy in the late third century BC tree rings indicate a period of mild conditions at the time when Hannibal led his elephants across the Alps.[6] However, no detailed quantitative records of regular meteorological observations covering a long period of time were ever made in antiquity, yet another manifestation of the lack of interest in statistics in antiquity of which modern historians are painfully aware, and which is also a major problem for the economic history of the ancient world. Consequently, documentary sources do not provide us with the statistical data required to investigate possible long-term climatic trends.

Although the classical Greeks and Romans never experienced anything else, the pattern of hot dry summers and cool wet winters has only existed during the post-glacial period since about 3000 BC, although there were parallel changes in earlier interglacial periods. Palaeoanthracological and palynological evidence shows that Mediterranean rainfall was higher and more evenly distributed during the year in the Neolithic period, permitting deciduous oak and lime trees to flourish in areas which are dominated by drought-resistant evergreen vegetation today.[7] Consequently many important Mediterranean plants (e.g., the vine) have not had time to evolve adaptations to the Mediterranean climate; they grow in the hot, dry summer and are dormant in winter when it would be better to grow in winter, when more water is available, and be dormant in summer instead (like acacias in other parts of the world). As a result intensive irrigation is very important for agriculture in many parts of the Mediterranean today to overcome natural rainfall variability and increase yields. The degree to which controlled artificial irrigation was practiced in antiquity is an important question for economic history, e.g., was irrigation already being practiced in the *huertas* around Valencia in Spain during the Roman empire, or was this practice only introduced by the Arabs in the early mediaeval period? (Compare the dependence of ancient Egyptian agriculture on flood-basin agriculture watered by the highly variable natural ebb and flow of the Nile, or runoff farming in the wadis of North Africa.) It is significant that the Roman agronomists concentrated on wheat and barley cultivation as far as cereals are concerned and wrote virtually nothing about the cultivation of rice, a vastly more productive way of exploiting coastal Mediterranean plains.[8] Even the olive tree benefits from irrigation, yielding a substantial harvest every year instead of the biennial harvests characteristic of dry-farming conditions.

Superimposed on the normal alternation of wet winters and dry summers and the runs of good or bad years were periodic cycles lasting for centuries

[5] Sallares 1991: 390–5. [6] Neumann 1992.
[7] Vernet 1997 on southern France and Spain. [8] Sallares 1991: 22–4.

or longer, caused by variations in annual-mean radiation from the sun. It has been suggested that in the Levant, for example, warm and dry periods alternated with cold and humid periods. The Iron Age was cold and humid, the Assyrian and Persian periods were dry, the Hellenistic period was cold and humid, the Roman period was warm, while the Byzantine period was yet again cold and humid.[9] In semi-arid Mediterranean regions cold and humid conditions signified more rainfall. This is likely to have benefited cereal production and favoured population growth. Consequently a decline in solar activity leading to colder and more humid conditions c. 850 BC may well have been the critical factor underlying the simultaneous development of Iron Age cultures around the Mediterranean, which is otherwise difficult to explain.[10] It is important to note that global or hemispheric climate changes can produce different effects in different regions. The cold periods in Europe coincided with a weakening of the southwest Asian monsoon.[11]

Research on the periodic advances and retreats of the glaciers in the Alps, which have occurred throughout the Holocene, indicates that the bulk of the period of the Roman empire (c. AD 100–400) was warm, relative to the periods immediately before and afterwards.[12] Other types of evidence yield similar conclusions. For example the analysis of sediment grain-size data from the Iceland basin in the North Atlantic to reconstruct past changes in the speed of deep-water flow (believed by climatologists to be an important factor in the ocean current circulation pattern that determines climate in Europe) shows periodic tendencies that correspond with recent climatic developments such as the "Little Ice Age" of c. AD 1500–1800 and the Mediaeval Warm Period. Going back to antiquity, this record indicates a Roman Warm Period peaking at about AD 150.[13] Analysis of the atmospheric mercury deposition record (a process influenced by temperature) in a peat bog in Galicia in north western Spain also suggests that the Roman Warm Period at its peak might have been about 2 °C warmer than the present, and that the Roman Warm Period was more prolonged than the Mediaeval Warm Period.[14]

These conclusions are probably somewhat exaggerated. Nevertheless the reality of the Roman Warm Period can be corroborated by various types of proxy data, for instance the spread of viticulture into Roman Britain as demonstrated by recent archaeological finds at Wollaston in the Nene Valley in Northamptonshire.[15] In the vicinity of the Roman city of Sagalassos in south western Anatolia not only olive pollen (which can be blown considerable distances by the wind) but also olive presses and olive wood have been found in areas where it is too cold for the olive tree to survive there

[9] Issar 2003. [10] Speranza et al. 2002. [11] Gupta et al. 2003.
[12] Röthlisberger 1986. [13] Bianchi and McCave 1999.
[14] Martínez-Cortizas et al. 1999. [15] Brown et al. 2001.

today. It has been suggested that this indicates that average temperatures were 2–3°C higher than they are today.[16] The economic effects of climatic change were probably complex and varied from region to region and from crop to crop within the agricultural system. The warmer conditions during the period of the Roman empire, besides permitting the geographical extension of olive and vine cultivation, probably favored arable farming in northern Europe, but may have adversely affected it in some semi-arid areas, for example in the Near East.[17] The question of whether climatic changes favored increased agricultural production and so facilitated human population growth in the first two centuries AD, is obviously a very important question for economic history. More generally it is essential to consider the question of whether climatic trends can be correlated with and played a causal role in human population fluctuations.

III THE NATURAL ENVIRONMENT

In addition to being subject to regular climatic cycles, the Mediterranean environment is also a world of sudden, unpredictable catastrophes.[18] There were earthquakes, dust storms, swarms of locusts, devastating floods, and volcanic eruptions.[19] There was active volcanic activity in Latium in the area of the Alban Hills as recently as the Neolithic period. Further south in Campania, Mt. Vesuvius played a prominent role in the Roman period, destroying Pompeii and Herculaneum in AD 79. The eruptions in Sicily of Mt. Etna, an important source of both carbon dioxide and sulphur dioxide, in 44–42 BC probably had a significant short-term impact on the climate. However volcanoes did not have major long-term effects on the climate or the economy in classical antiquity.

Tectonic activity in the Mediterranean gave rise to many earthquakes in antiquity, too numerous to list comprehensively here; only the destructions of Helike on the Corinthian Gulf in 373 BC and Olympia in AD 426 in Greece and the earthquake at Pompeii in AD 62 will be mentioned here. Earthquakes presumably caused significant short-term damage to the local urban economy of affected towns; whether they also made a substantial impact on agriculture in the countryside is unclear. Besides earthquakes and volcanoes, there were numerous other catastrophes in the Mediterranean from time to time. Dust storms sometimes arrived in southern Europe from as far away as the Sahara; they may also have had local origins in soil erosion sometimes, as in the case of the dust storms which buried the Roman city of Stobi in Macedonia in late antiquity. Catastrophes sometimes

[16] Waelkens et al. 1999. [17] Issar 2003.
[18] Olshausen and Sonnabend 1996; Horden and Purcell 2000: 298–341.
[19] Stothers and Rampino 1983.

took a biological rather than a geological form. Swarms of locusts were one type of calamity which undoubtedly hit the countryside harder than the towns (unlike volcanoes and earthquakes). Livy records devastating locust onslaughts on North Africa in 125 BC and in Campania, the Pontine Marshes south of Rome, and Apulia in Italy; the last episode in 173 BC required intervention by the Roman army. Modern accounts of locust swarms in Lazio in the eighteenth century suggest that such events would have had severe short-term effects on the farming economy in antiquity.[20]

Floods were the type of catastrophe which arguably had the most substantial long-term impact by permanently altering the landscape. The river Tiber, for example, experienced a long series of severe floods in the past which frequently deposited sediments in the valleys between the hills of Rome. Strata in the Roman Forum dating to the time of the Roman empire are several meters above archaic levels and six–seven meters below the current ground level. The construction of the *Cloaca Maxima* shows that ancient Rome had drainage problems from the beginning of its history. Tacitus describes a debate in the Roman Senate in AD 15 which demonstrates how helpless the Romans were in the face of severe floods.[21] High rainfall in the mountains which fringe most of the Mediterranean frequently took the form of deluges, causing erosion in the uplands and interior. The eroded sediments were redeposited lower down river valleys, particularly in deltas such as those of the Po and Tiber in Italy, the Ebro in Spain, and the Achelous in Greece. Of course the silt brought down by the Nile is responsible for the fertility of Egypt. In the case of the Tiber the existing delta has only developed since about AD 1500, but in antiquity the large lagoons that existed on either side of the river near Ostia were being filled in.[22] On the one hand, this process created new economic opportunities in the shape of extremely fertile agricultural land. The most fertile land in Italy today is found in such areas, in the Po valley, or the Ombrone delta in Tuscany and the Pontine region south of Rome. However, it also had a negative impact on the human labor force required to exploit the land, since the expansion of easily flooded coastal plains which could readily turn into marshes paved the way for the spread of malaria around the coastal regions of Italy during the Roman period (see section V below).

The question of erosion and its possible causes leads us onto the problem of deforestation, the most controversial issue in Mediterranean environmental history. It is worth discussing here because the timber industry was undoubtedly extremely important in antiquity. Some at least of the hills of Rome were probably well wooded at the time of Rome's foundation c. 750 BC.[23] However by the late Republic the city of Rome had huge

[20] Sallares 2002: 183; Livy e.g., *Per.* 60. [21] Sallares 2002: 109–10; Tac. *Ann.* I. 76, 79.
[22] Bellotti et al. 1995. [23] Quilici 1979.

requirements for building construction work, heating baths and houses, cremations, industrial activities, cooking (an urban population of three quarters of a million people or more would have done a lot of cooking), and many other purposes, which could not be met locally.[24] These requirements were mainly met by floating timber down the rivers of Tuscany and the Tiber to Rome, according to Strabo. Pine, fir, and oak were most widely employed for building. Of course wood was also important for metal smelting, for example for silver ores in Attica and Spain, copper in Cyprus, iron from Elba at Populonia in Tuscany, and for shipbuilding. The Athenians took a strategic interest in the colony of Amphipolis in the northern Aegean during the Peloponnesian War precisely because it was a good source of shipbuilding timber for triremes, as well as silver.[25]

Many historians have believed, taking their lead from Plato's description of Attica, that extensive deforestation occurred in the Mediterranean in antiquity, leaving a denuded landscape. However this "ruined landscape theory" has also been criticized.[26] Looking at this debate as objectively as one can, it is necessary to observe that there is a great diversity of opinion. Even among professional scientists who are specialists in Mediterranean ecology, there are substantial differences of opinion.[27] Similarly among those historians who do believe in large-scale deforestation, there are differences of opinion regarding its chronology. One study concluded that there has been extensive deforestation in five mountain zones of the Mediterranean world (the Taurus in Turkey, the Pindus in Greece, the Lucanian Apennines in Italy, the Sierra Nevada and Alpujarra in Spain, and the Rif in north Africa). However the conclusion was reached that it occurred principally in the early modern period, not in classical antiquity.[28]

The view that little has changed is based on the observation that many regions of Mediterranean countries with low annual rainfall, a limestone-based geology that does not retain water, and a summer drought could never have supported significant forests. It is also argued that descriptions of ancient landscapes by classical authors were relative to the landscapes with which they were familiar. Consequently they included small shrubs and dwarf trees in the category of "forest," since they had never seen the tall trees in the forests of northern Europe. In other words, we should not necessarily assume that a "forest" necessarily included any very tall trees as far as an ancient Greek was concerned. However it is here that information about shipbuilding is very relevant, since trees of a certain size were required for that purpose, as in Theophrastus' description of the forests of Latium and Corsica c. 300 BC, rather than small shrubs.[29] The theory

[24] Meiggs 1982: 218–59; Rausing 1987. [25] Meiggs 1982: 126–30.
[26] Grove and Rackham 2001 *contra* Hughes 1994; Plato's *Critias* 111c.
[27] Grove and Rackham 2001 *contra* Blondel and Aronson 1999: 201–6.
[28] McNeill 1992. [29] Theophr. *Hist. pl.* 5.8.2–3.

of no change maintains that savannah-style vegetation, with scattered trees in open country but no closed forest canopy (like the Spanish *dehesas*), is characteristic of many Mediterranean areas both now and in the past, and that little or nothing has changed over the last three thousand years; little deforestation has occurred and it is not responsible for soil erosion. Erosion is interpreted as predominantly gully erosion of underlying rock in badlands caused mainly by deluges, for example in Basilicata in southern Italy producing the alluvial deposits of Metapontum on the coast. Where soil erosion from cultivated land has occurred it is attributed principally to ploughing, not to deforestation.

The history of erosion is tied to the problem of the Older and Younger Fills.[30] The Older Fill does not concern our period. The Younger Fill now seems to be a heterogeneous mix of depositional episodes that occurred at different times in different areas; some are definitely classical in date, for example at Metapontum in southern Italy or on the coasts of western Anatolia; others date to late antiquity or the early mediaeval period (e.g., the burial of Olympia in Greece), while yet others occurred as recently as the time of the Little Ice Age.[31] Some of these episodes can be associated with human activity, while for others cyclical changes in the climate offer a more convincing explanation.

The most important point to emerge from the whole debate is that it is impossible to generalize about the Mediterranean as a whole. The human impact varied from locality to locality. Consequently the Mediterranean countries *as a whole* cannot be described either as a ruined or as an unchanged landscape. The theory that little has changed in the last few thousand years is reasonably convincing for some of the most arid parts of the Mediterranean, such as the Alpujarra in south eastern Spain, or south eastern Greece. However even in southern Attica there is archaeological evidence for farming in the fourth century BC on limestone ground which has virtually no soil cover today.[32] This shows that the question of environmental degradation cannot be considered independently of the question of human population pressure on the landscape. Some of the details of the theory of no change seem to be self-defeating. For example, the importance of anthropogenic erosion is minimized, but it is then acknowledged that soil erosion can be caused by ploughing arable land to grow rain-fed autumn-sown cereals, leading to criticism of the cultivation in southern Italy of durum wheat, the type of wheat best suited to the local environment. What are large human populations supposed to have eaten in the past if they had not been allowed to grow cereals, to avoid soil erosion?[33]

[30] Vita-Finzi 1969.
[31] Abbot and Valastro 1995; Kayan 1999; Huntington 1910; Grove and Rackham 2001: 291–4.
[32] Lohmann 1994. [33] Grove and Rackham 2001: 89, 265 and 270.

One general problem in making the debate relevant to ancient economic history is that the protagonists on both sides of the debate have tended to focus on certain areas, such as the badlands, which are undoubtedly of great interest from the perspective of environmental science, but are not exactly the heartlands of classical civilization. None of the five mountainous regions selected for study by McNeill, for example, ranks among the greatest centers of Greco-Roman civilization. Similarly by focusing on Mediterranean Europe, Grove and Rackham excluded north Africa from their consideration of the problem of "desertification," but it is surely in the vicinity of the Sahara (in an area where megafauna such as elephants and lions existed until Roman times) that this problem was and is most acute. Literary sources suggest that some parts of north Africa had plenty of trees, while others did not.[34] Computer modeling of the climate about two thousand years ago to study the effects of the presence of substantial vegetation in such areas on the climate suggests that there was considerably more rainfall in north Africa and Egypt than there is today, with increased rainfall levels in the Iberian peninsula and Armenia as well.[35] Such conclusions help to make sense of Ptolemy's weather diary, written in Alexandria during the second century AD, which describes a weather pattern with rain in every month except August and thunder throughout the summer (Table 2.1). These ideas help us to understand the agricultural prosperity of north Africa in antiquity, as well as the prosperity of the south of Spain during the Roman period. The rise and fall of the kingdom of the Garamantes in the Fezzan in north Africa has been linked to rainfall fluctuations.

Leaving aside marginal areas such as those bordering deserts, the greatest degree of human impact on the natural environment in antiquity is most likely to have occurred in the immediate vicinity of the largest human population centers, but such areas are actually rarely considered in detail in the debates between ecologists. For example it has been argued that the rate of soil erosion in Latium increased *ten times* in the second century BC.[36] It is hard to resist associating this trend with the increase in settlement numbers in south Etruria revealed by archaeological field surveys, presumably linked to intensive agriculture and market-gardening to feed the population of the city of Rome, which was increasing rapidly at the time.[37] Environmental degradation is then likely to have spread away from large settlements along communication lines such as river valleys and roads. It has been suggested that the major Mediterranean river valleys were once generally forested, since perennial rivers compensated for the shortage of summer rainfall, but are now largely deforested, with only a few exceptions such as the river Strymon in northern Greece.[38]

[34] Contrast Caes. *B Civ.* 2.37 with *B Afr.* 20.
[35] Reale and Dirmeyer 2000; Reale and Shukla 2000.
[36] Judson 1968.
[37] Potter 1979.
[38] Blondel and Aronson 1999: 122.

Table 2.1 *Distribution of rainfall in one year at Alexandria in the second century AD according to Ptolemy (cols. 2–3) and in 1889–1922 (col. 4). Source: Murray 1935, 19–20*

Month	Rainy days	Drizzle	Modern average
January	4	1	11
February	3	–	6
March	–	1	5
April	5	3	1
May	3	4	1
June	1	5	–
July	2	–	–
August	–	–	–
September	3	2	–
October	4	–	1
November	3	2	7
December	2	2	10
Totals	30	20	42

Livy described the Ciminian Forest north of Rome c. 300 BC as if it was the Amazon jungle. His account is sometimes regarded as exaggerated, but in the opinion of Italian specialists in environmental studies little of the ancient beech forest in the area of the Monti Cimini remains today.[39] A series of detailed local studies do support the idea of substantial human impact on the natural environment in many areas in classical antiquity. In the Biferno valley in the Molise region of eastern Italy (part of ancient Samnium) a field survey revealed a massive expansion (unparalleled until the early modern period) of rural settlements and intensification of land use from the fourth century BC to the first century AD accompanying a phase of extensive erosion and sediment deposition.[40] Similarly in the hinterland of Metapontum in southern Italy as much as ten meters of sediment was deposited during the period c. 600–c. 300 BC, when this Greek colony was flourishing. The affected areas quickly became marshy, a development which accelerated the spread of malaria in this region and subsequently led to the decline of the human population.

A balanced interpretation of the problem of environmental degradation in antiquity is that there were different outcomes in different areas; it is difficult to generalize. In many areas the vegetation cover was probably much the same as it is today. For example palynology yields this conclusion in the vicinity of the Lago di Pergusa in central Sicily.[41] In other areas there was a significant degree of deforestation in the past. For instance it has been

[39] Pratesi and Tassi 1977: 49 *contra* Grove and Rackham 2001: 172; Liv. 9.36.1–8.
[40] Barker and Hunt 1995. [41] Sadori and Narcisi 2001.

pointed out that the Roman boundary stones which enclose the famous cedar forest on Mt. Lebanon include considerable areas where there are hardly any trees today.[42] In the lower Rhône valley in France the scarcity of tree pollen and tree-dependent beetles indicates that this area was largely deforested in the classical period.[43] Of course there are still other areas where forests have spread, either naturally or through human planting, since antiquity. An example of a modern plantation is the pine forest on the shore of the Maremma national park in Tuscany in Italy, which was planted in the nineteenth century. The natural spread of a tree is illustrated by the increase, recorded in pollen cores, of Aleppo pine (*Pinus halepensis*), which is now common in Attica in Greece for example. It has increased in frequency since the Bronze Age because it is a good colonizer of cleared terrain, since its seeds germinate readily after forest fires.

The effects of human pressure on the environment in classical antiquity took other forms besides deforestation. It is easy to think of pollution as a modern problem, but it has been demonstrated that there were sharp rises in the concentration of lead and copper in ice strata in the Greenland ice cap, in lake sediments in Sweden, and in peat bogs in Switzerland and Spain from about 600 BC onwards.[44] These metal deposits were undoubtedly by-products of the great increase in the scale of mining and metallurgy in classical antiquity. Modern historians frequently point out that the Laurium silver mines of Attica, which produced large quantities of lead as a by-product, paid for the Athenian navy, constructed by Themistocles, and so for the Athenian empire; they fail to point out that the Laurium mines were also the first major source of anthropogenic pollution in world history, a less savory distinction. Mining for other metals, such as mercury, also made a contribution to atmospheric pollution. Thus cinnabar mining started in the fifth century BC at Almadén in Spain and increased in Roman times; this is evident in the palaeoenvironmental record from a peat bog in Galicia in north western Spain.[45]

The Mediterranean Sea, since it is almost entirely landlocked and surrounded by large and (especially on its southern rim) increasing human populations, is one of the most heavily polluted seas on earth today. However, it would be a mistake to think that such problems are unique to the modern epoch. The pre-industrial environment was not clean either.[46] Seneca clearly described the high level of atmospheric pollution in the city of Rome, which is not surprising in view of the extensive burning of wood for fuel that was mentioned earlier. The Grotta Rossa mummy, the only surviving mummy from ancient Rome, displays severe anthracosis in the

[42] Mikesell 1969. [43] Andrieu-Ponel et al. 2000.
[44] Hong et al. 1994; Renberg et al. 1994; Hong et al. 1996; Shotyk et al. 1998.
[45] Martínez-Cortizas et al. 1999. [46] Nutton 2000.

lungs even though the individual in question died young.[47] This corroborates Seneca's evidence and indicates that the level of atmospheric pollution in the city of Rome was very high. Atmospheric pollution is important not only for environmental history and for human health; it is also a key indicator of the scale of "industrial" activity in antiquity. Although the metal deposition data do not tell us anything about productivity, they do demonstrate that the scale of mining activity in the period c. 500 BC – c. AD 500 was substantially greater than anything seen before, or indeed immediately afterwards (after the disintegration of the Roman empire). This supports the theory that substantial economic growth (at least in terms of total production levels) occurred during the time of the Roman empire.

IV AGRICULTURE

Agriculture was the foundation of the ancient economy. Mediterranean agriculture is a form of polyculture, based on the cultivation (and frequently intercropping) of cereals (principally wheat and barley), olives, and vines, as is well known, with legumes (broad beans, chickpeas, lentils, etc.) also playing a significant role by providing a balanced mix of proteins to the diet. This combination of crops had existed in the Near East since at least c. 3000 BC. However its spread to the western Mediterranean was an innovation of the first millennium BC. Columella and Pliny the Elder, scrutinizing earlier literature, both observed that the geographical range of olive and vine cultivation had expanded enormously by the first century AD. Pliny contrasted Fenestella's view that olive cultivation did not exist in north Africa, Spain or Italy during the reign of Tarquinius Priscus (sixth century BC) with the situation in his own time, when olive cultivation was not only practiced in these regions but had spread far inland in some areas.[48] The disappearance c. 600 BC of the SOS amphoras, which had been used to export olive oil from Attica to Etruria, and the simultaneous appearance of Etruscan ceramics holding locally manufactured perfumes incorporating olive oil, has been interpreted as evidence in support of Fenestella's opinion.[49] Pliny believed that wine production in Italy only became commercially important from the middle of the second century BC onwards.[50] Diodorus Siculus observed that the Greek colony of Acragas in Sicily acquired its wealth in the fifth century BC by exporting olive oil to Carthage, since arboriculture was not yet widespread in north Africa, although there is no doubt that that situation soon changed. Similarly, Justin noted that the Greek colonists at Marseilles introduced olive and vine cultivation to Gaul. One of the works in the Aristotelian corpus states

[47] Capasso 2000; Sen. *Ep.* 104.6. [48] Columella, *Rust.* l.1.4–5; Plin. *HN* 15.l.1.
[49] Gras 1985b: 212–15. [50] Pliny *HN* 14.13–14.87–91; Fregoni 1991.

that the Phoenicians exported olive oil to Tartessus in Spain (today by far the world's largest producer of olive oil) in exchange for silver.[51]

The evidence from literary sources yields a consistent picture of the dissemination of olive and vine cultivation into the western Mediterranean as a result of Greek and Phoenician trade, cultural influence, and colonization from c. 800 BC onwards. Archaeological or palaeobotanical evidence pertaining to this question is often ambiguous. Thus in the case of olive cultivation olive pollen in pollen cores could equally well have originated from wild or domesticated trees; olive wood could come from wild or domesticated trees; since oil from wild olive trees can be and was used for some purposes (e.g., perfume manufacture), evidence for the use of olive oil does not necessarily imply domestication; small-scale production of olive oil is possible without olive presses. Nevertheless it remains true that there is a lack of evidence for olive presses in the western Mediterranean before the commencement of Greek and Phoenician colonization. This lack of evidence for the technology of olive oil manufacture implies that there was at the very least no large-scale olive cultivation before the classical period in the western Mediterranean, and probably none at all.

Moreover it is sometimes difficult to date palaeobotanical evidence. For example the olive peak in pollen cores from the south of France used to be dated to the classical period, but it now appears that olive cultivation in southern France only reached its height in the mediaeval period.[52] Given the inherent ambiguities in the archaeological record, the evidence of the literary sources on this question should be accepted. Polyculture of cereals, olives, and vines was an innovation of the Early Iron Age in the western Mediterranean.[53] Its spread undoubtedly increased overall agricultural production, facilitated human population growth, and increased trade by extending opportunities for the exchange of staple agricultural products between areas of surplus and areas of deficit, given the high degree of interannual rainfall and so harvest variability in Mediterranean-climate regions.[54] Later in antiquity the existence of this market made possible further extensions of specialized olive cultivation in Tripolitania in north Africa and in northern Syria. There was also a considerable expansion of viticulture in Egypt during the Ptolemaic period.

The olive tree only gives a high yield every second year under dry-farming conditions. The labor input required by olive cultivation is very low, except at harvest time. Viticulture requires more labor than olive cultivation. Nevertheless viticulture was potentially more profitable than other types of agriculture, as was already argued by Cato the Elder in the second century BC. One analysis suggests that an average yield of good quality wine

[51] Diod. Sic. 13.81.4–5; Just. *Epit.* 43.4.1–2; (Arist.) *Pr.* 844a17–24.
[52] Leveau 1998. [53] Sallares 1991: 29–34. [54] Garnsey 1988.

on fertile land could give profit margins of about 7–10 percent, at least in central Italy to feed the huge market provided by the city of Rome.[55]

The spread of olive and vine cultivation in antiquity was only a fraction of the total east to west movement of useful plants, particularly fruit trees. No less than 42 percent of all the plants mentioned by Columella have Greek names in his Latin text. Moreover a comparison of Columella with the earlier agronomic treatise of Cato, written in the first half of the second century BC, indicates that the influence of Greek agronomy increased over time. Columella and Pliny both stated that many plants which were not native to Italy had been introduced by the Romans.[56] Pliny regarded the movement of useful plants as one of the benefits of the *Pax Romana*; for example Vitellius is said to have introduced the pistachio, and Lucullus the cherry tree, to Italy. He noted that the Latin names for fruit and nut trees were generally of Greek origin, suggesting that the Romans had obtained them (or at least techniques for their cultivation – see below) from the Greeks.[57] Pliny even says that from the time of Pompey onwards the Romans exhibited exotic trees (such as apricot) plundered from foreign countries in triumphal parades![58] A whole group of useful trees such as apple, sweet cherry, sour cherry, pear, pistachio, and plum all seem to have been domesticated and entered cultivation for the first time in the first millennium BC, even though it is clear from archaeological evidence that the fruits of related wild species had long been gathered by prehistoric peoples.[59]

Many of these trees require the technique of grafting for successful cultivation. The fact that all the trees that require grafting became domesticated at roughly the same time, long after their wild ancestors were well known to farmers, suggests that the technique of grafting only became known in the Mediterranean in the first millennium BC.[60] Grafting may have originated with citrus fruit cultivation in the Far East. The spread of arboriculture using grafting was a very important development in Mediterranean agriculture in the first millennium BC, which increased both agricultural production and productivity and facilitated the development of specific varieties. Grafting is also the most rapid way of propagating the domesticated olive tree, although it can be propagated in many different ways.

Movements of crop plants within the Mediterranean climatic zone were relatively easy and successful. In some cases progress in agriculture north of the limits of the Mediterranean required on the spot improvement of

[55] Duncan-Jones 1982: 33–59. Cf. Carandini 1983a; Tchernia 1986: 209–18.

[56] Columella, *Rust.* 3.8.4–5; Plin. *HN* 27.1.2–3.

[57] Plin. *HN* 12.7.14, e.g., peach – *malum Persicum*; almond – *amygdalis*; chestnut – *castanea*; walnut – *nux iuglans*.

[58] Plin. *HN* 12.54.111. [59] Zohary and Hopf 1988: 128–66.

[60] Zohary and Hopf 1988: 129–30.

local indigenous varieties of plants. For example the author of a speech attributed to Demosthenes suggested to an Athenian jury in the fourth century BC that the idea that wine could be produced in the Black Sea region was preposterous, but palaeobotanical evidence shows that viticulture commenced in the Crimea in the Hellenistic period.[61] In this region outside the Mediterranean its development required the domestication of local vine varieties, although Greek traders and colonists naturally brought the idea of viticulture with them from Greece.

This process of the amelioration of locally occurring varieties of wild vine was also important in France, for example, as viticulture spread northwards beyond the boundary of the Mediterranean-climate zone in the south of that country. According to Braudel the development of new vine varieties (one ancestral to the *cabernet* of Bordeaux, the other ancestral to the *pinot* of Burgundy), probably from the local wild vine (*lambrusca*) of French forests, was required for viticulture to spread into the wetter and colder regions of central and northern France.[62] Ancient sources show how the spread of a new crop stimulated, firstly, trade with areas lying beyond its cultivation limits – Diodorus Siculus states that the Gauls were willing to trade a slave for an amphora of wine – secondly, a desire to extend its cultivation limits, and thirdly, a desire in some quarters to prevent overproduction. The Roman authorities seem to have had some misgivings about the extension of viticulture at the expense of arable farming, since Domitian in the first century AD is said to have ordered half the vineyards in the provinces to be uprooted after a bad grain harvest, although he did not take any action to enforce his edict. His main concern was to safeguard the grain supply of the city of Rome.[63] In practice the inevitable could not be prevented. As we have already seen, viticulture reached Britain during the Roman Warm Period. The emperor Probus in AD 276 is said to have permitted all the inhabitants of France, Spain, and Britain to have vineyards.[64] It was only during the late Roman empire that viticulture expanded to its natural limits in France.

Palaeobotanical evidence shows that the Romans also tried to take other Mediterranean plants such as lentil and peach northwards with them, as their empire expanded, as far as Britain, but such introductions were less successful. However many species of insects exploited the increase in interregional contact to move around without being noticed by anyone in antiquity (an important theme to which we shall return below to consider the movements of the mosquitoes which transmit malaria). For example the Mediterranean timber beetle *Hesperophanes fasciculatus*, which is common

[61] Dem. 35.35; Janushevitch et al. 1985; Neumann 1991 discussed the climate of the Black Sea region.
[62] Braudel 1990: 318–21. [63] Suet. *Dom.* 7; Tchernia 1986: 221–33.
[64] Aur. Vict. *Caes.* 37.3; SHA *Prob.* 18.8.

in Greece today, and the furniture beetle *Anobium punctatum* were brought to Britain in timber or furniture imported in Roman times.[65]

Cereal cultivation in antiquity did not change in quite such a dramatic way as the advent of olive and vine cultivation in the western Mediterranean. However there were some notable developments during our period. Barley (*Hordeum vulgare*) and emmer were the most important cereals at the beginning of our period.[66] Barley requires less water than wheat. Consequently barley cultivation predominated (probably for human as well as animal consumption) in arid areas such as Attica and parts of north Africa.[67] Xenophon advocated a safety first policy of spreading the sowing in Attica over a considerable period of time, an adaptation to extremely irregular rainfall. Theophrastus described Attica as the best land for barley cultivation, an indication of Attica's poverty, since barley was regarded as food for the poor and slaves; the rich always preferred to eat wheat.[68] Josephus noted that the poor ate barley while the rich ate wheat in Palestine in the first century AD.[69] Similarly in Sparta most Spartiates contributed barley to the common messes, but the rich sometimes made contributions of wheat.[70] Cultural preferences favored one cereal, while climatic constraints favored the other. In Greece barley was used for porridge, while the Egyptians liked it for beer. Barley requires a lower labor input for cultivation than wheat and was consequently cheaper than wheat in antiquity. Autumn-sown dense-eared varieties of six-row hulled barley were usually grown in Greece.

Emmer (*Triticum dicoccum*, a hulled tetraploid wheat) played an important role in wetter areas such as central Italy. It has been found in the archaic strata of the Roman Forum in Rome, and emmer rations are mentioned in the *Twelve Tables*.[71] Pliny's statement that it was still important in Campania (and North Africa) in the first century AD has been confirmed by palaeobotanical finds at Pompeii.[72] It was used to manufacture groats. Emmer was the principal cereal cultivated in Egypt until the Hellenistic period. Herodotus described Egyptian consumption of it in such a way as to suggest that it was contrary to Greek habits. According to Pliny the Egyptian varieties of emmer were easier to thresh than the Greek varieties.[73] Emmer was the hulled wheat best suited to Mediterranean climatic conditions. Palaeobotanical evidence shows that its place was taken in northern Europe, e.g., Britain in the Iron Age, by spelt wheat (*T. spelta*), a hexaploid hulled wheat which is better adapted to cold conditions. However spelt wheat is rarely mentioned in literary sources, which concentrated on the lands around the Mediterranean. Einkorn (*T. monococcum*), a hulled

[65] Osborne 1971. [66] Sallares 1991: ch. 3. [67] *IG* II² 1672; [Caes.] *B Af.* 67.
[68] Xen. *Oec.* 17.1–6; Theophr. *Hist. pl.* 5.8.2. [69] Joseph. *BJ* 5.427.
[70] Xen. *Lac.* 5.3. [71] *Twelve Tables* 3.4. [72] Pliny *HN* 18.29.109–16.
[73] Hdt. 2.36.2; Plin. *HN* 18.20.92.

diploid wheat, was important in northern Greece in the prehistoric period and in the countryside of Pergamum in Asia Minor in the second century AD according to Galen. However it never became important in the western Mediterranean.[74] The hulled wheats needed the same labor input for cultivation as the naked wheats and were less vulnerable to some pests.[75] However, converting the grain into bread is a much more laborious process in the case of the hulled wheats; one reason why they were eventually abandoned in favor of the naked wheats.

The major features of the history of cereals in classical antiquity were, firstly, the decline of barley in many areas with a concomitant increased preference for wheat, and secondly, a tendency for hulled wheats of all ploidy levels to be replaced by free-threshing wheats. Emmer declined in favor of durum wheat (*T. durum*) and poulard wheat (*T. turgidum*), both tetraploids, in Mediterranean-climate regions, while spelt wheat tended to give way to modern bread wheat (*T. aestivum*), another hexaploid, in northern Europe. The changeover was most dramatic in Egypt, where the native emmer was almost entirely displaced during the Ptolemaic period by the durum wheat preferred by the Greeks.

Wheat came to be preferred to barley and other cereals because it contains gluten, which raises loaves of bread during baking. Within the free-threshing types of wheat, the soft-grained bread wheat is excellent for making fine flour for bread, while the hard grains of durum wheat can be broken down easily into semolina, but cannot be pulverized any further towards the fine flour state with primitive milling technology. Poulard wheat gave a high yield, but the flour produced from its grains is much weaker than the flour from bread wheat. Moreover its grains are softer than those of durum wheat, making it less suitable for food products based on semolina. The best bread was made from bread wheat (Latin *siligo*), which was cultivated mainly in northern Italy, Gaul and Britain in the Roman period and imported to warmer regions. The upper class in Rome ate *panis siligneus* made from bread wheat, while the lower classes ate *panis plebeius* made from other types of wheat or other cereals.[76]

Bread wheat was also cultivated in the Crimea. Consequently the Black Sea grain trade was important to classical Athens not only for supplying its grain requirements in purely quantitative terms, but also for cultural reasons. The high Roman evaluation of bread wheat was related to the spread of the practice of making leavened bread, for which bread wheat is most suitable. The introduction of the rotary grain mill and finer sieves permitted finer "white" flour to be produced, although the very best bread available in antiquity contained much more grit than modern bread. However bread wheat was still difficult to cultivate in antiquity because its ears did not ripen

[74] Gal. VI, p. 518 ed. Kühn. [75] Columella, *Rust.* 2.12.1–2. [76] Sen. *Ep.* 119.

evenly and shattered rapidly once ripe, according to Pliny. These technical problems led to the invention in Gaul of the *vallus*, a reaping machine.[77] Varieties of all types of wheat in antiquity generally contained a higher proportion of proteins and a lower proportion of carbohydrates (giving smaller seeds) than their modern counterparts. Consequently ancient wheats were more nutritious per unit weight, although modern varieties of course give a much higher yield per unit area.

A variety of other cereals was also cultivated in antiquity, often in areas outside those upon which our literary sources focus, but none were very significant in Mediterranean-climate regions. Oats cultivation is mentioned in Mysia in Asia Minor by Galen; it is also recorded for Thrace. Galen also notes rye cultivation in Thrace and Macedonia. Rye was also a significant crop in northern Italy and in central and northern Europe. Millets gave a low yield, but as the only summer cereals available in classical antiquity they had an agroecological niche of their own. Rice, the most productive cereal in modern Mediterranean agriculture, was cultivated in some parts of the Near East in Roman times; its spread westwards in antiquity was hindered by the lack of suitable artificial irrigation works to keep paddy fields permanently submerged.[78] Maize, which is also very important in modern Mediterranean agriculture, only arrived from the western hemisphere after Columbus.

Agricultural systems based on the more productive maize and rice can support larger human populations than systems based on wheat and barley cultivation. This conclusion has implications for the human population sizes that could have been supported by ancient agricultural systems. In general the yields of ancient arable farming were probably fairly low. Columella reckoned that a 4:1 yield: seed ratio was not unusual in most parts of Italy, amounting to a net wheat yield of about 400 kg./ha.[79] Higher yields would have been possible in particularly fertile areas, for example regions with rich volcanic soils such as the vicinity of Mt. Etna in Sicily.[80] The highest yields would have been obtained in areas of irrigation agriculture such as Egypt and Mesopotamia. However, even in such areas there were many uncertainties. The fragmentary records of astronomical diaries from Hellenistic Babylonia mention several years in which harvest failures accompanied droughts and disease, while a low Nile flood was always a possibility in Egypt.

Cereal yields also depended on the extent to which arable farming was integrated with animal husbandry to provide animal manure for the crops. In general it appears that transhumance was a characteristic feature of pastoralism in the past in semi-arid Mediterranean dry-farming regions. To find fresh pastures flocks and herds of animals were regularly led up into

[77] Plin. *HN* 18.20.91; Palladius 7.2.1–4. [78] Sallares 1991: 22–4.
[79] Columella, *Rust* 3.3.4; Duncan-Jones 1982: 370–1. [80] Cic. *Verr.* 2.3.109–13.

greener mountainous areas in the summer from the desiccated lowlands. This practice reduced the availability of animal manure to arable crops. Animal products, especially dairy produce and wool from sheep and goats and meat from pigs, did make a considerable contribution to the economy (both the food sector and the textile industry), but animal husbandry was not closely integrated with arable farming in antiquity.

V HEALTH AND DISEASE

In order to explain the glories of Greco-Roman civilization it would be easy to assume that ancient populations must have been extremely healthy. However such an assumption would be false. There is a considerable volume of evidence that many ancient populations suffered from a substantial disease burden, consisting of both endemic and epidemic diseases. It is safe to assume that diarrhoeal and intestinal diseases were a major cause of high infant mortality and consequently of low life expectancy at birth in ancient populations. Celsus recorded that dysentery mainly affected infants and children up to the age of ten.[81] Waterborne diseases would have been particularly important in Egypt, but were certainly not confined to that country.[82] Older age groups also suffered from a heavy disease burden. Nearly a fifth of the skeletons of the people who were killed trying to flee Herculaneum during the eruption of Mt. Vesuvius in AD 79 display morphological changes consistent with brucellosis, a disease generally contracted by consumption of infected animal products, particularly milk from goats.[83] This at once tells us that much of the food and drink consumed by the Romans was not sterile. It also indicates the scale of the problem; nearly 20 percent of the population of one of the most well-known Roman towns was afflicted by just one out of the numerous infectious diseases that are known to have been active in antiquity.

Herculaneum was certainly not unique. Similar findings have emerged from research on the human biology of the skeletal remains from the Greek colony of Metapontum in southern Italy.[84] A number of skeletons display probable traces of thalassaemia, a human genetic disease which confers some resistance to malaria. As the physical environment of the territory of Metapontum became steadily more marshy, providing more breeding sites for the mosquito vectors of malaria, it is likely that malaria played a major role in the decline of the population of Metapontum during the Hellenistic period. However malaria was by no means the only problem faced by the inhabitants of Metapontum. There is also osteological evidence for the presence of an endemic treponematosis related to venereal syphilis.

Literary texts can reveal the presence of diseases which do not or only rarely leave identifiable lesions on human bones. Most of the acute

[81] Celsus, *Med.* 2.8.30. [82] Scheidel 2001a.
[83] Capasso 1999. [84] Henneberg et al. 1992.

infectious diseases fall into this category. The books of *Epidemics* in the Hippocratic Corpus show that numerous infectious diseases of varying degrees of severity were present in the small city states of northern Greece during the fifth and fourth centuries BC; for example it is possible to recognize an epidemic of mumps on Thasos, while there are many references to more deadly diseases.[85] Among the respiratory diseases tuberculosis was particularly feared. It appears to have had a high mortality rate. The various types of human malaria were well known in northern Greece. The Hippocratic texts describe other dangerous infectious diseases that are less well known today, such as relapsing fever. In addition, it may be surmised that other deadly tropical diseases which have not been recognized so far in ancient texts or archaeological materials were nevertheless present. An example is leishmaniasis, which still occurs in animal reservoirs in parts of Italy and other Mediterranean countries today, despite modern eradication campaigns, and causes sporadic human infections. It was surely present in the Mediterranean world in antiquity, despite the lack of attention paid to it. As far as health and disease were concerned, the lands around the Mediterranean were part of the tropical world in antiquity.

Malaria did not occur everywhere for two reasons. Firstly, it is a temperature dependent disease. Consequently the most dangerous species of human malaria, *Plasmodium falciparum*, was confined to Mediterranean-climate regions and was only active even there during the summer and autumn, although other less virulent types of malaria also occurred in central and northern Europe in antiquity. Secondly, it requires the presence of certain types of mosquito as a vector; not all species of mosquito can transmit malaria to humans, and mosquito breeding sites do not occur everywhere. Nevertheless, malaria was common in some areas in antiquity, such as western central Italy around Rome, as well as large parts of southern Italy, Sicily, Sardinia, north Africa, and the eastern Mediterranean lands. A malaria epidemic in late antiquity has been identified at an archaeological site in Umbria in central Italy.[86] Where malaria occurred in antiquity, in the long run it was the single most important component of the pathocoenosis, or ecological community of pathogens, not only because of its own direct effects on mortality and morbidity but also because of its synergistic interactions with other diseases, in particular infectious respiratory and intestinal diseases. This combination drastically reduced both life expectancy at birth and adult life expectancy in areas where malaria was endemic. Its effects were so severe that malaria had a direct influence on human settlement patterns, encouraging people to live in hilltop settlements, since mosquitoes as weak fliers are generally confined to low-lying areas. The seven hills of Rome are the best example of this phenomenon.[87]

[85] Grmek 1989. [86] Soren and Soren 1999; Sallares 2002: 66–8. [87] Sallares 2002.

Besides its purely demographic effects, malaria has and had considerable effects on the agricultural economy where it occurs, because repeated chronic infections have a debilitating effect on farmworkers, particularly at harvest time in late summer or early autumn. Thus economists have found a significant negative correlation between malaria incidence and per capita growth rates in developing countries today. The same correlation probably occurred in antiquity. Consequently the frequency of *P. falciparum* in southern Italy in the past is likely to be one of the reasons why in the long run northern Italy became more prosperous than the south. The economic divide observed in recent times between highly developed northern Italy and underdeveloped southern Italy commenced in antiquity with the spread of falciparum malaria from north Africa to southern Italy. Malaria can also influence the nature of agricultural systems; it makes difficult the cultivation of any crop that requires a lot of attention during the late summer and early autumn.[88] As has already been stated, malaria requires the presence of certain types of mosquitoes. Consequently it is likely that the spread of malaria northwards in the western Mediterranean in the first millennium BC required the prior spread of these mosquitoes, presumably on board ships; an unintended side-effect of the increase in trade by sea in classical times indicated by increases in the number of shipwrecks. Malaria was probably already common in Greece, especially northern Greece, and the Near East before its spread to central Italy.

Galen regarded *P. falciparum* malaria as particularly common in the city of Rome in his own time in the second century AD, but he was also well aware that different diseases were common in different cities.[89] There is no doubt that his perception of the situation was correct; we have already seen the examples of malaria in Rome, brucellosis in Herculaneum, treponemal disease in Metapontum, tuberculosis in the cities of northern Greece; leprosy in Alexandria is another example. Leprosy is the best example of the appearance of a new disease in classical times, according to the perceptions of classical authors. The Hippocratic authors show hardly any awareness of leprosy. It had become well known in Egypt and the Near East by the end of the Roman empire, but it did not spread widely in western, central and northern Europe until the mediaeval period. Galen's perception implies that there was a diversity of urban mortality patterns in the ancient world. In general cities were less healthy than the countryside in the past, as Celsus was aware, although malaria can produce extremely high mortality rates in small rural communities.[90]

In addition to the endemic diseases mentioned so far, which can frequently assume chronic forms of long duration, there were acute infectious epidemic diseases, which were often density dependent. These diseases were

[88] Sallares 2002: 242–4. [89] Sallares 2002: 222. [90] Mudry 1997.

favored by increasing urbanization in the classical world. The texts in the Hippocratic corpus provide evidence for the presence of numerous diseases in classical Greece, but really major epidemics seem to have been rare in Greece in the fifth and fourth centuries BC. Only the so-called "plague of Athens" in 430–426 BC described by Thucydides, in which about a third of the whole population of Athens perished, stands out. The pathogen responsible for that calamity was certainly not bubonic plague; numerous identifications have been proposed, of which smallpox and typhus are the most plausible. However Livy, following the annalistic tradition, does record a series of epidemics in the city of Rome as it grew during the Republic. In general not enough detail is given to be able to even attempt a retrospective diagnosis, but it is clear that epidemics became more frequent in Rome as it eclipsed the cities of Greece with respect to size.

Nevertheless it is not until the time of the Roman empire that we first hear of epidemics that appeared to affect virtually the whole of the then known world. The appearance of pandemics was a side-effect of the general increase in inter-regional trade and movements of people in classical times. The first pandemic was the so-called "Antonine Plague," which raged for about twenty years in the second half of the second century AD.[91] The causative agent responsible for the "Antonine Plague" was again definitely not bubonic plague; it is widely agreed to have been smallpox. Owing to the fragmentary nature of the sources it is difficult to trace its effects in detail, but later parallels make it plausible that the "Antonine Plague" might have killed about a third of the population, at least in some areas. In the middle of the third century AD there was another pandemic, the "plague of Cyprian." Unfortunately the evidence available for this pandemic is even worse than that for the "Antonine Plague"; it cannot be identified.

True plague (*Yersinia pestis*) did not become an important human disease until the time of the plague of Justinian in the sixth century AD. However, the foundations for the early mediaeval explosion of true plague were laid during the time of the Roman empire by the silent spread of its rodent host, the black rat (*Rattus rattus*), which is now gradually being revealed by archaeology. The spread of the black rat was yet another consequence of increased inter-regional contact in classical antiquity. Economists have suggested that the occurrence of pandemics in the past could have had sudden stochastic effects on the balance between population and resources so massive as to affect the whole course of long-term economic history in Europe, with respect to the timing of the Industrial Revolution.[92]

[91] Duncan-Jones 1996. [92] Sallares 2007.

CHAPTER 3

DEMOGRAPHY

WALTER SCHEIDEL

Demographic conditions are a major determinant of economic performance. In the following, I focus on the relationship between demographic structures and macro-economic features. The economics of household and gender are discussed in the next chapter. After a brief outline of the fundamental demographic characteristics of the Greco-Roman world (I–II), I present a theoretical model of the interdependence of economic and demographic development, and explore its principal variables in the context of ancient Mediterranean economies (III–VIII). This introductory survey is meant to provide a conceptual framework for the more specific discussions in Chapters 7 to 28, and more generally seeks to contextualize the study of Greek and Roman economic and demographic history within the wider ambit of historical demography and population theory. While many of the issues raised in the following sections cannot be satisfactorily addressed on the basis of ancient evidence, they are nevertheless essential to our understanding of ancient economies.

I LIFE EXPECTANCY AND ITS CORRELATES

(a) *Mortality and morbidity*

In recent years, researchers have established a broad consensus regarding the basic structure of ancient populations.[1] Continuing controversies are now largely confined to particular interpretations of the evidence, which are of limited relevance here.[2] The populations of the ancient world were characterized by a regime of high fertility and mortality. While mean life expectancy at birth is conventionally put in a range from about twenty to thirty years, the actual age structures of ancient populations (and thus age-specific survival rates) are generally unknown. Age records from some

[1] Much of recent work deals with the Roman world: Parkin 1992; Bagnall and Frier 1994; Frier 2000. For Greece, see Hansen 1985; Sallares 1991: 42–293. Corvisier and Suder 2000 give a general overview. For critical evaluations of recent research, see Golden 2000; Scheidel 2001b; and cf. Suder 1988, 1991, and Corvisier and Suder 1996 for earlier bibliography. Scheidel forthcoming, b will provide a comprehensive overview.

[2] More substantial disagreements over population numbers are addressed below, II.

300 census returns filed in Roman Egypt during the first three centuries AD have been used to reconstruct female and male age distributions that are broadly consistent with model life tables suggesting a mean life expectancy at birth of twenty-two to twenty-five years.[3] An alternative reading of these records points to significant differences between rural and urban populations, and to exceptionally high attrition rates in large cities.[4] Mean life expectancies at birth in the low twenties have also been extrapolated from select cemetery populations, Roman tombstones in north Africa, and a Roman schedule used to calculate annuities known as "Ulpian's life table."[5] However, demographic readings of these sources remain controversial: age records in epitaphs are often vitiated by age and gender preferences; skeletal samples cannot always be reliably aged and need not accurately mirror the age structure of actual past populations; and the evidentiary basis of the annuities schedule is unknown.[6] At the same time, in supporting the notion of a low mean life expectancy at birth in the twenties, these estimates converge with literary evidence that suggests comparably low survival rates among the Roman elite and, more importantly, with comparative data from more recent high-mortality regimes ranging from eighteenth-century France to early twentieth-century China, India, and Egypt.[7] In consequence, we may reasonably assume that throughout the Greco-Roman world, average life expectancy at birth fell in a bracket from about twenty to thirty years, although these limits may occasionally have been exceeded in particularly hazardous (e.g., malarious) or healthy (e.g., high-altitude and low-population density) environments.

Age-specific death rates and therefore overall age structures were likely to have varied within a broad band bounded by constraints set by the probable levels of mean life expectancy at birth. While modern model life tables are predicated on the simplifying notion of predictable ratios between life expectancies at different ages which allow a given life expectancy at birth to be linked to a particular set of normative age distributions,[8] the specifics of the actual age composition of pre-modern populations were contingent on ecological conditions. In the long term, the nature and prevalence of endemic infectious disease acted as the principal environmental determinant of local age structures. The considerable degree of epidemiological variation within the ancient Mediterranean has been reviewed in the previous chapter: the correlate of climate, population density, and the evolution of infective agents, ancient disease environments were subject to profound change over space and time. Local demographic conditions would have

[3] Bagnall and Frier 1994: 75–110; Bagnall, Frier and Rutherford 1997: 99–104.
[4] Scheidel 2001a: 118–80. [5] Frier 1982; 1983b; 2000: 790–2.
[6] For criticism, see Hopkins 1966; Parkin 1992: 5–58, 75–8, 82–3; Scheidel 2001b: 17–19; 2001c.
[7] Roman elite: Scheidel 1999. Comparanda: Bagnall and Frier 1994: 88.
[8] Coale and Demeny 1983. For criticism, see Scheidel 2001c: 3–11.

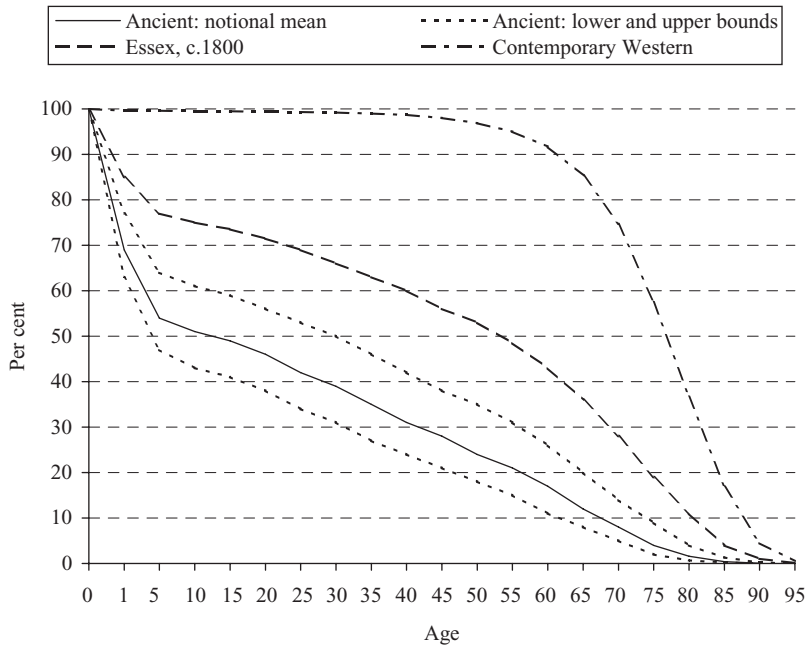


Figure 3.1 Percentage of survivors to age *x*
Source: Coale and Demeny 1983: Model West Females, Levels 1 and 6 (Ancient: lower and upper bounds), Level 3 (notional mean), Level 11 (Essex, c.1800), Level 25 (Contemporary Western)

varied accordingly.[9] In addition, cultural conventions (from collective violence to gender biases) affected differential mortality.[10] For these reasons, the survival rates for Greco-Roman populations set out in Figure 3.1 are best understood as rough approximations that map out the limits of the plausible. The "notional mean" in particular is suggested for computational purposes only and should not be taken to apply to any given regional or local environment.

Despite these uncertainties, the basic outlines are clear: although mortality rates in infancy and early childhood are particularly volatile and may arguably be exaggerated by standard model life tables, there can be no doubt that attrition was strongly concentrated in the first years of life.[11] In addition, mortality remained substantial throughout the life-cycle, thereby depressing the number of those surviving to a more advanced age: up to three or four times as many people may have died before age ten as after age sixty. Death was as much a phenomenon of childhood and maturity

[9] E.g., Scheidel 1996c: 139–63; 2001a: 1–180; Sallares 2002; Woods forthcoming.
[10] Scheidel 2001b: 30. Cf. below, Chapter 4. [11] Woods 1993; Scheidel 2001b: 21–3.

as of old age. As is shown in the next chapter, mortality on this scale hampers economic development by discouraging investment in human capital, creating large numbers of orphans and widows, and disrupting long-term economic strategizing. It is true that what is by modern standards considered "high" mortality is not an insuperable impediment to economic growth: after all, mean life expectancy at birth in England did not consistently exceed forty years until the mid-nineteenth century, when industrialization was well underway. However, an average rate in, say, the low twenties differs profoundly from one in, say, the mid-thirties, translating to adolescent mortality rates that are two-thirds higher in the former than in the latter scenario. The incidence of familial and economic dislocation would vary accordingly.[12] Moreover, the scale of mortality is positively correlated with that of morbidity. In the most developed nations today, "health-adjusted life expectancy" (HALE) – the average number of years lived in good health – falls short of overall life expectancy by no more than 8 percent, whereas in the most disease-ridden countries, up to one-sixth of all years lived are spent in a state of ill health or disability.[13] A plausible HALE of twenty years or less would have significantly depressed economic productivity in ancient societies.

(b) *Fertility*

Most importantly, high mortality usually went hand in hand with high fertility.[14] At ancient levels of life expectancy, the average woman surviving to menopause must have given birth to between 4.5 and 6.5 children in order to maintain the existing population. In view of likely levels of divorce, widowhood, and sterility, mean marital fertility must have been higher still, around 6 to 9.[15] Local long-term fertility rates would have differed depending on the specifics of local mortality regimes. Within any given region, however, average fertility must have been closely tied to the death rate: a population in which mean birth rates had exceeded (or fallen short of) mean death rates by one-fifth (equivalent to annual growth rates of plus or minus 0.7 percent) would have doubled (or been halved) in size every century. Shifts of that nature could only occur locally and for a limited amount of time. Annual growth rates of the order of either −1 or +1 percent or more are feasible mostly in the short run or in specific locales: while death rates could exceed birth rates either temporarily in the event of epidemic outbreaks or more consistently in large cities where negative

[12] England: Wrigley and Schofield 1981: 235. Estimates based on Coale and Demeny 1983: 56, 61.
[13] WHO, *World Health Report 2003*.
[14] Bagnall and Frier 1994: 135–59; Frier 1994, 2000: 797–808; Scheidel 2001b: 32–46, forthcoming, b.
[15] Frier 1994: 325.

growth rates had to be counterbalanced by immigration, growth spurts – especially in the wake of demographic contractions or in colonial settings – would raise fertility over baseline mortality.[16] Nonetheless, in the long term (such as the period covered by this volume), local, regional, and temporal variations largely canceled each other out, converging into a central trend of very slow net growth over time.[17]

II POPULATION SIZE

(a) *Long-term trends and contexts*

Recorded population numbers are few in number and often of doubtful quality: rhetorical stylization and symbolic figures permeate ancient sources, and although official counts in Greek *poleis* or the Roman empire may well have yielded reasonable approximations of gross population number, such findings rarely entered the surviving literary tradition.[18] The serial statistics of Roman citizen numbers from the early Republic through the first century AD are the main exception but subject to problems of interpretation (see below). The most reliable evidence is derived from papyrological documents from Ptolemaic and especially Roman Egypt which record the number of residents of various cities and villages but no regional totals.[19] In contrast to the contemporaneous Han empire in China, no global census totals for the Roman empire are known. As a consequence, the figures given in this and the following sub-section range from rough approximations to probabilistic guesses and should not normally be taken to indicate more than a certain order of magnitude.[20]

During the period under review, from the middle of the second millennium BC to the early first millennium AD, all parts of the Mediterranean and its hinterlands experienced significant demographic growth. With all due caution, we may assume that between the twelfth century BC and the second century AD, the population of the part of Europe that was eventually taken over by the Roman empire approximately quadrupled in size, at a long-term average annual growth rate of around 0.1 percent. Growth was probably slower in the already more developed eastern half of the Mediterranean but far from negligible, perhaps of the order of 0.07 percent per

[16] For epidemics and urban mortality, see below, II, VIII. For growth following contraction, see below, Chapter 8, and Scheidel 2003b.

[17] This principle is easily confirmed by the observation that at an annual net growth rate of 1 percent, a Mediterranean population of about 50,000 in 1000 BC would have expanded to 6.5 billion (the current world population) by AD 200. Ancient baseline growth must have been much lower, around 0.05–0.1 percent p.a.: see below, II.

[18] Scheidel 2001b: 49. [19] Rathbone 1990; Alston 2002: 332.

[20] For the (hazardous) derivation of population estimates from probable carrying capacity, see esp. Beloch 1886; Corvisier 1991: 229–92; de Angelis 2000. Cf. Sanders 1984 on potential margins of error.

year during the same period.[21] By comparison, the mean annual growth rate for the European part of the Roman empire amounted to between 0.06 and 0.07 percent for the period from the late second-century AD peak to 1800, while it was substantially higher, probably approaching 0.1 percent, for Europe as a whole.[22] During the same period, virtually no net growth occurred in Rome's former Asian and African provinces. In China proper, annual growth averaged 0.1 percent between 1 and 1800.[23] These comparisons reveal both fundamental continuities and divergences. Long-term demographic growth in the temperate parts of Europe was fairly stable from the late Bronze Age to the onset of modernity. After the depression of population numbers following the disintegration of the western and much of the eastern Roman empire in the fifth and sixth centuries, the formerly Roman part of Europe (with the exception of Greece) generally re-attained peak Roman population levels by the twelfth or thirteenth centuries, and after another slump caused by the Black Death consistently exceeded them from the mid-fifteenth century onwards. The underlying secular trend rate was closely tracked by the population of China at the opposite end of the Eurasian land mass. By contrast, demographic – and therefore economic – development in north Africa and the Levant reached its pre-modern saturation point in the Roman imperial period, and did not permanently cross this threshold until the nineteenth century.[24]

To the extent that the production of people is a function of the production of goods, these underlying growth rates also provide a rough index of economic development. In the long term, and especially in subsistence economies which cannot accommodate substantial declines in conventional living standards, population cannot grow faster than total output. The ability of a system of production to support a given increase in population over a given period of time at a constant real wage is known as the absorption rate. Judging by the above estimates, the minimal long-term absorption rate of ancient – or indeed any pre-modern agrarian – economies appears to have been close to 0.1 percent per annum. This rough estimate is in line with the mean absorption rate calculated for late mediaeval and early modern England.[25] In addition, due to ongoing technological innovation (see below, III), per capita consumption must have risen very gradually in the long term. If we were to posit, entirely speculatively but perhaps not unreasonably, a 50 percent increase in per capita output and consumption

[21] From c. 8–10 million to 35–40 million in Europe and from c. 8–9 million to 20–23 million in the Near East: McEvedy and Jones 1978, and below, Table 3.1.

[22] From 35–40 million for the Roman provinces (and 45–50 million for Europe as a whole) to 100 million (and 180 million) in 1800: Table 3.1; de Vries 1984: 36.

[23] McEvedy and Jones 1978: 171. Cf. Wilson and Airey 1999: 119 for medium-term variation.

[24] McEvedy and Jones 1978; Frier 2000: 814.

[25] Lee 1980: 525 (0.089 percent p.a. 1250–1700, 0.46 percent p.a. 1705–1789, 0.88 percent p.a. 1810–1839).

between 1000 BC and AD 200, extensive economic growth would have averaged 0.16 percent per annum, translating to a baseline rate of intensive growth of 0.06 percent. The latter ties in with recent guesstimates of corresponding rates of 0.05 percent for Greece from 1300 to 300 BC (including a 0.15 percent spurt from 800 to 300) and of up to 0.1 percent for the last two centuries BC in the Roman empire.[26]

(b) *Regional developments*

While these figures are unlikely to be wide of the mark overall, they conceal significant variation in the medium term and between regions. At the end of the Bronze Age, the future predominance of Greece and Italy was already foreshadowed by the fact that their average population densities exceeded those of other parts of Europe.[27] In mainland Greece, a massive demographic contraction in the wake of the collapse of the Mycenaean palace system was followed by a prolonged recovery that took off in the ninth century, gathered momentum in the eighth and generated substantial net growth relative to late Bronze Age levels before petering out in the fourth or third centuries BC (see Chapter 8). By the classical period, this process of natural growth, together with the influx of large numbers of chattel slaves, had resulted in particularly high population densities in the major *poleis* of central Greece, above all Athens, Corinth, and Aegina, which to varying degrees came to depend on the large-scale import of grain to support their local populations (see Chapters 12–14). By contrast, populations in highland and other peripheral areas expanded later and did not peak until the Hellenistic and Roman periods.[28] Modern estimates of the peak population of the core of mainland Greece and the Aegean islands in the classical period converge on about 2 million, or 3 to 3.5 million including Thessaly, Epirus, and Macedonia.[29] Overseas settlements, first in Ionia on the west coast of Asia Minor and from the eighth century onwards in Sicily, southern Italy, and the Black Sea region, may have accounted for another 2 million Greeks or thereabouts.[30] Modern debates have mostly focused on the size of the Athenian population in the fifth and fourth centuries BC. Drawing on scarce source material and divergent assumptions about local carrying capacity and the scale of food imports, modern estimates range

[26] Morris 2004: 736; Saller 2002: 259–60. Cf. Jones 1988: 30–4 on traditional long-term growth.

[27] McEvedy and Jones 1978: 19–20, with 20 fig. 1.3.

[28] Bintliff 1997b. Cases include Thessaly, Macedonia, Epirus, Aetolia, Achaea and Crete.

[29] Corvisier and Suder 2000: 34. Cf. Map 3.1.

[30] Beloch 1886: 261–305; Scheidel 2003b. Hansen 2006 estimates a somewhat higher grand total of at least 7 million, based on a series of extrapolations from the known size and number of walled Greek cities and assumptions about urban settlement density and the ratio of urban to rural residents (for the latter, see below, n. 188).

from 250,000 to over 300,000 residents (including 60,000 adult male citizens and perhaps 100,000 slaves) at the late Periclean peak in the 430s BC, and from 150,000 (including 20,000 adult male citizens and 50,000 slaves) to 250,000 residents in the 320s BC.[31] Our ignorance about the likely number of resident aliens (metics) and slaves is responsible for much of this uncertainty. In the early fifth century BC, the Spartan citizen population peaked at around 25,000, sustained by up to 100,000 helots.[32]

In its heyday in the early fifth century BC, the Persian empire of the Achaemenid dynasty stretched from Egypt and the Aegean to the Indus valley and may have comprised some 20 to 25 million subjects. Its principal successor, the Seleucid empire, hardly exceeded 15 million in the third century BC and subsequently kept losing territory, while the population of Egypt fluctuated between perhaps 4 and 7 million during the Greco-Roman period.[33] Field surveys frequently indicate increasing urbanization as well as a spread of settlement in the Hellenistic East (except in Greece itself) that is indicative of ongoing population growth and agrarian intensification.[34]

Estimates of the number of Roman citizens (and of the population of Italy as a whole) hinge on our interpretation of reported census totals for adult males. Figures are given from 508 BC onwards but may not be trusted until the mid-third century; fourteen totals (from 258,318 to 394,736) are available for the second century but only four for the next, featuring a jump from 910,000 in 70/69 BC to 4,063,000 in 28 BC.[35] As the free population of peninsular Italy probably stood at around 3 million in 225 BC and only a few hundred thousand adult male citizens are thought to have resided outside Italy in 28 BC, the total for 28 BC would imply a citizen population of over 10 million for Italy, a higher gross total including aliens and slaves, and an even more massive aggregate tally of perhaps closer to 20 million for the mid-Principate.[36] The implied population density for the Italian peninsula in particular of up to 100 people/km^2 is very high and was not reached until the late nineteenth century.[37] This has led the majority of scholars to follow Beloch's conjecture that the Augustan census recorded all citizens instead of adult males only.[38] This otherwise unsupported assumption reduces the total Italian population to a more plausible 4 million citizens plus aliens and slaves in 28 BC. It deserves attention that even in this conservative scenario,

[31] See my addenda in Garnsey 1998: 195–200 for a full survey of the literature.

[32] Figueira 2003; Scheidel 2003c.

[33] My estimates for the Achaemenid and Seleucid empires fall between those by McEvedy and Jones 1978: 125 (lower) and Aperghis 2004: 56–8 (higher; cf. also Aperghis 2001: 73–7). For Egypt, see Scheidel 2001a: 181–250.

[34] Alcock 1994: esp. 187: see below, Chapter 15, Table 15.1.

[35] Brunt 1987: 3–120. Figures for the late first century are necessarily higher because of the enfranchisement of the Italian allies and the Cisalpina.

[36] Brunt 1987: 60, 263; Morley 2001: 50–2; Scheidel 2004c: 6–7.

[37] Scheidel 1996c: 168. [38] Beloch 1886: 370–8; Brunt 1987: 113–15.

Map 3.1 Population densities in Greece in the fifth and fourth centuries BC
Source: adapted from Corvisier and Suder 2000: 36 fig. 1

Italy's average population density was still much higher than in any other region except Egypt and Syria (see below, Table 3.1). Even so, the higher estimate is not strictly speaking impossible and has recently been defended by Lo Cascio.[39] Evidence of endemic conflict over land in the late Republic, the large number of cities in Italy and other indications of population pressure (as well as the strikingly high levels of military mobilization implied by the lower estimate) might be taken to support this revisionist argument.[40] At the same time, the "high count" is seriously undermined by its mismatch with comparative data from other parts of the Roman empire and from later periods, its implications regarding the size and distribution of the imperial population as a whole, and its logical incompatibility with well-documented developments such as the emergence of a central Italian slave economy and the eventual geographical peripherization of military service. Thus, while the possibility of a substantially larger Italian population (which might require upward adjustments for other parts of the Roman empire as well) cannot be ruled out entirely, the balance of probability favors the lower estimate.[41]

If we accept the lower estimate of the size of the Roman citizenry, the total population of the Roman empire at its peak on the eve of the "Antonine plague" of AD 165 probably numbered between 60 and 70 million. While approximately 55–60 percent of them resided in the European provinces and around 20 percent each in Asia and Africa, the demographic split between the "Latin" western and the "Greek" eastern halves of the empire was about 60–65 to 35–40 percent (Table 3.1).[42] By coincidence, the Roman empire broadly resembled the Han empire in terms of population number and density, with each of them controlling about a quarter of the world's population.

In Late Iron Age western Europe, considerable economic innovation and therefore demographic growth occurred for several centuries prior to the Roman conquests, and continued into the early imperial period.[43] Under

[39] Lo Cascio 1994a, 1994b, 1999b, forthcoming.

[40] See below, VI and VIII, and Lo Cascio 2001a (mobilization; but see now Rosenstein 2004); Morley 2001: 59–61 (land hunger).

[41] Lower estimate: Morley 1996: 46–50; Scheidel 1996c: 167–8 and esp. 2004c: 2–7. Cf. also De Ligt 2004: 728–38. The likely impact of urban excess mortality, above all in Rome, also implies a low total: Morley 1996: 33–54; Jongman 2003a; Scheidel 2003a. For a brief summary of this conundrum, see Scheidel 2001b: 52–7. The suggestion that the Augustan census figures may refer to all household heads, orphans, and widows (Hin [in progress]) supports a plausible intermediate scenario that is consistent with an early imperial Italian population of perhaps 11–12 million.

[42] Figures in Table 3.1 adapted from Frier 2000: 814 table 6 (for a grand total of 61.4 million), albeit with a preference for somewhat higher tallies where appropriate: cf., e.g., Woolf 1998: 138; Millett 1990: 181–6; Scheidel 2001a: 242–8. The numbers in parentheses are derived from the alternative interpretation of imperial census figures in n. 41.

[43] See below, Chapters 9 and 24. This process can be linked to climatic improvements from about 400 BC onwards (cf. Galloway 1986: 17).

Table 3.1 *The estimated population of the Roman empire in AD 165*

Region	Population (in millions)	Area (in km²)	Population density (per km²)
Italy & islands*	8–9 (?12–13)	310,000	26–29 (?39–42)
Iberia	7–9	597,000	12–15
Gaul & Germany	9–12	680,000	13–18
Britain	1.5–2	160,000	9–13
Danubian region	5–6	660,000	8–9
Greek peninsula	2.5–3	161,000	16–19
European provinces	33–41 (?37–45)	2,568,000	13–16 (?14–18)
Anatolia	9–10	650,000	14–15
Greater Syria**	5–6	140,000	36–43
Asian provinces	14–16	790,000	18–20
Egypt	5–6	30,000	167–200
North Africa	7–8	415,000	17–19
African provinces	13–14	445,000	–
Total	59–72 (?63–76)	3,800,000	16–19 (?17–20)

* Sicily, Sardinia and Corsica
** Including Cyprus

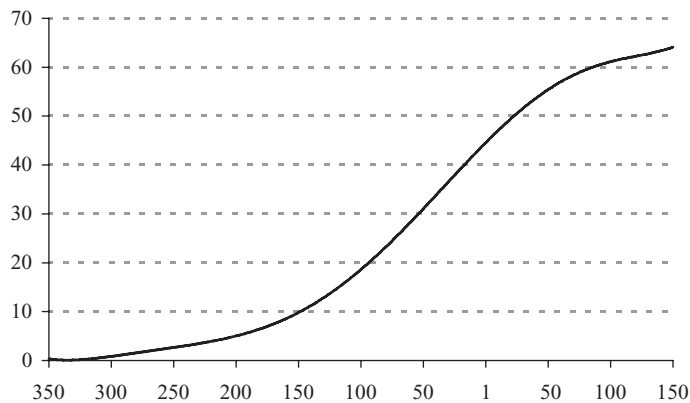


Figure 3.2 Approximate size of the population under Roman control, 350 BC–AD 150 (trendline; in millions)
Source: Scheidel forthcoming, b

Roman rule, the Maghreb and Tripolitania experienced major expansions in output and population (cf. Chapter 27). In general, it is reasonable to assume that the peaceful conditions during the first two centuries of the Principate resulted in ongoing growth throughout the empire and particularly in its western half.[44] Widespread epidemics from the 160s to the

[44] Frier 2000: 813–15; Scheidel 2001b: 63–4. The "frontier hypothesis" predicts higher fertility in sparsely settled frontier provinces: Easterlin 1976; Vanlandingham and Hirschman 2001.

190s AD, probably smallpox, caused a demographic contraction which may have been substantial, although its actual scale remains uncertain.[45] Further pandemics in the 250s and 260s AD probably contributed to this process. Despite ancient and modern concerns about general "manpower shortage" in late antiquity, the reality or extent of population decline is difficult to ascertain and was probably most pronounced in unstable frontier areas in the western provinces.[46] For this late period, from the fourth to the sixth centuries AD, field surveys and other archaeological data suggest expansions in parts of the eastern half of the empire from mainland Greece to Syria and Palestine.[47] Large-scale drops in population accompanied the disintegration of the western Roman empire in the fifth century and the arrival in the Mediterranean in the 540s AD of a plague pandemic akin to the Black Death.[48]

(c) *Migration*

Migratory flows are usually impervious to any but the crudest probabilistic attempts at quantification.[49] According to Cavalli-Sforza's reconstruction of the genetic history of the region, no massive population shifts occurred after the beginning of the Iron Age, which means that the bulk of all growth may be ascribed to the gradual expansion of local populations with improving productive technology.[50] At the same time, the geography of the Mediterranean facilitated inter-regional mobility, exemplified by the creation of hundreds of settlements all over the Mediterranean and the Black Sea by Phoenicians and Greeks during the first half of the first millennium BC, and the transfer of Roman and Italian merchants to the Greek East and the reverse flow of migrants from the Levant to Italy.[51] Local migration between villages may well have been substantial, and the establishment of hundreds of cities in previously un-urbanized regions must have necessitated the (mostly short-range) relocation of perhaps 20 to 40 million people during the period under review.[52] In quantitative terms, the slave trade was the most important conduit of inter-regional migration, involving as it did the transfer of millions of slaves to the core areas of

[45] Littman and Littman 1973; Duncan-Jones 1996 (with Greenberg 2003); Scheidel 2002; Zelener 2003; Rijkels 2005: 22–76.

[46] See esp. Lewit 1991; also Whittaker 1976; Fischer 1993. Salmon 1974: 114–79 fails to produce compelling evidence of general population decline.

[47] Bintliff and Snodgrass 1988; Tate 1992; Safrai 1994; Foss 1995; and see below, VI.

[48] Christie 1996; Russell 1968; Biraben 1975: 25–48; Conrad 1981.

[49] Scheidel 2001b: 46–8. For a comprehensive parametric reconstruction of population transfers in Roman Italy, see Scheidel 2004c, 2005a.

[50] Cavalli-Sforza, Menozzi and Piazza 1994: 277–80.

[51] Horden and Purcell 2000: 377–400 stress the lateral mobility of Mediterranean populations; cf. Purcell 1990 on Greek mobility in particular. Settlements: Aubet 1993 (Phoenicians); Chapter 10 (Greeks).

[52] Villages: Osborne 1991b; cities: see below, VIII.

ancient slave society, Greece and especially Roman Italy.[53] By contrast, not more than a few hundred thousand individuals are likely to have emigrated from mainland Greece from the archaic to the Hellenistic periods, and by AD 14, the number of Roman citizens of Italian extraction who resided in the provinces need not have exceeded 750,000.[54] In contrast to the Later Han empire, where population shifted southwards, and various centrifugal colonization movements under subsequent dynasties, the Roman empire does not appear to have experienced mass migration between its constituent parts.[55]

III POPULATION REGULATION

(a) *A general model*

In order to appreciate the significance of demographic conditions for economic development, we need to address several key questions: in traditional societies, what was the reciprocal relationship between population growth and economic change; was the former in any sense regulated, and by what mechanisms; and how did population size or growth relate to general well-being?

Population size equilibrates with resources at a level mediated by technology and conventional living standards.[56] Following Malthus, the principal equilibrating mechanisms can be divided into preventive checks (acting on fertility) and positive checks (acting on mortality). Homeostatic regulation is achieved by the interplay of these variables regardless of whether the members of a population are aware of or attempt to influence this process. The theoretical concept of demographic equilibrium does not envisage an inflexibly static system: rather, it seeks to identify sustainable population size in the absence of exogenous forces, such as famines, epidemics and wars and, in the long run, climatic change, technological innovation, and the evolution of endemic disease patterns, which in reality account for much of observed variation in population size and growth. Thus, by emphasizing underlying constraints, the concept of the equilibrium state helps us assess the relative input of exogenous factors.

Figure 3.3 illustrates the governing principles of homeostatic control. Following demographic contractions that pushed population size below the equilibrium level (as in the case of the Early Iron Age depression in

[53] Finley 1981: 167–75; Harris 1980b, 1999; Bradley 1987; Scheidel 1997, 2005a, forthcoming, c.

[54] Scheidel 2003b; Brunt 1987: 264–5.

[55] China: Bielenstein 1947; Lee and Wang 1999: 115–19; cf. Scheidel 2004c: 25. Frier 2000: 813 speculates that between AD 14 and 164, 20,000 persons may have annually migrated from the eastern to the western half of the empire (i.e., at a rate equivalent to 0.1 percent of the eastern population).

[56] For the theoretical underpinnings of this section, see esp. Lee 1986a; Wood 1998.

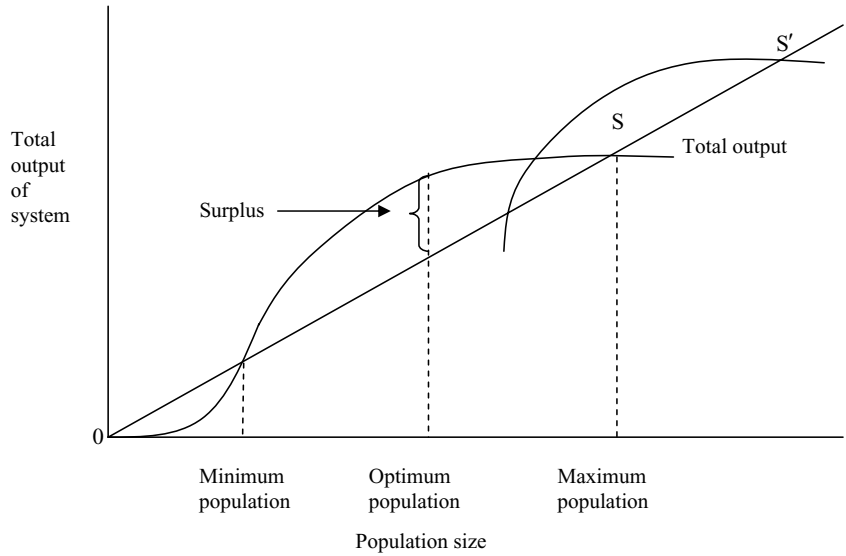


Figure 3.3 Population size and surplus for given resources and technology
Source: Lee 1986a: 101 fig. 1 and Wood 1998: 113 fig. 9

twelfth- and eleventh-century BC Greece discussed in Chapter 8 or, perhaps, in Roman Egypt in the wake of the "Antonine plague" of the late second century AD) or improvements in productive capacity caused by the opening up of new resources (such as during Greek "colonization" in the archaic period or Roman expansion across the western Mediterranean) or by technological progress (less common in the case of ancient economies), gross and per capita output may initially rise concurrently with population number. Eventually, growth in output and therefore population will decline as population size increases, especially once it approaches the sustainable equilibrium level. This constraint on population growth is a function of declining marginal productivity (also known as the "law of diminishing returns"): without ongoing technological change, output (i.e., production) will gradually rise more slowly than input (i.e., labor). When labor is the main input, diminishing returns will reduce average consumption (indicated by the shrinking distance between output and subsistence requirements in Figure 3.3). In theory, a population may reach a demographic saturation point (here denoted as S) beyond which further inputs yield negative returns and additional growth is not feasible.[57] At this stage, owing to the lack of capacity reserves, the population is increasingly rendered vulnerable to environmental shocks such as disease or food crises. Crucially, however,

[57] Wood 1998: 105–7.

any notional equilibrium state or saturation point (equivalent to the common concept of "carrying capacity") is entirely contingent on the current system of production, and will change with any modification of the technological and institutional framework. Thus, equilibrium levels or carrying capacity are relational variables that are in practice subject to ongoing variation. Assuming with Boserup that technological change is itself spurred by increases in population, the model in Figure 3.3 suggests that further improvements in the system of production and factor endowments (such as new land, climatic change, better tools, more efficient ways of organizing labor and capital, etc) may shift the theoretical saturation point (from S to S') well before average surpluses have in fact disappeared.[58] The equilibrium level changes concurrently with the system of production, albeit not always at the same pace. In the very long run, these parallel movements facilitate net population growth.

(b) *Productivity change*

That this long-term trend obtained for Greco-Roman antiquity as a whole is not in doubt (see below, IV–VIII).[59] At the same time, it is the specific correlation between output, population size, and surpluses in particular areas and periods that is pivotal to ancient economic history. In this, the pace of innovation in the system of production and the variability of conventional living standards are the critical variables. While minor adaptations in productive technology and organization would occur on a regular basis, major improvements that permitted rapid demographic expansions were probably rare or even non-existent. Why do systems of production change at all? Technical inertia – the rational resistance to change that entails costs and especially novel risks – tends to keep systems of production from changing unless and until they are compelled to do so: decline in per capita output associated with rising population size raises the utility gain from innovation and therefore may well be the principal inducement to productivity-enhancing adaptations.[60] Under these circumstances, the pressure for innovation is a function of the average level of well-being relative to the subsistence level which is in turn determined by the ratio of population number to current carrying capacity. Moreover, the rate of innovation is positively correlated with population size *per se*. It has been formally demonstrated that in the long term, population size and the stock of knowledge (which governs productivity) are not only mutually interdependent but serve as the two fundamental causal determinants of economic progress, while any other

[58] Boserup 1965, 1981. In practice, S is a curve rather than a point: Wood 1998: 108.

[59] *Pace* Horden and Purcell 2000: 267, emigration – i.e., the lateral expansion of a given system of production – cannot mitigate Malthusian pressures in the long term.

[60] Boserup 1965: 65–9; Grigg 1980: 144; Wood 1998: 108, 111.

factors are ultimately reducible to secondary endogenous variables.[61] The main reason is that larger populations create larger markets for information about technology and institutional arrangements.[62] Although the effects of this linkage are at best dimly perceptible for ancient economies, it seems that the rate of population growth in Greece and Roman Italy may have been positively correlated with the rate of inventions.[63] The principle that population size also contributes to economic development independently of population pressure is borne out by the observation that population growth tends to be proportional to population size in the sense that in the long term, rates of increase depend on previous population levels, a correlation that is empirically supported from at least 4000 BC onwards.[64] As a consequence, low-density areas would have been less conducive to innovation, whereas growing population density and concurrent urbanization (see below, VIII) can reasonably be expected to have accelerated technological and institutional progress. However, the *extent* of any such developments in any period or place within the Greco-Roman world must not be overestimated.[65] On the whole, processes that facilitated gross quantitative growth, above all the extension of cultivated land enabled by colonization and imperial pacification, may well have been of greater import than qualitative improvements of the existing resource base. In so far as systems of production expanded laterally rather than in terms of intensity, inducements for innovation must have been comparatively weak. Indications of technological responses to population pressure are only rarely discernible in the record: mainland Greece in the fifth and fourth centuries BC is the main example (see below, VI). The issue of demographically induced institutional change still awaits investigation.[66]

A variety of causal relationships may be consolidated into a comprehensive model of the interdependence of demographic and economic development (Figure 3.4). It is clear from this chart that without the flow from population size to technology, the whole system would tend towards a stable equilibrium, perturbed by exogenous forces but always returning to a steady state. Thus, as noted above, it is the capacity for building up and applying knowledge that is the pivotal determinant of long-term change, and, in so far as innovation is in turn a corollary of population size, the latter is an equally critical variable. Figure 3.4 takes a long-term view: the inversion of the conventional positive correlation between increasing knowledge and real wages on the one hand and rising fertility on the other is a late development, as is the amelioration of health hazards through knowledge.

[61] Simon 2000. Cf. Johnson 2000. [62] Jones 1988: 89.
[63] Simon 1986: 66–7. [64] Kremer 1993: esp. 706–7.
[65] Cf. Elvin 1973: 298–315; Jones 1988: 141–6; Mokyr 1990: 218–38; Deng 2000: 13–14, on the limitations of this process in pre-modern China. See below, Chapters 5–6.
[66] Cf. North 1981: 133, on mediaeval Europe.

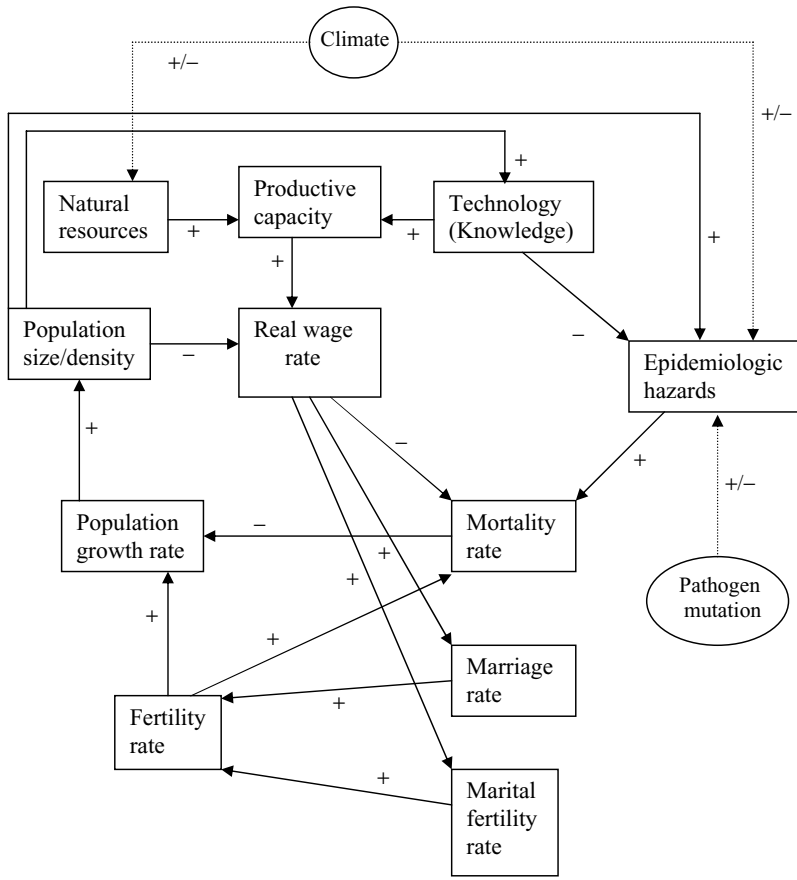


Figure 3.4 Causal relationships in a schematic model of homeostatic population regulation in pre-transitional populations
Source: Considerably expanded and modified version of Schultz 1981: 31 fig. 2.9

Key: Arrows indicate the effect of an increase in the base variable on the target variable (+for increase/improvement, – for decrease/deterioration); a decrease in the base variable has the opposite effect. Variables represented by squares are fully or partially endogenous, while variables in ellipses are entirely exogenous. Institutions are integrated into the model in that they are instrumental in mediating the relationship between various variables (such as between natural resources/technology and real wages, or between real wages and the fertility rate), and are best visualized as "acting on the arrows." The envisaged population as a whole is closed, and migratory flows within the system will on average cancel each other out. Migration and urbanization processes are subsumed within the relationship between population density, productive capacity and real wages. Relationships that are in the first instance confined to industrialized settings (such as the impact of technology on climate or pathogen mutation) have been disregarded.

Ancient economies, just as any other pre-modern systems, were ultimately governed by the causal relationships mapped out in the model.

(c) *Living standards*

The relationship between normative living standards and physiological subsistence is the other main variable that mediates pressure for innovation. To the extent that minimally acceptable living standards exceed bare subsistence (defined as the level of consumption enabling survival and demographic reproduction at replacement level), demand for improvements in productivity will emerge before population growth reaches a final saturation point. The greater the average difference between these two consumption levels, the more capital reserves will be available, and the easier it is for innovation to occur. In principle, and in the very long run, normative living standards rise with technological advances in as much as the latter (which require human capital) increase the value of time and thus the price of children, thereby constraining fertility and permitting intensive growth (see below, VII). However, family farms would have been left largely unaffected by such developments.[67] In traditional agrarian societies, therefore, this process must have been unfolded very slowly, especially since in the long term, upward adjustments of average living standards during phases of productivity growth could be offset by rising inequality in resource distribution or reversed in periods of declining marginal productivity (see below, V). Given low levels of technological change, living standards may more commonly have been manipulated through institutional arrangements that governed the rate of surplus extraction via rents, taxes, tribute, serfdom and slavery, without significantly altering average consumption levels in the population as a whole.

(d) *Conclusion*

For all these reasons, ancient economies were probably caught in what has been described as a "low equilibrium trap," in which in the long term, limited increases in output will raise surpluses less than population size and the latter will eventually offset intermittent productivity gains (as envisaged in Figure 3.3). A lasting escape from this trap is not feasible merely with cumulative increases in modest investment over an extended period; rather, a "critical minimum effort" is required to generate self-sustaining intensive growth.[68] This is corroborated by the fact that technological progress depends partly on the quantity of the available surplus (also known as the savings rate): as innovation emerges primarily from the non-agrarian sector,

[67] Lee 1986b: 99. [68] Leibenstein 1954; Nelson 1956.

the likelihood of successful innovation is a function of the size of the agrarian surplus that supports the non-agrarian sector (i.e., urban and rural industry), which equals the extent to which the average product of labor exceeds normative living standards. This principle holds true regardless of whether surplus is coerced by rent-seeking elites (arguably the most common pattern in antiquity) or created through the operation of competitive markets.[69] However, as indicated in Figure 3.3, while the preconditions for innovations are best at optimal population size – when the size of the non-agrarian sector could, at least in principle, peak in a given system of production – the demand for innovation grows only as productivity declines. Moreover, in the absence of systematic family limitation (see below, VII), optimal population size is inherently unstable.[70] (Barring effective birth control, an optimal population size could only be stabilized through increased surplus extraction without food re-circulation.) This particular configuration of factors in turn undermines any "critical minimum effort" to escape the low-equilibrium trap. In general, therefore, innovation was a self-limiting escape mechanism: in the words of James Wood, "over long stretches of time, population and food supply may leapfrog over each other, generating ever larger population sizes and more intensive systems of production but never gaining any permanent improvements in well-being."[71] The following three sections sketch out how and why this general model applies to the Greco-Roman world.

IV VARIATION IN POPULATION GROWTH AND SIZE

(a) *Short-term variation*

The baseline upward trend in ancient population number is modulated by two distinct layers of variation in the short and medium terms. Short-term variation is commonly caused by exogenous shocks such as climatic fluctuations that affect harvest quality. Comparative evidence from other pre-modern societies suggests that temporary output fluctuations are more likely to activate preventive checks (either via nuptiality, as in England, or via marital fertility, as in China) than to raise mortality. While fertility tends to be highly sensitive to grain prices, the responsiveness of mortality is inversely correlated with the level of development.[72] Dearth was often a necessary but not a sufficient cause for higher death rates: in fact, the effect of harvest variation on mortality appears to have been mainly indirect, via migration and exposure to disease, and was mediated by social mechanisms

[69] Lee 1986a: 101–2. [70] Wood 1998: 113.

[71] Wood 1998: 113. Jones 1988: 85–146 surveys depressants of intensive growth.

[72] Galloway 1988 is the most comprehensive survey; see also Galloway 1994. Different regional responses: Lee in Wrigley and Schofield 1981: 356–401; Campbell and Lee 2000.

that govern the distribution of the impact of scarcity.[73] Sweeping famines associated with less differentiated starvation were generally rare.[74] Although there are no data from the Greco-Roman world that would allow us to trace the relationship between economic and demographic variation in the short term, it is reasonable to assume that the picture was very similar. Inter-annual fluctuations in precipitation and harvests are well documented for the modern Mediterranean and must have been equally common in antiquity.[75] Sporadic evidence from Roman Egypt reveals local inter-annual price variations.[76] Buffering mechanisms such as long-distance transfers of foodstuffs must have been largely confined to the urban sphere.[77] Temporary food crises greatly outnumbered famines that led to mass mortality.[78] While there is no way of knowing whether harvest failures primarily affected marriage rates or marital fertility, we may speculate that given early and universal marriage for women and social acceptance of post-partum interventions (see below, VII), responses to scarcity may very well have been concentrated within marriage. At low levels of development, the negative effects of variability of food consumption on survival are conducive to risk-averse behavior among poor agriculturalists: indeed, the scale of inter-annual food storage has been found to be positively correlated with average life spans.[79] Because of this, it is preferable to view risk-averse behavior as a function of pre-existing economic constraints rather than an exogenous, cultural brake on development. High levels of vulnerability to scarcity and the benefits from conservative allocation strategies would have reinforced the "low-equilibrium trap" by discouraging productive innovation.

(b) *Medium-term variation*

For the historian, variations in the medium term – on the scale of generations or centuries – are more important because they help account for differentiation within and between conventionally defined historical periods. For heuristic purposes, we may distinguish between four ideal types of population growth: first, negative growth – i.e., contraction – brought about by a variety of exogenous (climate, certain kinds of disease) and endogenous factors (war, systems collapse); second, growth during the recovery from demographic contractions or depressions; third, growth in response to endogenous productivity gains that raise local carrying capacity; and fourth, "lateral" growth caused by the transfer of more efficient systems of production (technology, organization of labor) to other regions.

[73] Walter and Schofield 1989b: 48–57. Gender preferences also play a role: e.g., Tsuya and Kurosu 2000, and esp. Bengtsson, Campbell, Lee et al. 2004.
[74] Watkins and Menken 1985. [75] Garnsey 1988: 10–14; Ruschenbusch 1998.
[76] Rathbone 1997a: esp. 213. [77] Cf. Hopkins 1983a.
[78] Garnsey 1988: 3–39; cf. 1998: 272–92. [79] Ortega Osona 2000.

Negative growth varied widely in terms of scale and scope. Greco-Roman history as a whole is bounded by two major contractions: at the end of the Mycenaean period in the Aegean (c. 1200–1000 BC; see Chapter 8), and more universally from the fifth to the seventh centuries AD in the wake of the disintegration of the western Roman empire and the subsequent pandemic of bubonic plague (see Chapter 2, and above, II). In between, widespread epidemics in the late second and the mid-third centuries AD may have depressed population levels in many parts of the Roman empire. The loss of perhaps more than half of Athens' adult male citizenry during the Peloponnesian War in the late fifth century BC is by far the most conspicuous case of severe but strictly localized attrition.[80] Although massive and prolonged contractions may cause productive techniques to regress and carrying capacity to drop, demographic recovery not only created pressure to restore earlier productivity levels but commonly propelled output and population size beyond any previously attained levels.[81] This scenario implies a combination of the second and third categories of population growth. The ongoing growth of output and population in Greece from the Early Iron Age through the classical period – for a total of 500–600 years – is the principal example from antiquity. Notwithstanding its exceptional duration, this process structurally resembled the European economic and demographic expansion in the High Middle Ages, from about AD 1000 to 1300, or the shorter recovery after the Black Death and subsequent net expansion in the late fifteenth and the sixteenth centuries. China's growth phases during the Song and Ming dynasties conform to the same pattern.[82] Overall, however, these instances of "efflorescence" – simultaneous increases in population and productivity – were comparatively rare in pre-modern history and ordinarily failed lastingly to overcome the constraints of the "low-equilibrium trap" (see above, III).[83] More frequently, demographic recovery events would merely compensate for prior population losses or even fall short of this measure: examples include fourth-century BC Athens and parts of the Roman empire after the epidemics of the second and third centuries AD. Unlike the previous two types, "lateral" growth is exogenous in the sense that it entails changes in the system of production that do not occur in response to internal inducements, and thus falls outside the scope of homeostatic models. The establishment of Greek overseas settlements in the Mediterranean and Black Sea regions from the eighth to the fifth centuries BC, the migration of Greeks and Macedonians to the Near East during the Hellenistic period (e.g., the Fayyum in Egypt), and Roman colonization within and later outside Italy all belong in this category.[84]

[80] Hansen 1988: 14–28. [81] Boserup 1965: 62–3.
[82] Grigg 1980: 7; 53; Goldstone 1991: 25. [83] Goldstone 2002.
[84] See below, Chapters 10, 16, 18.

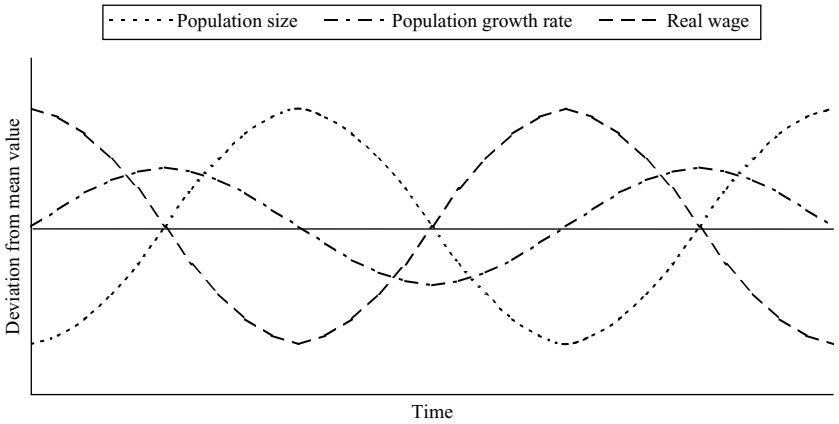


Figure 3.5 Model of population regulation driven by exogenous change in the population growth rate
Source: Lee 1986b: 87 fig. 3

In keeping with the general model of homeostatic population regulation outlined in the previous section, the most reliable comparative data suggest an inverse correlation between population growth (and life expectancy) on the one hand and real wages (i.e., average surpluses) on the other. This relationship is best documented for England from the thirteenth up to the early nineteenth centuries.[85] The specifics of this correlation (presented in idealized form in Figure 3.5) indicate that while wages respond sensitively to deviation of population size from the equilibrium level and fertility responds weakly but positively to ensuing changes in real wages, thereby acting as a proximate determinant of population growth, the observed swings are ultimately driven by exogenous variation in the growth rate caused by the incidence of mortality rather than by endogenous forces.[86]

This causal interconnection underscores the homeostatic tendencies of pre-transitional economic-demographic systems and the importance of mortality shocks and secular shifts in the severity of the disease environment, and shows that population size and wage levels cannot deviate too widely from the equilibrium level without triggering countervailing mechanisms.[87] For all we can tell, exogenous shocks – in the form of climatic and epidemiological changes – were similarly important in the Greco-Roman period. The impact of epidemics has been briefly considered above (II). More generally, long-term fluctuations in population size are strongly

[85] Lee 1973, 1980, 1986b, 1987: 447–8. Real wages are important indicators of well-being: Schofield 1989: 289–90 shows an inverse correlation between real wages and mean life expectancy at birth, and a positive match between the Crude Marriage Rate and real wages.

[86] Lee 1980: 536–40, 1986b: 100. See also Tsoulouhas 1992; Reher and Osona 2000: 185–6.

[87] Wood 1998: 110; Reher and Osona 2000: 205.

influenced by long-term climatic variation.[88] In middle latitudes, warmer winters were historically associated with accelerations in population growth: in early modern Europe, for example, a 1 degree C increase in mean winter temperature would raise the annual natural growth rate by 0.1 percent.[89] Warming periods induced similar expansions in Greece after the post-Mycenaean depression and in the western Mediterranean from about 200 BC to AD 400.[90] Unfortunately, evidence of the movement of real wages or overall well-being relative to population size or growth is almost entirely missing from the record. In what may arguably be the only exception, price and wage data from Roman Egypt in the second and third centuries AD seem to indicate a rise in real incomes in the wake of the demographic contraction caused by the "Antonine Plague."[91] If correct, this reading is consistent with the model derived from later European data in Figure 3.5. Overall, in the absence of comparable statistics, we must rely on the interpretation of features that can be taken as proxy variables suggestive of levels of average well-being.

V VARIATION IN WELL-BEING

Secular changes in ancient living standards are only beginning to be systematically explored. Assessing a bundle of features including mortality, morbidity, nutrition, housing and clothing, Morris argues for significant improvements in well-being in the Greek Aegean between the tenth and the fourth centuries BC.[92] No comparable survey currently exists for the Roman world, and although we may suspect similar developments to have occurred in Roman Italy during the Republican period, different institutional characteristics (associated with higher levels of socio-economic differentiation and political inequality) may conceivably have limited the degree to which the majority of the Italian population benefited from economic growth. These issues will be explored in several of the following chapters. In general, the increasing availability of certain goods, such as metal tools and implements, and the distribution of manufactured wares serve as a rough index of long-term growth in per capita output.[93]

(a) *Nutritional status*

Yet more than anything else, in an environment in which food intake would account for perhaps two-thirds of the consumption budget of many commoners, it is changes in food availability and diversity that are crucial to any appraisal of living standards. Despite the introduction and dissemination

[88] Galloway 1986. [89] Lee 1987: 456–7. [90] See Chapters 2 and 8.
[91] Scheidel 2002. [92] Below, Chapter 8, and Morris 2004, 2005.
[93] Hopkins 1978b: 55–9; Gunderson 1982: 247–50.

of new crops (see Chapter 2), it remains doubtful whether the majority of the population gradually came to enjoy improved diets.[94] Moreover, nutritional status arises from the balance of all energy inputs and outputs, and since food not only maintains the body but also sustains work and combats parasites and infections, food intake *per se* does not determine nutritional status or correspond to physiological well-being. Fluctuations occur in food supply as well as energy demand. The impact of disease is a key factor for the latter: the presence of disease determines the nutritional status which in turns affects susceptibility to disease. At the same time, some diseases are so virulent that they act independently of nutritional status. Moreover, in demographic terms, moderate levels of malnutrition may even be beneficial by affording protection against certain infections and by reducing fecundity. Because of the complexity of these interactions, evidence of poor nutritional status can be no more than a vague indicator of the quality of food intake.[95] Ancient data for nutritional status are available in the form of trace elements in skeletons, osteological markers of deficiency conditions, and measurements of adult body height.[96] Widespread evidence of deficiency disease as indicated by stress markers on bones and teeth clearly point to a high incidence of low nutritional status. However, the fact that average height for both sexes from Greek and Roman sites in the Mediterranean matches the means for Naples in the 1960s where life expectancy was much higher inspires little confidence in extrapolations from stature to demographic conditions.[97] Perhaps most importantly, information on the Body Mass Index (BMI) – the principal indicator of well-being – does not exist for antiquity. As a result, we can plausibly assume but not independently demonstrate that Robert Fogel's claim that poor nutritional status rendered a significant proportion of early modern European populations unfit for sustained work, or observations on economically disruptive energy conservation efforts of low-BMI populations in developing countries today, also hold true for the impoverished strata of ancient populations.[98] It is uncertain to what extent improved nutrition could substantially reduce mortality in populations that were exposed to numerous sources of infection.[99] In more recent pre-modern societies, higher incomes ensured higher food intake but did not necessarily alleviate the impact of infectious disease. This is borne out by data concerning European elites prior to the mid-eighteenth century when survival

[94] Garnsey 1999: 118–20. See Chapters 14 and 22.

[95] See Walter and Schofield 1989b: 17–21 for a summary; Carmichael 1983 (protection); Rotberg and Rabb 1985: 308 (virulence); Waterlow 1996: 106–7 (fecundity).

[96] Morris 1992: 97–100; Garnsey 1999: 43–61.

[97] Ibid. 58. There are additional reasons to doubt a universal correlation between height and life expectancy: Riley 1994.

[98] Fogel 1993: 10–13; Waterlow 1996.

[99] Johansson 1994.

rates still depended more on location (i.e., climate and population density) than on socioeconomic status.[100] Evidence of low life expectancy among the urban top echelons of Roman imperial society implies a – in any case *a priori* plausible – similar scenario for the ancient world.[101] For the same reason, temporary economic-demographic "efflorescences" need not have resulted in substantial improvements in nutritional status or overall well-being, especially in as much as they led to higher population densities and levels of urbanization and thus to new health hazards (see below, VIII): after all, even modern economic growth, although it unfolded on a much more dramatic pace and scale, initially failed to improve general well-being.[102]

(b) *Inequality*

In any pre-modern population, where the majority of the population produce their own food, the direct link between average per capita output and average well-being is fairly well defined. Nevertheless, social and political differentiation complicates this relationship except in the most egalitarian systems.[103] The impact of differential resource allocation on carrying capacity (i.e., the equilibrium size of a population) is positively correlated with the extent to which normative living standards exceed minimum physiological subsistence. In the kind of largely agrarian subsistence economy that was typical of most of the Mediterranean for most of the period under review, transferable surpluses were generally small and their manipulation by rent-seeking elites could not greatly affect the demographic makeup of the rural majority. Moreover, changing levels of surplus extraction would not affect average per capita consumption as long as food rents were recirculated into the general population.[104] Although the Roman imperial world-system transformed parts of the Mediterranean into net exporters of staple foodstuffs, the relative share of such transfers in total local production must normally have been small (unlike for cash crops).[105] It is only when institutional arrangements interfere with normative living standards that they begin to affect gross population size. Chattel slavery is the most important example: in so far as a slave could be coerced to work harder and/or consume less than the average non-slave worker, a slave economy would support a larger population than a traditional family-based system of production. This mechanism facilitated the influx of large numbers of

[100] Livi-Bacci 1991: 63–78; Johansson 1994: 113–14; see also Lee, Wang and Campbell 1994: 401 (China). For contrasting findings, cf. Flinn 1981: 18 (Geneva).

[101] Scheidel 1999. [102] Kuznets 1966; Fogel 2000: 139–63. [103] Wood 1998: 107–8.

[104] If higher extraction detracts from normative living standards, the population will work harder to create additional income, and initially population size may rise as a result; in the long term, fertility will decline in response to this squeeze, and population growth will be reversed: Lee 1986a: 109.

[105] Cf. Hopkins 1983a.

slaves into areas that were already experiencing population growth, specifically central Greece in the archaic and classical periods and parts of Roman Italy and Sicily during the Republican period.[106]

Whereas average well-being rises during an expansion before dropping with declining marginal productivity (as indicated in Fig. 3.3), variation in well-being may also rise but then become "crystallized" instead of abating under population pressure. In this case, increasing material inequality could be regarded as an endogenous outcome of economic and demographic growth.[107] To what extent this process accounts for economic differentiation in ancient societies remains to be investigated: Greece in the late classical and early Hellenistic periods and Roman Italy in the late Republic and the early Empire are likely candidates. This trend towards rising inequality would be exacerbated by generalized "demographic differentiation" as defined by Chayanov, when even with identical access to resources, stochastic variation in household histories gradually causes living standards to diverge.[108] Since inter-family differences in birth rates are positively correlated with the overall level of fertility, periods of growth are necessarily conducive to rising variance in well-being.[109] At the same time, however, actual – as opposed to predicted – variance is strongly influenced by institutional arrangements. Thus, the Athenian democratic system arguably constrained tendencies towards increasing differentiation much more effectively than Roman institutions, especially under the Principate. This is illustrated by the fact that uncommonly egalitarian landholding patterns in classical Attica point to high normative living standards, whereas extremely high indices of inequality in landholding in parts of the Roman empire are likely to reflect rural poverty.[110] Even so, it deserves attention that even the supposedly significant gap between physiological subsistence and normative living standards (which in turn determined the demographic equilibrium level) in classical Greece did not in the long run engender sufficiently rapid innovation to outpace population growth and sustain lasting intensive growth.

VI POPULATION PRESSURE

Evidence of population pressure is of particular relevance to our understanding of the interaction of economic and demographic developments and the

[106] See below, Chapters 10, 12, 19.

[107] Wood 1998: 115, 128. Cf. ibid. 115–16 for a model of the development of variation in well-being.

[108] Chayanov 1986: 254. For (computationally deficient) models of ancient household life cycles, see Gallant 1991.

[109] Wood 1994: 33–6, 1998: 116. See also Goldstone 1991: 32–3.

[110] For Gini coefficients, see Morris 2000: 140–1 (Athens); Duncan-Jones 1990: 138–9 (Roman empire). See also Hopkins 1978a: 1–96 on the process of differentiation in Roman Republican society.

constraints of a given system of production on sustainable growth. In the almost complete absence of statistical information on real wages, we must fall back on indirect diagnostic signs of declining marginal productivity and relative overpopulation, such as the fragmentation and subdivision of farms, rising land prices and rents, landlessness, and especially agricultural intensification and increased cultivation of marginal land.[111] For much of the period and region under review, existing productive technologies appear to have been sufficiently flexible and expandable to accommodate lengthy phases of moderate demographic growth. It is worth remembering that "overpopulation" is independent of population size *per se* but reflects average well-being relative to the subsistence level. In fact, given the positive correlation between population density and innovation rates, low-density populations may be more vulnerable to population pressure than others.[112] With regard to Greek and Roman societies, the conspicuous growth of chattel slavery is perhaps the most telling sign that productive arrangements could readily be adapted to sustain a growing population. Although precise numbers are unavailable, there can be no doubt that the number of foreign slaves entering central Greece in the archaic and early classical periods greatly exceeded the number of settlers leaving the region for other parts of the Mediterranean or the Black Sea.[113] The same is even more true for Roman society and Italy in general during the last two centuries BC: on a cautious estimate, several million slaves must have been transferred to Italy while the total number of Roman citizens of Italian origin residing overseas probably did not exceed 750,000 by the beginning of the Augustan period.[114] Boserup has argued that in the absence of sufficient population pressure, intensification requires coerced labor.[115] The Roman villa system may arguably be understood in these terms. The fact that in both central Greece and the core areas of Roman Italy, slaves dominated the domestic service sector and were disproportionally represented in the cities also speaks against widespread population pressure and falling living standards in the countryside. Even Egypt, traditionally the most densely populated region of the ancient Mediterranean, could support an expansion of domestic slavery in the Ptolemaic and Roman periods, alongside immigration from the Aegean and the creation of a new capital city.[116]

[111] See Grigg 1980: 20–8 for a summary of comparative evidence.

[112] Wood 1998: 111, 114.

[113] Scheidel 2003b. Greek overseas settlement may have been motivated by relative advantages in factor prices but is not necessarily indicative of saturated production systems in the source regions. Moreover, emigration seems to have absorbed only a moderate share of total natural growth in the Aegean.

[114] Scheidel 2005a, forthcoming, c (slave numbers); Brunt 1987: 263 (citizens).

[115] Boserup 1965: 73–4.

[116] Roman Italy: e.g., Hopkins 1978a: 68; Jongman 2003a. In Egypt, slavery is associated with Hellenization: e.g., Clarysse and Thompson 2006.

Nevertheless, natural growth together with the influx of coerced labor would eventually outstrip local capacity for ongoing economic growth. In mainland Greece, the dispersal of settlement into the countryside from the sixth to the fourth centuries BC is indicative of intensification. Signs of terrace-agriculture in late classical Attica can be taken to represent the logical progression of this process.[117] The most extreme case among Greek city states is the island of Aegina which could feed only a minority of its population and, while also depending on imports, may have practiced marling to increase agricultural productivity.[118] Greek preference for barley (with higher outputs than wheat) has also been linked to the need to support the largest possible number of people.[119] Overpopulation would help account for endemic warfare from the 430s BC onwards.[120] In Roman Italy, the social and political instability of the last century of the Republican period has recently been associated with rising population pressure and competition for cultivable land.[121] This trend may have continued into the early imperial period when even marginal land appears to have been in high demand.[122] While Roman agronomists described systems of crop rotation that reduce fallowing and raise total output, it remains unclear to what extent they were in fact adopted, especially outside large profit-oriented estates.[123] Given that the shift to the more productive three-field system in late mediaeval Europe provides powerful evidence of intensification and population pressure, it is all the more unfortunate that the existence or scale of comparable processes in the Roman empire cannot be determined.[124] Later ancient evidence suggestive of overpopulation is limited to the eastern Mediterranean in the fourth to sixth centuries AD, including Greece, Syria, Palestine, and Egypt: the expansion of villages in northern Syria is merely the best-known example of a more widespread trend.[125]

In the broadest terms, cycles of demographic growth in the Greco-Roman world appear to have conformed to the model set out in sections III–V, with parallels in high mediaeval Europe in general and early modern England,

[117] Morris 1994b: 363–4. For the problems of extrapolating relative population density from field survey data, see Sbonias 1999a, 1999b.

[118] Figueira 1981: 23–43; Strabo 8.6.16. [119] Sallares 1991: 313–16.

[120] Goldstone 1991 argues that population pressure leads to societal breakdowns. Cf. also Chu and Lee 1994.

[121] Morley 2001: 59–61. "High" estimates of the size of the Roman citizenry (above, II) logically imply population pressure in Italy: Lo Cascio 1996b: 294–6. Cf. De Ligt 2004 for population pressure in the context of the "low" count.

[122] Evans 1980: 34–5; Dyson 1992: 115. For the possibility of population pressure in the early empire in general, see Frier 2001.

[123] White 1970a; Pleket 1993: 73–4, 75–9; Kron 2000. For large-scale grain farming on Roman slave estates, see Scheidel 1994b.

[124] But cf. Pleket 1993: 322–32.

[125] See esp. Tate 1992: 273–342 (Syria); Safrai 1994: 446–57 (Palestine); cf. also Villeneuve 1985 (Hauran); Bintliff and Snodgrass 1988 (Greece); Alston 2002: 357–8 (Egypt).

France and Ireland in particular.[126] The base-line trend of very slow population growth was partly overlaid by distinct growth cycles, above all in archaic and classical Greece, in Roman Italy in the Republican and early imperial periods, and in the eastern Mediterranean in late antiquity, that were eventually checked by a variety of factors: endemic warfare and subsequent emigration in mainland Greece, epidemics in the second and third and again in the sixth centuries AD in the Roman empire. The paucity of pertinent evidence makes it hard to tell whether other periods of growth likewise resulted in population pressure and exposure to positive checks, including the demographic expansions in western Europe in the Late Iron Age, in the Eastern Mediterranean and the Middle East in the Hellenistic period, in the "Barbaricum" of central Europe beyond the Roman frontiers, or in Mesopotamia in the Sasanian period. These uncertainties notwithstanding, what matters most for our understanding of ancient economic history is that there is no single case on record in which mounting population pressure precipitated a breakthrough to a markedly superior system of production that would have re-kindled intensive economic growth.

VII FERTILITY CONTROL

(a) *Natural fertility*

The preceding discussion of the interdependence of demographic and economic developments is predicated on the assumption that increases in production or real income tend to result in population growth that curbs intensive economic growth. Because of this linkage, fertility control is a critical factor in economic development. Prior to the modern demographic transition, virtually all known historical populations shared a characteristic age-specific distribution of fertility, known as a "natural fertility" regime.[127] In this scenario, the average incidence of childbirth rises steeply after menarche, peaks in the early twenties and subsequently declines at first gradually and then more rapidly, petering out in the forties. This pattern is a direct function of life-cycle changes in the physiological fecundity of the female body. By contrast, family limitation, conventionally defined as the deliberate cessation of procreation following the births of a particular number of children, often confines childbirths to the most fecund years and generates a different distribution pattern (Figure 3.6). The age distributions of fertility with and without family limitation differ regardless of the average level of fertility (i.e., the Total Fertility Rate, defined as the average

[126] Grigg 1980: 49–144. The same is true of China: Elvin 1973. No documented system could break this mold until the eighteenth century, except for small Holland from the sixteenth century onward (Grigg 1980: 145–234).

[127] Henry 1961; Coale and Watkins 1986; Wood 1994: 23–112.

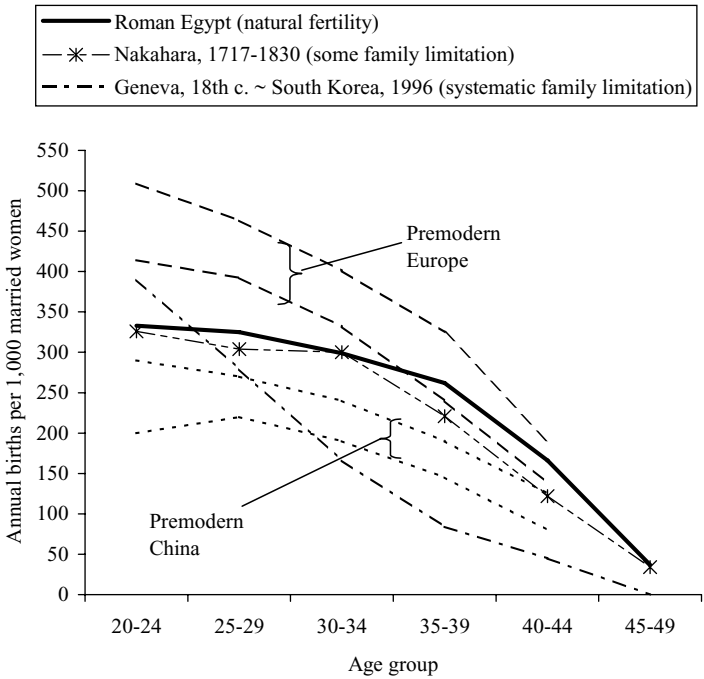


Figure 3.6 Levels of marital fertility in different populations
Source: Frier 1994: 325 table 1 (Egypt); Flinn 1981: 31 table 3.3 (Europe); Lee and Wang 1999: 87 fig. (China); Eng and Smith 1976: 175 (Nakahara); Henry 1961: 89–90, Korea Institute of Health and Social Affairs (Korea)

number of children born to each woman surviving to menopause). The only available sample of pertinent quantifiable evidence from the Greco-Roman period comes from the census returns of Roman Egypt. The documented incidence of live births is strongly suggestive of a natural fertility regime (Figure 3.6).[128] There is no indication of a "stopping strategy" governed by parity or maternal age.

(b) *Means of fertility control*

According to Ansley Coale's classic definition, birth control will not be applied unless it is "within the calculus of rational choice" of couples who want smaller families and have the means to act on their preference.[129] However, apparent absence of family limitation is not to be mistaken for a

[128] Frier 1994. On natural fertility in antiquity, see also Sallares 1991: 129–60.
[129] Coale 1973: 65.

lack of fertility control in general. As Figure 3.6 demonstrates, age-specific birth rates may vary considerably under conditions of natural fertility. This is because the concept of natural fertility refers to reproduction that is socially controlled rather than by individuals on a parity-specific basis, and excludes instances of fertility control unrelated to parity, such as birth spacing or marital abstinence. Historically, birth spacing has been much more common than stopping. Thus, large variations in average reproductive performance have been achieved in the absence of anything like "conscious control" over procreation. Moreover, while the *concept* of rational choice in reproduction was widespread in pre-modern societies, *motivation* appears to have been the pivotal factor in the actual application of fertility control.[130] Considerable evidence from pre-transitional societies suggests that couples have always strategized about the configuration of their offspring, at least in terms of preference, and that they may often have tried to achieve their preferences even in the absence of deliberate stopping behavior, primarily by means of child abandonment and infanticide, sale, wet-nursing, adoption, loan, service arrangements, etc.[131] While none of these interventive measures reduces total fertility (as measured in live births), several of them would have a significant impact on early survival rates. Cumulatively, they can be instrumental in shaping the composition of individual families at various stages of the household life cycle, thereby adjusting the economic consequences of reproductive outcomes in ways not necessarily very different from preventive family limitation.

From a global comparative perspective, we may distinguish between three principal systems of household formation that correspond to particular modes of fertility regulation. In the most general terms, the historical "northwestern European" pattern was characterized by late marriage for both sexes (typically in the mid-twenties) coupled with high rates of both celibacy and marital fertility. In the "Mediterranean" pattern, women married earlier while men married late, whereas in the "Eastern" (i.e., East Asian) scenario, universal and early marriage was common for both sexes.[132] In the first case, given the lack of fertility control within marriage, marital birth rates were high (cf. Figure 3.6), and overall fertility had to be regulated proximately through the incidence and length of marital unions, as determined by average age at first marriage, the proportion of people ever marrying, and rates of remarriage. Limited differences in levels of marital fertility were largely a function of differences in breastfeeding practices which determined post-partum fecundability.[133] In China, the main example of the "Eastern" pattern, universal and early marriage for women meant that nuptiality could

[130] Spacing: Saito 1996: 545–6. Variation: Kirk 1996: 366. Concept vs. motivation: Alter 1992: 22–3.
[131] Mason 1997: 447–8. [132] Hajnal 1982. Cf. Viazzo 2003 for qualifications.
[133] Saito 1996: 544–6.

not reliably serve as a preventive check.[134] Instead, comparatively low rates of marital fertility (cf. Figure 3.6) appear to have been ensured by a combination of prolonged breastfeeding, female infanticide, and male celibacy. Adoption, mostly of relatives, helped balance household needs.[135] In Japan, femicide may possibly have depressed post-partum survival rates.[136] Broadly speaking, the "Mediterranean" regime occupied an intermediate position between these two ends of the spectrum, with (moderately) early female marriage raising the importance of marital fertility control.

With regard to nuptial practices and household structure, Greek and Roman families appear to have conformed mostly to the "Mediterranean" pattern (see Chapter 4), though arguably in conjunction with some "(Far) Eastern" features. In the case of Roman Egypt, cultural preferences for extended breastfeeding may have contributed to extended birth spacing.[137] At the same time, the fact that the documented fertility distribution for Roman Egypt resembles that in the early modern Japanese village of Nakahara where about half of the residents practiced family limitation in the form of stopping behavior while the (wealthier) other half did not (Figure 3.6), suggests that even a putative "natural fertility" regime may in fact accommodate a certain degree of parity- and/or sex-specific birth control.[138] More importantly, postnatal interventions may arguably have been more prevalent outside Egypt.[139] Child exposure and infanticide are recurrent motifs in the Greek and Roman literary and legal traditions.[140] While these practices are unlikely to have been rare, even rudimentary quantification remains beyond our means, and reported sex ratios do not normally permit us to estimate the likely scale of femicide.[141] The latter may be a function of the size of dowries. There is little useful information on this issue from outside elite circles: dowries appear to have been generally important in Greece, where they represented the only (pre-mortem) inheritance for daughters and other relatives were obligated to provide them if necessary, whereas daughters' rights of inheritance in Roman society created more flexibility, and dowries among commoners may have been modest.[142] Compared to East Asian societies, post-partum measures were uncommon in later periods of European history owing to a set of circumstances that curbed fatal neglect of children, including religious doctrine, fear of punishment,

[134] Lee and Wang 1999: 63–82.

[135] Low fertility: Lee and Wang 1999: 47–51; adoption: 107–9. Their claim that these strategies were supplemented by deliberate birth control (including stopping behavior) is rejected by Wolf 2001.

[136] This is likewise controversial: for doubts, see Saito 1992.

[137] Masciadri and Montevecchi 1984: 32–5; cf. Tyldesley 1995: 69. [138] Eng and Smith 1976.

[139] Scheidel 2001b: 45, on Diod. 1.80; Strabo 17.2.5. [140] Eyben 1980/1; Boswell 1988; Harris 1994.

[141] *Contra* Pomeroy 1983; Brulé 1992. But cf. Clarysse and Thompson 2006 for potential indirect evidence for sex ratio manipulation in Ptolemaic census lists for Greek and Macedonian settlers in Egypt.

[142] Fox 1998: 166–20; Saller 1994: 204–24.

collective institutions for foundling care, child labor in richer households, and large-scale wet-nursing.[143] It may well be relevant here that these constraints were weak or absent in Greek and Roman culture.

A broad array of putative contraceptives and abortifacients were discussed in ancient sources, and at least some of the recommended chemicals may have been effective.[144] However, the actual frequency of deliberate preventive or invasive means of birth control within marriage remains obscure: documented interest in the subject or knowledge of herbal agents fail to tell us about motivation or the context of actual application.[145] Ancient and comparative evidence suggests that these types of birth control may have been concentrated within competitive elites concerned about intergenerational status preservation.[146]

Divorce acts as a preventive check by reducing lifetime fertility. Quantifiable data are limited to the census documents of Roman Egypt, which report fairly frequent and often early marital dissolution.[147] In Athens and Rome, divorce was easy to obtain by both sexes. While its overall incidence remains unknown, we may suspect that it was significantly more common than in later Christian Europe.[148] Low rates of female remarriage must also have depressed total fertility.

Although unrelated to fertility control *per se*, adoption was another way to adjust family composition. Again, the evidence focuses on aristocratic practice and quantification remains impossible. Conceivably more common in Rome than in the Greek world, adoption was easier to undertake than in later periods of European history but there is no compelling reason to accord it a particularly important role in ancient household strategies.[149]

(c) *Households and fertility*

Recent research on the composition of ancient households has revealed a range of types from putatively nuclear (urban) households in the western provinces of the Roman empire to more complex families in the eastern Mediterranean, especially in Roman Egypt and Syria.[150] Family and household structures are critical in determining the nature of fertility regimes and their interaction with economic development. Broadly speaking, small nuclear families practicing neolocal marriage enjoy greater economic independence; for them, age of first marriage and even the number of children

[143] Lynch 2000. Even if some forms of childcare were thinly veiled instruments of infanticide – cf. Boswell 1988 – there is no doubt that overt infanticide had by then become culturally marginalized.

[144] Riddle 1992, 1997. [145] Thus Frier 1994. Cf. Hopkins 1965.

[146] Johansson 1987. Cf. Salmon 1999; Caldwell 2004. [147] Bagnall and Frier 1994: 123–4.

[148] Cox 1998: 71; Treggiari 1991b; Saller 1994: 219–20.

[149] Pomeroy 1997: 122–3; Saller 1994: 43. More common among Romans?: cf. Wentzel 1930.

[150] Saller and Shaw 1984 (cf. below, Chapter 4); D. B. Martin 1996; Bagnall and Frier 1994: 57–74; Sadurska and Bounni 1994.

matter more than for extended families that buffer risk and help channel resource flows within rather than between households. In extended families, where spousal units are embedded in larger kinship groups, the cost of raising children is more dispersed, favoring early non-neolocal marriage for both sexes. In this latter category, the timing of marriage is less sensitive to economic conditions.[151] These differences may have consequences for fertility control, in as much as the welfare functions of the extended family create an incentive structure that inhibits responsiveness of marital fertility to economic opportunities or secular mortality decline. While the latter factor would not normally have been present to any significant extent in ancient populations (see below), reduced sensitivity to population pressure would have made intensive growth even more difficult to achieve. However, because in nuclear families, children act as risk insurance – in lieu of collective buffers provided by other co-resident kin – marital fertility need not decline even when per capita output improves.[152] Conversely, the linkage between economic and demographic developments among the nuclear families of early modern England depended on distinct features such as strict neolocality, life cycle servitude and systems of communal risk devolution that do not appear to have existed in a comparable way in ancient societies.[153] Rather, conditions in the Greco-Roman world resembled those in pre-transitional southern Europe (or modern Bangladesh), where disproportionate emphasis on kin relations through the male line fostered virilocality that limited the economic freedom of new couples; low levels of labor circulation between rural households ensured a strong commitment to family labor; patron–client links constituted the main welfare agency; and socially approved minimum living standards for marriage were low. This combination of features tends to facilitate high fertility.[154]

It therefore seems unlikely that ancient nuclear – let alone extended – families benefited from social or economic institutions that would have restrained marital fertility in the event of rising economic output. While the causes of secular fertility decline in modern history continue to be hotly debated,[155] none of them seems to have acted on ancient populations. The Greco-Roman world conforms best to the ideal type of a relatively undifferentiated economy of family farms and rural crafts in which economic activity is largely a family affair, labor is applied to capital in the family's control, and inheritance is the principal means of access to the means of production, so that the level of nuptiality is a function of mortality in the

[151] Cain and McNicoll 1988. [152] Cain 1981. [153] Smith 1981.

[154] Smith 1981: 617–18; Cain and McNicoll 1988. Cf. Viazzo 2003.

[155] Economic theories have centered on the changing cost and value of children, whereas more recent critiques emphasize cultural and ideational factors. For comprehensive overviews, see Kirk 1996: 367–81; van de Kaa 1996: 402–28; more briefly Alter 1992; Hirschmann 1994.

previous generation, and the young tend to fill existing niches. It is only when a significant proportion of the population sells their labor that intergenerational links weaken and both inheritance and children lose value, and growing markets in goods and labor begin to serve as a preventive check on fertility.[156] No comparable changes in intergenerational wealth flows are visible in antiquity. Although urbanization may have been conducive to such changes, lower urban fertility would merely have reinforced the cities' demographic function as "population sinks" that helped regulate rural population growth (see below, VIII). Without a concurrent mortality decline, migration to the cities and the resultant increase in the specialization of labor might even have raised rather than depressed the fertility of rural households.[157]

The economic "low-equilibrium trap" that inhibits sustained intensive growth (see above, III) has an important demographic dimension: a low-productivity, high mortality and high fertility regime typically rests in an equilibrium state that can only be perturbed by a boost in capital and the stock of knowledge that favors increased investment in offspring.[158] For most of human history, the default position was a low-level equilibrium with little human capital and low rates of return on investment in human capital (i.e., education), associated with large families and low investment. Conversely, it takes high rates of return on human capital relative to return on children *per se* to increase investment to an extent that ultimately depresses fertility. Although the existence of large families does not necessarily imply demand for them, and the diffusion of cultural preferences may arguably matter more than micro-economic forces,[159] there can be little doubt that these crucial economic preconditions must obtain for changing preferences to translate to secular shifts in fertility levels. In the absence of dramatic changes in productive technology or (non-urban) labor markets, no transformation of this kind can have occurred in antiquity.[160] Fertility declines in developing countries have been correlated with improvements in the status of women: women need to benefit from a fertility decline in so far as their wage rate is inversely correlated with their fertility.[161] Again, no comparable process can be posited for Greek or Roman societies (see Chapter 4).

[156] Caldwell 1982; Schofield 1989. [157] E.g., Stark 1981.

[158] Becker 1988; Becker, Murphy and Tamura 1990.

[159] E.g., Bulatao and Lee 1983; Easterlin and Crimmins 1985.

[160] Although choice theories are predicated on the possibility of conscious fertility control by couples – Cleland and Wilson 1987 – this option may well have been available in principle, as suggested above. But see Scheidel 2001b: 37–44 for a critique of the ancient and modern construct of alleged Greco-Roman preference for small families or childlessness.

[161] Women's status: e.g., Mason 1985; Handwerker 1991; Federici, Mason and Segner 1993. Benefits: Schultz 1981: 6, 150–90.

(d) *Mortality and fertility*

It is true that according to some comparative data, a fertility transition is not a necessary precondition for economic development; nor is the latter indispensable to the former.[162] Nevertheless, if mortality rates drop, intensive growth is unlikely to be sustained in the long term unless fertility follows suit. Although fertility transitions are now known to have occurred under diverse conditions, mortality decline is undeniably a necessary – if not a sufficient – condition for them to unfold.[163] Mortality decline is of crucial importance also because of its correlation with HALE (see above, II): lower death rates will necessarily be accompanied by improved health among survivors that raises returns on investment in human capital, thereby curbing fertility and facilitating productivity growth. No substantial mortality or morbidity decline is credibly attested for the Greco-Roman world or indeed any pre-modern population prior to European and Chinese elites in the eighteenth century.[164] Moreover, since a mortality decline may initially trigger higher fertility, the long-term depression of fertility by lowered mortality is largely a function of the labor system and the sources of income.[165] In the absence of fundamental economic transformations along the lines described above, even an increase in mean life expectancy – had it indeed occurred in certain phases of ancient history – would not have triggered a fertility transition or supported sustained intensive growth. In consequence, we must conclude that the principle of a relatively inelastic ratio of productivity to demographic growth that lies at the core of the model outlined above (III) is fully applicable to Greco-Roman economies.

(e) *Change and continuity*

In the most general terms, we can observe a mixture of continuity and change between antiquity and more recent periods of Mediterranean history. The intermediate level of marital fertility in Roman Egypt (Figure 3.6) is consistent with a mixture of "European" and "Asian" features of fertility control as outlined above. While it is unclear whether the "northwestern European" pattern of late marriage pre-dates the time of the Black Death, it does not appear to have prevailed in the western provinces of the Roman empire. It is possible that as Christianization increasingly marginalized traditional fertility depressants such as post-partum family limitation, adoption, and divorce, the age and frequency of first marriage gained importance

[162] Coale and Watkins 1986.

[163] Stressed by Kirk 1996: 368–9; van de Kaa 1996: 405–9. Chesnais 1992 refutes apparent exceptions to this rule.

[164] Livi-Bacci 1991: 63–7; Lee, Wang and Campbell 1994: 401.

[165] Schultz 1981: 5.

as the main preventive check.[166] More importantly, we have to allow for substantial diversity within the ancient Mediterranean and its hinterlands, and even between local communities, even if it defies empirical investigation.[167] Comparative evidence from Europe and East Asia shows that because demographic variables such as age of first marriage and celibacy rates are correlated with economic opportunities, their relative importance is prone to fluctuate over time.[168] The lack of serial data from any part of the classical world prevents us from tracking any such developments, in so far as they did in fact occur. However, notwithstanding considerable underlying demographic inertia, it would be misleading to reckon with rigorously stable demographic regimes that constrained economic development in an unchanging fashion. Rather, demographic and economic structures would co-vary over time. These shifts most likely took place over the medium term, as measured in generations or centuries, and would therefore be of particular relevance to our understanding of differences between conventionally defined periods of Greco-Roman history. Our inability to calibrate our analysis at the required level of resolution is perhaps the biggest impediment to the synthetic study of ancient economic and population history.

At the same time, it deserves notice that in the long term, different configurations of fertility control tend to generate similar homeostatic equilibria: in the final analysis, historical Total Fertility Rates do not vary much regardless of the typical age of first marriage or the average length of birth intervals.[169] In the same way, irrespective of the culturally mediated incidentals of proximate agency, ancient populations would necessarily regulate their fertility in a homeostatic manner. There is no sign that at the documented level of economic development and organization of labor, ancient Mediterranean populations were in a position to reduce average fertility in order to preserve intermittent productivity gains in a way that would have sustained long-term intensive growth. Among agrarian economies, "only populations blessed with the most advantageous institutions governing reproduction, surplus extraction, and use of surplus, would be able to (. . .) progress into the next-higher technological regime."[170] Ancient societies were not among them.

VIII URBANIZATION

(a) *The scale of urbanization*

Yet even in the absence of major breakthroughs, some intensive growth could and did of course occur, but is virtually impossible to measure and

[166] See Shaw and Saller 1984 for a partial rebuttal of Goody's 1983 thesis of sweeping demographic changes in the wake of Christianization.

[167] Cf. Wilson and Airey 1999: 122 for striking differences between contemporaneous villages in Tokugawa Japan.

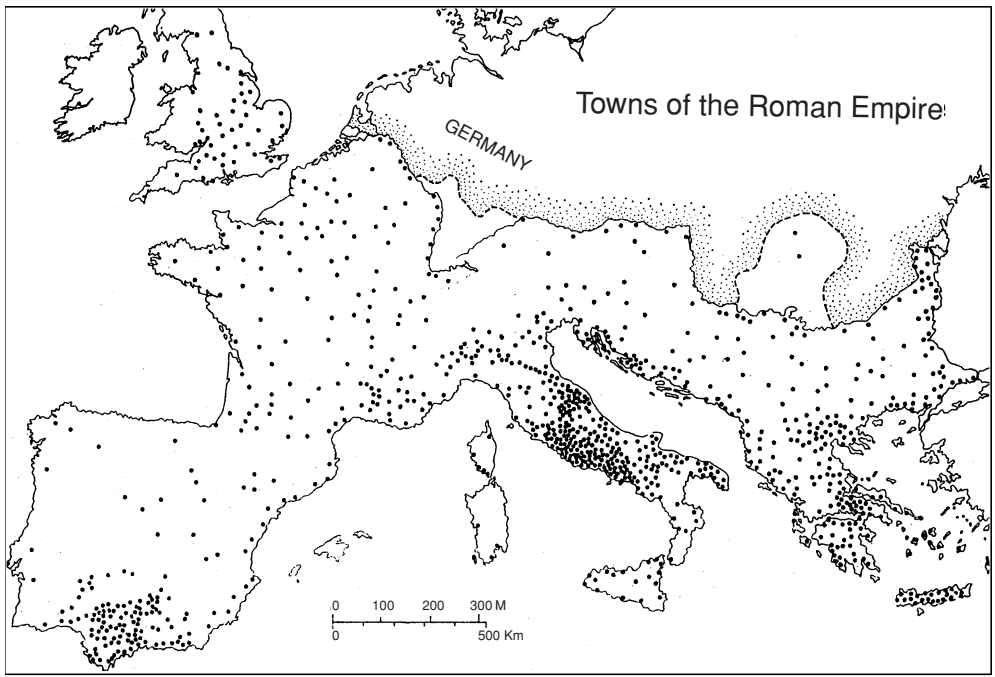
[168] Schultz 1981: 29; Saito 1996: 542. [169] Wilson and Airey 1999. [170] Lee 1986a: 123.

can only be estimated in vague terms (cf. above, 11). This raises the question to what extent shifts in the distribution of population between countryside and cities, or more precisely between the agrarian and the non-agrarian sectors of the economy, were indicative of and correlated with real economic growth. Urbanization, whilst mediated by political and cultural factors, is ultimately a function of population density. Even if labor productivity and individual surpluses are small, rising density will be conducive to the expansion of non-agrarian production and urbanization. Although levels of urbanization also depend on prevailing transport technologies (to supply cities with vital goods) and modes of sociopolitical organization, in so far as these variables are themselves shaped by population size and density, they may to a certain degree be considered endogenous epiphenomena of underlying demographic conditions. And while transport by river and sea lowers the density threshold for urbanization by increasing the catchment area for urban sustenance, low population densities forestall long-distance transfers in as much as the supplying periphery needs to be endowed with sufficiently high concentrations of population to enable mass transport of goods to ports.[171] This precondition helps explain the role of high-density Egypt as the leading exporter of foodstuffs in the ancient Mediterranean, and may account for the fact that the Maghreb only gradually assumed a similar position, presumably as local population densities rose under Roman rule.

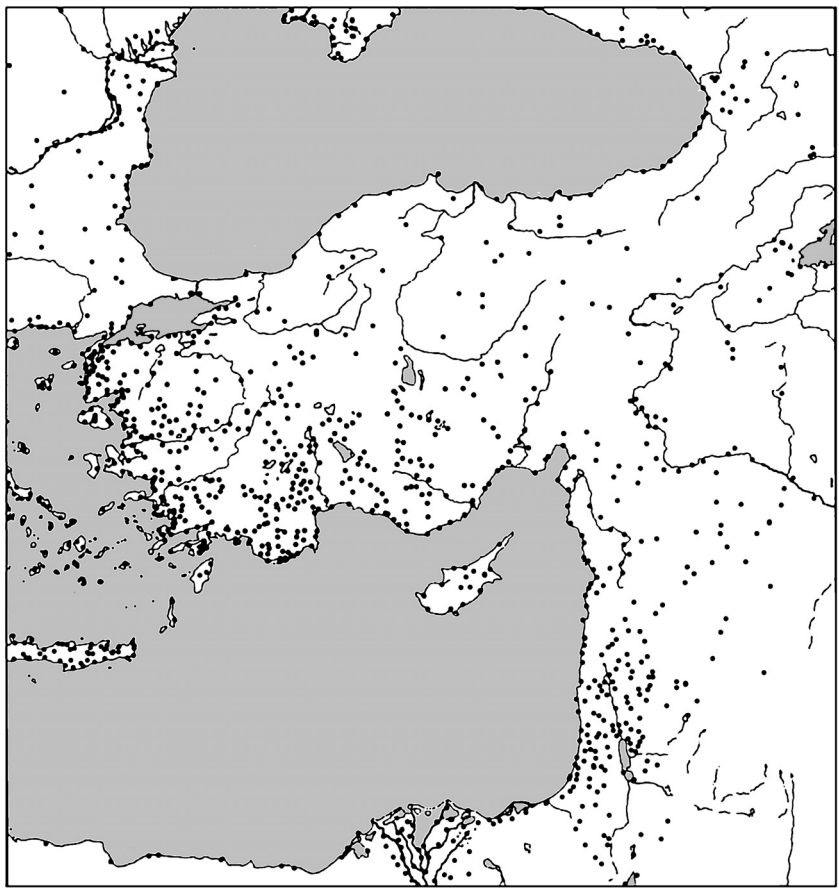
The average share of urban residents in the total population cannot be reliably determined for any particular region or period of the Greco-Roman world. It is however clear that for much of the period under review, the Mediterranean witnessed a gradual westward spread of cities. After the collapse of Mycenaean civilization, no genuinely urban communities appear to have existed anywhere west of Anatolia, Crete, and Egypt.[172] With the formation of urban nuclei in the Aegean and the foundation of Phoenician and Greek settlements in the west, the coastal areas of the Mediterranean came to be sprinkled with small cities, some of which flourished while others eventually contracted or failed. Major inroads were made under Roman rule, first with the proliferation of cities in Italy and subsequently with the expansion of urbanism into Spain, Gaul, Britain, the Danubian region and the interior of the Maghreb.[173] However, even at the climax of Roman urbanism, cities were largely clustered on the coast or along major rivers (Map 3.2). In the meantime, urbanism also thrived in the eastern half of the Mediterranean (Map 3.3).

It would make little sense to estimate urbanization ratios for Greek *poleis*. By the classical period, a few million Greeks had come to be spread out across some 1,000 *poleis* in the Aegean and other parts of the Mediterranean and the

[171] Boserup 1981: 68, 74. [172] Cf. Morris 2006 for conditions in Greece.
[173] E.g., Lassère 1977; Bekker-Nielsen 1989.



Map 3.2 The distribution of cities in the western provinces of the Roman empire
Source: Pounds 1969: 155 fig. 10



Map 3.3 The distribution of cities in the eastern provinces of the Roman empire
Source: adapted from Jones 1937: maps II–IV; graphics by A. T. Wilburn

Black Sea. As a consequence, most communities were small and the urban–rural divide was exceedingly permeable. According to one guesstimate, fewer than half of all *poleis* comprised more than 2,000 members, and only 15 percent more than 5,000.[174] Under these circumstances, only the largest *poleis* (which did however account for a substantial share of the total Greek population) would be endowed with urban centers that predominantly consisted of non-farmers.

Large cities were newcomers to the scene: up to the fourth century BC, no city of 100,000+ residents is safely attested, and the permanent urban

[174] Number: Hansen and Nielsen 2004: 53–4. Size: Ruschenbusch 1985: 262; but cf. Nixon and Price 1990.

population of Athens definitely, and that of Syracuse almost certainly, fell short of this mark.[175] While we cannot tell for sure when (or even if) Carthage reached this size, it was not until the third century BC that the city of Rome crossed this threshold, accompanied by Alexandria in Egypt and Antioch in Syria.[176] In the following centuries, these metropoles grew faster than the general population: by the second century AD, between 1.5 and 2 million people lived in the five largest cities of the Roman empire – Rome, with up to one million; Alexandria, with up to 500,000; Antioch, with at least 150,000; and Carthage and Ephesus. At its peak, Rome was as populous as the twelve largest cities of Christian Europe in 1500 taken together, on a par with the capitals of Song China and Tokugawa Japan, and unsurpassed in Europe until London reached the same size around 1800.[177]

Cities of that size had to be supported by catchment areas that only a very large empire could provide. Owing to divergent paths of historical development, the urban system of the early imperial period was more intensely primate in the western half of the empire than in the east. The main urban centers of the Levant – Alexandria, Antioch, Pergamon – had originally attained their size as the capitals of separate empires during the Hellenistic period and subsequently retained or even added to their substantial populations under Roman rule. In the west, by contrast, the Romans had expanded into comparatively weakly urbanized regions (and destroyed their main urban rival Carthage). As a result, with the exception of the re-established regional African metropolis of Carthage, the Latin half of the empire long lacked substantial secondary population centers: we cannot reliably identify a single western city other than Rome and Carthage whose urban population reached 50,000, and it was not until the emergence of Mediolanum and Ravenna as new centers of the late imperial period that significant changes seem to have occurred. In AD 330, the designation of Constantinople as a new capital city added a third mega-city to the eastern half of the empire.[178]

The total number of cities in the Roman empire is not known with precision but probably approached 2,000.[179] Urban status was a legal construct, and some small settlements may have been urban more in name than in

[175] See Morris 2006, who thinks that classical Athens probably peaked at c. 40,000.

[176] Alexandria: Scheidel 2004a; Carthage: Lancel 2000. Seleucia on the Tigris belonged in the same category, in a sense succeeding Babylon, which ought to have reached 100,000 (or possibly a much higher total) by the middle of the first millennium BC: cf. van de Mieroop 1997: 95–7. The size of Memphis is another unknown variable (cf. below, Chapter 16).

[177] Rome: Hopkins 1978a: 96–8; Morley 1996: 33–9. Lower estimates (e.g., Storey 1997) are unlikely: Lo Cascio 1997a; Scheidel 2001b: 51–2. Alexandria: Delia 1988; Antioch: Downey 1958; Liebeschuetz 1972: 92–5; Carthage: Gros 2000a: 542. Cf. in general Nicolet, Ilbert and Depaule 2000. Europe in 1500: de Vries 1984: 270–8.

[178] Dagron 1974. [179] Scheidel forthcoming, b.

nature.[180] Official bias in the recognition of urban status accounts for substantial regional imbalances: despite their similarly sized populations, Italy boasted over 400 cities while Egypt had only around 50; because of this, large Egyptian "villages" could be more populous than small Italian "cities."[181] Since the Roman empire grew out of a conglomerate of highly diverse sociopolitical formations ranging from earlier empires to tribal peripheries, it did not develop a single unified urban system that could profitably be subjected to rank-size analysis. As is typical of pre-modern economies, disproportionately large primate cities coexisted with numerous small urban communities while intermediate population centers were comparatively rare.[182] Italy is necessarily the most extreme example, where the capital may have accounted for up to two-thirds of the total population of cities of more than 10,000 residents. In Roman Egypt, Alexandria was perhaps six to eight times as populous as the next-largest city.[183] This pattern reflects the gravitational pull of rent-absorbing political centers and the corresponding weakness of the economic integration of urban economies within a given region.[184]

Relying on necessarily speculative and over-schematic calculations, I am inclined to posit an aggregate urban population of the Roman empire of the order of 7 to 9 million, approximately one-eighth or one-ninth of the total imperial population.[185] Regardless of its reliability, any notional average is bound to conceal substantial regional differences.[186] Over time, nucleation would often alternate with dispersal.[187] In earlier periods, very large proportions of the inhabitants of many Greek communities seem to have resided in the urban centers instead of their rural territories: Bintliff has argued that almost three-quarters of the population of classical Boeotia lived in cities, and drawing on an exhaustive survey of the size of walled cities throughout the Greek world, Hansen projects an overall urban/rural ratio of 1 to 1.[188] Most of these "urban" residents would have farmed land in the surrounding area. It is unclear to what extent Roman settlers in Republican *coloniae* at least initially resided behind city walls and whether comparable "agro-towns" also existed in Roman Italy.[189] More generally, we need to allow for the possibility that the full sociopolitical fusion of town and country that was a defining characteristic of Greek and Roman

[180] Cf. Paus. 10.4.1. [181] Beloch 1886: 438; Hopkins 1978a: 68; Rathbone 1990: 124–37.
[182] Smith 1982 (a "concave" pattern, as opposed to the lognormal distribution of city size found in developed economies). Cf. de Vries 1984: 85–120.
[183] Morley 1996: 182; Rathbone 1990: 119–21.
[184] Cf. Ades and Glaeser 1995 for the correlation between political inequality and urban primacy.
[185] Scheidel forthcoming, b.
[186] Urbanization rates were highest in the most densely populated parts of the empire: see Hopkins 1978a: 68 for Italy, and Scheidel 2001a: 247–8 for Egypt.
[187] E.g., Alcock 1993. [188] Bintliff 1997a: 235; Hansen 2006: 24.
[189] Garnsey 1998: 107–31, with my addenda 131–3.

civilization raised the number of urban residents well above the size of the non-agricultural population.[190] For this reason alone, ancient urbanization tallies may not readily lend themselves to comparative assessments. Moreover, while computations of urbanization ratios for later historical periods do not normally recognize settlements of fewer than 5,000 (or even 10,000) residents as "urban," the majority of all "cities" of the Roman period must have fallen short of this threshold.[191] The magnitude of the resultant incompatibility of ancient and later urbanization estimates is highlighted by the observation that in Europe west of the Balkans in 1500, some 3,000–4,000 settlements enjoyed some form of urban rights whereas only about 500 of them had at least 5,000 inhabitants and are included in modern calculations of urbanization levels.[192] Nevertheless, in the context of my global estimate, it seems reasonable to assume that probably as early as 1300, and certainly by 1500, the formerly Roman territories west of the Balkans had re-attained and surpassed Roman urbanization levels above the conventional threshold of 5,000, especially if we control for the anomalous size of the city Rome in antiquity.[193] In terms of the total number of "urban" settlements, the Roman empire once again appears to have broadly matched the contemporaneous Han empire.[194]

(b) *Urbanization and economic development*

These tentative quantifications are of little relevance to our understanding of economic development unless we can correlate urbanization levels with the share in economic output of the non-agrarian sector. In the absence of usable statistics, we can only guess at the ratio of non-farmers to city-dwellers. The observation that in pre-modern societies, the former tend to outnumber the latter by up to 5 percent need not apply to economies in which the minimum size threshold for "cities" is very low and the population of many small towns of one or two thousand residents must have included a strong complement of farmers.[195] The presence of larger "agro-towns" would have skewed the picture even further.[196] Nonetheless, there is no good reason to believe that more than one person in eight would have been permanently or predominantly engaged in non-agrarian labor. In any case, whilst allowing for exceptions in particularly developed or

[190] Cf. below, n. 195. [191] Cf. de Vries 1990: 44–8 on definitional problems.

[192] de Vries 1984: 28, 67; cf. Pleket 1990: 145. Roman city sizes often cannot be determined with the requisite precision: cf. Duncan-Jones 1982: 259–77; Scheidel 2001b: 60–1.

[193] de Vries 1984: 42–3, 70, 72 (c. 9? percent in 1300); 36, 67, 270–8 (c. 11 percent in 1500).

[194] Nishijima 1986: 574. However, my estimate of the urban proportion of the Roman population is twice as high as (low) estimates for T'ang and Song China: Rozman 1973: 279–80.

[195] Bairoch 1989: 266. Cf. de Vries 1984: 22. About 6 percent of men in several (large) villages in Roman Egypt were tradesmen: Alston 2002: 335–6.

[196] See above, n. 188–9, and below, n. 202.

privileged regions such as classical Attica or Roman Italy, we must assume that the proportion of non-farmers in the total population fell short of the 20 percent estimated for sixteenth-century England.[197]

More generally, urbanization may be envisaged as the outcome of any one of four processes: the concentration of a previously dispersed non-agrarian population of rentiers, craftsmen, traders, and even farmers in cities, without concurrent changes in population density or productivity; increasing population density at constant per capita output, creating a larger cumulative surplus that sustains larger, urban, settlements for the non-agrarian population; increasing per capita output at constant population levels, expanding the relative share of the non-agrarian sector and encouraging urban residence; and, finally, concurrent increases in population and productivity. In practice, none of these ideal types occurs in pure form, and the same is true for antiquity: the likely convergence of these inducements alone makes it impossible to gauge the contribution of each of them. Even so, the scale of the urban expansion in some parts of the Greco-Roman world, most notably in the north-western provinces of the Roman empire, suggests that gross population growth *per se* was a necessary but not a sufficient condition. Rather, institutional arrangements and even moderate levels of intensive economic growth appear to have been the main driving force behind the success of urbanism. For instance, the hundreds of new urban centers that sprang up in archaic Greece may have owed their existence to the strengthening of local government and the emergence of a nucleated rentier class.[198] In later periods, while the collection and re-allocation of resources by urban elites remained fundamental to the existence of cities, transcendent imperial power gradually became an even more critical determinant of urban development. By the early Roman imperial period, many cities had come to function as nodal points of a larger system of exploitation and transfers, converting local taxes and rents into exportable items of trade and cash. Without the exaction of resources that was caused or facilitated by imperial authority, elongated lines of trade and the resultant network of cities that was ultimately centered on the capital would not have emerged in the same way.[199] Because of these obvious differences in context, it would not make much sense to treat the Greco-Roman or "ancient" city as a stable and uniform institution or attribute to it a single function or location within a particular system of production as a whole.

Nevertheless, modern observers have frequently been preoccupied with attempts to define ancient cities in terms of ideal types and to identify

[197] Wrigley 1987: 170. [198] Morris 2006.

[199] Hopkins 1995/6. This network was best developed in Italy (Morley 1996), although overall levels of integration remained poor (cf. above).

their shared characteristics. In the wake of Finley's work, much debate has revolved around the distinction between Sombart's and Weber's concepts of the "consumer city" (in which a rentier class of landowners or officials draws wealth generated in the countryside in the form of produce from their own holdings, rents, and taxes, and by spending this income on retainers and artisans in the city creates an urban market for food and labor) and the "producer city" (supported by the production of goods that are exchanged for food and raw materials), and the application of these ideal types to the study of ancient economies. For Finley, Greek and Roman cities typically – though not exclusively – belonged in the former category because they relied much more on non-reciprocal rents than on trading or manufacturing for external markets, whereas critics are at pains to demonstrate the supposed significance – yet *de facto* often just the mere existence – of urban commercial activities.[200] This is not the place to revisit this increasingly stale controversy, and readers are referred to the more specific discussions of the urban economy of different periods and regions in later chapters. Suffice it to say that I find myself in agreement with Erdkamp's recent observations that since the model of the "consumer city" is primarily concerned with the economic foundation of the urban economy in its relation to the outside world (i.e., the mechanism employed in the extraction and transfer of agricultural surplus), it does not predict a particular level of economic development and is not logically associated with the notion of a "primitive" economy; that the concept is readily consistent with the presence of numerous urban artisans and merchants, and with "complex" urban economies in general; that evidence of inter-regional trade or manufacturing for export would not impinge on the model; and that even though reciprocal exchange through the market between food production and other sectors (urban or rural) did of course occur, non-reciprocal relationships predicated on social and political entitlement were sufficiently dominant to determine the nature of ancient economies within and beyond the urban sphere.[201] Once again, however, we must reckon with significant change over time. As Hansen has argued, many of the *poleis* of archaic and classical Greece conformed more closely to Weber's concept of the "farmer-citizen-city," in which the majority of community members resided in an urban core but farmed their own land and were sustained by its products.[202] In parts of the Roman empire, on the other hand, urban rentiers appear to have played a more dominant role.[203] Thus, political regime, overall levels

[200] Finley 1981: 3–23, 1999: 123–49. Jongman 1988a is the fullest case study. For criticism, see, e.g., Engels 1990; Parkins 1997; Horden and Purcell 2000: 105–8; Mattingly et al. 2001. On the debate, Whittaker 1995.

[201] Erdkamp 2001.

[202] Hansen 2004, with reference to Weber 1999 (1921): 67–8 ("Ackerbürgerstädte").

[203] See above, n. 110.

of inequality, and the structure of landownership were critical determinants of the economic character of ancient cities.

It will always be easier to count cities and track shifts in their numbers than to reach agreement on the nature of the urban economies of the ancient world. From a pragmatic standpoint, therefore, what matters most in the present context is whether urbanization and economic development tend to be correlated in a predictable fashion, and more specifically whether cities, by their very existence, are conducive to economic growth. In principle, urbanization creates new problems – at the most mundane level in terms of the technology and organization of food transport, and beyond that regarding institutional arrangements – and therefore new opportunities and an intrinsic impetus for innovation.[204] On average, the mere presence of cities can be expected to have raised agricultural efficiency by creating novel inducements.[205] Thus, to the extent that urban elites increased rent extraction to support urban spending and the perceived amenities of cities encouraged migration, cities might be said to have acted in the same way as population density: while growing density raises demand per unit of land (an absolute increase), urbanization raises it by increasing the non-agrarian share of the population (a relative increase). Needless to say, these underlying mechanisms cannot be formally demonstrated for ancient economies, and the scale of such effects is a crucial issue that is hardly susceptible to empirical investigation.

Thanks to the predominance of non-reciprocal resource flows between the agrarian and non-agrarian sectors, ancient "consumer cities" might be regarded as "parasitical" and therefore considered an impediment to (rural) economic growth.[206] However, even parasitic cities may have positive effects on the countryside and on economic development in general: as Wrigley has pointed out, they are parasitical only with regard to the division of current flows of goods, not with regard to the creation of circumstances in which the flow of goods can be increased over time. For instance, barring unilateral exploitation, rural populations might increase in size without being better off per capita. In fact, the absorption of population by cities is an important safety-valve of high-fertility regimes, and might even prepare the ground for economic development: "The growth of towns tended to increase the likelihood of achieving a low-pressure equilibrium because the high death rates in towns meant that they were normally consumers of men."[207] Although urban excess mortality would need to be accompanied by relatively moderate mortality levels in lower-density rural areas to facilitate an eventual fertility transition – which was the case in early

[204] Lee 1986a: 100; cf. North 1981: 132–5. [205] Wrigley 1990: 102.
[206] On "generative" vs. "parasitic" cities, see Hoselitz 1954/5; Wrigley 1978. Cf. Ringrose 1990.
[207] Wrigley 1978: 306.

modern England but hardly in the ancient Mediterranean – Greek and Roman cities could at the very least act as a brake on population growth, thereby delaying the negative impact of declining marginal productivity. From this perspective, it is tempting to attribute the considerable duration of ancient growth phases in part to the concurrent growth of cities and the strong urban focus of Greco-Roman civilization in general. Although the precise determinants of urban excess mortality continue to be debated, comparative evidence from later periods suggests that urban death rates usually exceeded birth rates and that cities were sustained by immigration from the countryside.[208] The pull of the city of Rome is merely the most conspicuous example: just as early modern London absorbed most natural growth in England and in the process reconfigured the economic system of its hinterland, late Republican and early imperial Rome has been said to have had a comparable impact on the social and economic structure of Italy.[209] In conjunction with the more than 400 other cities of Italy, the growth of the capital may arguably account for the apparent demographic stagnation of the Roman citizenry in the late Republic, even if slaves from overseas made up a substantial proportion of all urban residents.[210] In Egypt, another heavily urbanized region, urban excess mortality was equally likely to have constrained overall population growth: census data from some of its largest cities point to much higher attrition rates than in the surrounding villages.[211] In less urbanized regions, the pull of urban "population sinks" would have been correspondingly weaker but hardly non-existent. In the broadest terms, we may conjecture that in the Roman empire, urban excess mortality could easily have absorbed rural natural growth of the order of 0.1 percent per year, and possibly more.[212] By implication, over the course of about a millennium, the creation and maintenance of some 2,000 cities would consequently have entailed the movement of perhaps up to 40 million people from the countryside to urban environments.[213] Thus, from a demographic perspective, ancient cities, regardless of the nature of their economic foundations, were bound to make a contribution to economic

[208] de Vries 1984: 175–98; Scheidel 2001b: 28 n. 106; Woods 2003.

[209] Wrigley 1987: 133–56 (and cf. Rozman 1974 on Edo); Morley 1996. For health hazards in the capital, see Scobie 1986. Although Rome's infrastructural provisions for water supply and waste disposal may have alleviated morbidity, the exceptional severity of the local endemic disease environment (dominated by malaria) was bound to offset any such benefits: see Scheidel 2003a, *contra* Lo Cascio 2001b, 2001c: 187–92, 2006a. Contrast Hanley 1987, on Edo.

[210] Jongman 1990, 2003a; Scheidel 2004c: 14–19.

[211] Scheidel 2001a: 142–62.

[212] Annual rates of natural decrease of 1 percent for one-fifth of the gross urban population (residing in the five largest cities of the empire) and 0.5 percent for the remainder could be compensated for by the annual transfer of 0.1 percent of the rural population to the cities. Growing cities would require higher inputs.

[213] If the aggregate urban population increased by 9 million between 800 BC and AD 200 and annual natural decrease averaged 0.6 percent, 36 million would have been required to establish and maintain these cities. At half that attrition rate, the total is 22.5 million.

development by alleviating population pressure and slowing down slides in marginal productivity.

In consequence, pre-industrial cities are best viewed both as parasitic and as a stimulus; these functions cannot be separated. The extent to which urbanization stimulated growth is a question of degree, and critically depends on how much it led to increases in functional specialization.[214] By the time of the Roman empire, even small towns displayed a striking degree of differentiation in crafts and trades.[215] At the same time, the nature of the division of non-agrarian labor between city and countryside remains relatively obscure. We may assume that much as in the late mediaeval and early modern periods, most rural demand was met locally but supplemented by city–country trade, often mediated by periodic fairs. It has also been argued that ancient economies may have experienced less division of labor between cities and regions than mediaeval western Europe, and less inter-regional specialization in general.[216] These issues will be addressed in the discussion of particular regions and periods.

IX CONCLUSIONS

Throughout the Greco-Roman period, structural continuity on some levels coincided with significant change on others. Despite a potentially considerable degree of ecologically determined but ultimately multi-directional variation over space and time, the basic patterns of mortality and fertility are unlikely to have changed much – or at all – in the long term. At the same time, the distribution of population within the Mediterranean and its hinterlands underwent a lasting transformation. With the extension of short-fallow farming and urbanism to the western reaches of Europe and to north Africa, the demographic center of gravity gradually shifted from the eastern to the western half of the Mediterranean region. Hellenistic and Roman imperialism gave rise to the first mega-cities of the region and created a far-flung network of cities in the south-western half of Europe that, a millennium later, provided the template for urban revival and further expansion in the High Middle Ages. In the absence of major transitions in productive technology, much of the discernible increase in population must have been the result of extensive growth, facilitated by climatic change and the lateral dissemination and adaptation of crops, techniques and institutions. The true extent of intensive growth is largely obscured by these

[214] E.g., Wrigley 1978: 298–304; Pleket 1990: 79–86.

[215] Patlagean 1977: 156–81 notes that 110 different trades were recorded in the small town of Korykos in Cilicia. See also below, Chapter 25. Treggiari 1980: 56 counts 225 different jobs for urban laborers in the western Roman empire.

[216] De Ligt 1990, 1991; and see 1993a for fairs. Cf. Jongman 2000b on textiles. On Roman Egypt, see Alston 2002: 334–42.

developments: fluctuating over time, it may have accounted for the more conspicuous phases of socioeconomic development of the period – above all in archaic and classical Greece and in late Republican Italy – but was bound to progress very slowly in the long term. From a global perspective, the demographic and economic developments of the Greco-Roman period were part of a wider upward trajectory of undulating growth and contraction that extended into the mediaeval and early modern periods of European history.

CHAPTER 4

HOUSEHOLD AND GENDER

RICHARD P. SALLER

I INTRODUCTION

In the Greco-Roman world the household was the basic unit of production as well as consumption. This truism makes it imperative to understand how the household functioned through its life cycle, how property rights and labor participation were configured by gender and age. Too often in the past economic historians of antiquity have written with the implicit assumption that property owners and laborers were adult males.[1] Even a rough understanding of ancient Mediterranean demography suggests that such an assumption is unwarranted: women and children were important potential sources of labor and, in some legal regimes, substantial property owners.

The centrality of the household and family in the ancient economy is reflected in the most influential Greco-Roman work on the "economy," Xenophon's *Oeconomicus*. Written by an Athenian in the fourth century BC, this treatise of advice on estate management was read and cited as a source of wisdom for more than two millennia.[2] The work has been set aside as "not modern economics" (which it is not), and has been characterized as moral ideology (which it is).[3] But neither point should obscure the fact that its basic theme, the gendered division of labor, was fundamental in household production and consumption.[4]

The principal focus of this chapter will be on the configuration by gender and age of property rights and labor in the households of classical Athens and Roman Italy. This focus will necessarily involve simplification of the rich variety of ancient societies, because the evidence is not adequate to capture the variation. Where chance survival of a law code provides a glimpse of Greek women's property rights (e.g., for the Cretan *polis* of Gortyn in the fifth century BC), the law is quite different from that of Athens – a warning not to generalize from Athenian evidence to the condition of all Greek women. The choice of focus on Athens and Roman Italy is justified not only by the fact that these two societies are best attested, but also by

[1] Neither Rostovtzeff 1957 nor Finley 1973a has an entry in the index for women.
[2] Finley 1973a: ch. 1. [3] Murnaghan 1988. [4] Pomeroy 1994: ch. 5.

the fact that they exemplify two different conceptions of "patriarchy." That term has been used, rather confusingly, to cover both the husband's domination of his wife, and the father's domination of his children. With respect to property ownership, the first sense is appropriate to classical Athens, where citizen wives had practically no independent rights over property, whereas the second sense is appropriate for classical Rome, where there was no age of majority for children in their father's power.

This chapter opens with a methodological discussion of the difficulties with the sources. There follows an account of the demography of household formation and organization. The core of the chapter lies in the analysis of the patterns of property ownership and management by gender and age in Athens and Rome, and then of women's and children's labor in both societies. The differences between Athens and Rome in women's property rights is more evident than differences in labor participation. The stronger property rights of wealthy Roman women enhanced their social status, but it is not obvious that they much affected decisions about economic production. The participation of women and children in particular sectors of production appears similar from fifth-century BC Athens to second century AD Rome: the fact that the changes in the training and labor-force participation of women and children were limited over these centuries is one aspect of the story of limited development within a fairly low-level equilibrium in the ancient economy.

II SOURCES

The epistemological challenge of this subject is compounded by three basic problems. First, of course, there is the common problem of all ancient economic history, the absence of quantitative data. Comparative evidence suggests that patterns of property ownership and labor participation by gender and age can have demonstrable effects on the quality of life for women and children, but both the levels of participation and the effects are impossible to substantiate for antiquity in the absence of aggregate data.[5] Second, even in contemporary economics it can be difficult to document the dynamics of decision-making within the household – all the more so in antiquity with the thin, male-dominated sources. Third, this difficulty is exacerbated in antiquity by the heavy moralizing overlay in discussions of the household, without a counterweight in the form of works written by women.[6]

In economic history as in other forms of ancient history, the source materials are usually not genuine documents (except the Egyptian papyri and some inscriptions) but are representations in a variety of genres.[7] The

[5] Dercon and Krishnan 2000. [6] Dixon 2001, Murnaghan 1988. [7] Dixon 2001.

literary and philosophical representations, from the Homeric epics through the late Stoic philosophers, were powerfully shaped by the fundamental polarity of male outdoor/female indoor work and by the ideals of female domesticity.[8] Often children are invisible or recognized in casual asides.[9] As a result, these works should be treated not as sociological observation of behavioral patterns but as expressions of (adult male) moral ideals. Having acknowledged as much, I would also argue that these representations of women are not merely arbitrary fictions, unconnected with their lives. Rather, there is a substantive, as well as methodological, issue here: that is, to what extent did the ideology have practical effects, limiting women's ownership and labor participation? The brief answer is that the few, precious, relevant corpora of documents point to strong asymmetries of gender in accord with the ideology.

In Athens and Rome the law laid out a basic institutional framework for a configuration of roles and rights within the household by gender and age. Indeed, the relative prominence of the family in Athenian forensic speeches and Roman juristic texts is basic testimony to its centrality in organizing economic and social life. Of course, any use of Athenian orations must take account of the fact that they are heavily tendentious, that by definition the opposing sides in the court case represented the situation and perhaps the law itself differently.[10] The Roman juristic texts, mostly the product of later excerpting, present cases real and imaginary. Although the cases themselves cannot be taken as sociological description, it seems probable that the underlying socioeconomic assumptions were realistic in the elite citizen's world of the jurists; otherwise, patently unrealistic premises would have been challenged in legal contests and undermined the authority of their responses. On the other hand, it must be recognized that Latin usage often effaced gender distinctions in the legal texts, making it difficult to detect women, and could be ambiguous with regard to age.[11]

Evidence from the legal realm also raises substantive as well as methodological issues. To what extent did the legal rules and principles reflect practice? How influential were the legal institutions in shaping practice? Since the latter question is usually answered with respect to legal prescriptions and rules, it should be emphasized that legal institutions also enabled behavior. As an illustration, the Roman law of *patria potestas* did not grant independent property rights to adult sons in their father's power, and yet the legal institution of *peculium* gave these sons dependent property rights that enabled them to carry on a business.

Inscribed stones have a special value for the ancient historian, because they survive in the hundreds of thousands and from all regions of the

[8] Scheidel 1995: 205; Pearce 1974; Mactoux 1994–5: 309.
[9] Wiedemann 1989. [10] Cox 1998: xix–xx.
[11] Gardner 1995; Saller 1999; Wiedemann 1989: 154.

Mediterranean, including some from which no other texts survive.[12] Many of these texts are epitaphs on gravestones and are representations of the deceased. A substantial minority of the representations includes occupation and provides some of the finest-grained evidence available for the working classes. But these inscriptions should not be mistaken as a representative cross-section of the working population: women, young children, and the very poor are underrepresented. Some types of Attic inscriptions are genuine documents and have special value. For instance, the presence or absence of women in inscriptions recording loans or manumissions of slaves deserves particular attention. Likewise, the appearance of women's names in the wooden tablets recording business transactions in Roman Italy and on bricks and pottery permit insights that go beyond gender stereotyping.

III HOUSEHOLD ORGANIZATION

The household (*oikos* in Greek, *domus* in Latin) can be defined by the characteristics of coresidence, kinship, commensality, and economic cooperation.[13] Certain basic features of family and household can be found across the Greco-Roman world. Monogamy was the rule, though not without exception.[14] Divorce was permitted and available to husband and wife. Where it is possible to discern patterns, later male–earlier female marriage was the norm or the common practice. In Athens the norm seems to have been for men in their thirties to marry much younger girls in their teens, though the evidence for this practice is very limited.[15] The data for ages at first marriage in Roman society are fuller and more varied. The literary and legal texts for aristocratic practice suggest that it was not uncommon for girls to be married in their early teens; men of the senatorial elite were expected to marry in their early twenties.[16] Among men and women of the humbler social strata, marriage took place at a somewhat older age, though still with an age gap between men and women. The patterns of funerary commemoration reveal that responsibility for commemoration of women shifted from parents to husband around the age of twenty and for men it shifted from parents to wife around the age of thirty. The most economical explanation for the commemorative shift is that men in their late twenties or early thirties typically married women in their late teens or early twenties.[17] In Roman Egypt the household census records suggest that older brothers married their sisters in their early teens, whereas other men and women married at a somewhat older age, but still with an age gap typical of what Hajnal called the "Mediterranean type."[18]

[12] Saller 2001a. [13] Gallant 1991. [14] Goodman 1991: 174.
[15] Strauss 1993: 67–70; Cox 1998: 120–2. [16] Hopkins 1965; Shaw 1987.
[17] Shaw 1987; Saller 1994: ch. 2. [18] Hajnal 1965; 1982.

Newly married husbands at the age of thirty in a high-mortality regime had an average additional life expectancy of the order of 25–30 years, or less in unhealthy cities and lowlands. As a result of mortality and divorce, we must envisage societies in which widows and orphans were pervasive and vulnerable. Augustan legislation pressed the propertied citizen women of Rome to remarry up to the age of fifty by imposing testamentary disabilities on those who did not, but with what effect is uncertain. The census data from Roman Egypt show that marriage was the near-universal practice for freeborn women, and yet by the age of 35–40 only half of the women were still married.[19] In a context of high mortality, women who lived through their child-bearing years must have had on average five or six children in order to maintain the population. A plausible guess is that one-third to one-half of those children survived to age ten, and those surviving ten-year-olds could expect on average an additional 35 or 40 years of life. A computer simulation of kinship in Roman society suggests that the average age at paternity was about thirty-six, that perhaps one of three children lost their father before they reached the age of puberty, and that two of three were fatherless by the time they reached full adulthood at age twenty-five. The child who reached adulthood with both parents alive would have been among the fortunate minority (20 percent). Family fragmentation and reconstitution, with all the concomitant complications for property and labor, must have been typical, and indeed appear very prominently in the Attic orations and the Roman legal texts.

In the face of harsh mortality, Greek and Roman writers from Hesiod to the Roman jurists represented the normative core of the family unit as nuclear – that is, husband, wife, and children. Aristotle in the *Politics* discussed the household head's responsibility to govern his wife, his children, and his slaves (1253b5–10). This was the basic group that shared the household stores of food and drink. The Latin word for stores was *penus*, and the Roman jurists defined *penus* as the stock of food and drink intended for consumption by the head of the household (*paterfamilias*), his wife and children, and his domestic slaves "who do not work" (*Dig.* 33.9.3pr., 6). Neither in this basic definition nor in any other evidence from Athens or Rome do we find an assumption of a norm of extended, multi-family households – that is, no *frereche*.[20] Nor did the societies of the ancient Mediterranean develop systems of primogeniture or ultimogeniture inheritance; all practiced partible inheritance in one form or another.

In reality, households were extended in numerous ways to accommodate contingencies and needs through the household life cycle. Households included widowed mothers, orphaned children, and unmarried relatives; in addition to kin, ancient households incorporated slaves and other

[19] Bagnall and Frier 1994. [20] Sallares 1991: 196; Crook 1967.

dependants.[21] The census returns from Roman Egypt – the only systematic listings of members of households from the ancient Mediterranean – reveal a luxuriant variety of household forms, including numerous multi-family units (both parents and married children, and married brothers with their families).[22] In these returns, extended family households are more common in rural areas than in the towns. The same may have been true of other Mediterranean societies, but there are no data to confirm the hypothesis. The evidence for Athens and Rome suggests that property ownership and management were generally undertaken by individual families. The *consortium* in Rome, in which adult brothers held an undivided patrimony, was legally possible but regarded as exceptional in practice.[23]

IV PROPERTY OWNERSHIP AND MANAGEMENT

Athens and Rome present two different models of the distribution of property rights within the household. The Athenians held a unitary conception of household property, in which the husband was *kyrios* or manager of his wife's, as well as his own, property. Adult sons had the legal capacity to own property, but did not realize full legal control of the family estate until the death of their father. The unitary regime of household property may have been usual in early Rome, but by the classical era the typical marriage *sine manu* did not transfer the woman or her property to the authority of her husband. By contrast, in the absence of an age of majority, Roman children had no independent legal capacity to own property until the death of their father or their emancipation from him (not a common practice). What implications did this legal distinction have for economic practice?

(a) *Athens*

The law of classical Athens gave citizen women very limited discretion in dealing with property. Before marriage an Athenian girl had her father as her *kyrios*; during marriage her husband was her *kyrios*; and after marriage either an adult son or a male kinsman from her natal family would serve in that role. On her own, a woman could enter legally enforceable transactions only up to the value of a *medimnos* of barley (about a week's food for a family). The precise meaning and consequences of this law are debatable, but several indicators corroborate the narrow limitations on Athenian women's economic rights.[24]

The Athenians practiced a system of partible inheritance in which sons received equal shares of the patrimony, whereas daughters were provided

[21] Bradley 1991. [22] Bagnall and Frier 1994: 57–74.
[23] Crook 1967; Bannon 1997: ch. 1. [24] Schaps 1979: 54.

with dowries for marriage.[25] The dowries could be substantial and usually comprised movables (cash, furniture, slaves), leaving the real property to male heirs. As security for the value of the dowry, husbands offered land, marked by inscribed stone *horoi*.[26] On the extant stones, the mortgages range widely in value from less than 500 drachmas to over a talent.[27] As a proportion of the family wealth, the values attested by the orators run from less than 5 percent of the patrimony to nearly 20 percent.[28] As long as the marriage continued, the husband as *kyrios* controlled the dowry and was responsible to provide maintenance for the wife, but not according to any fixed formula. The inability of poor families to dower a daughter could endanger her chances of getting married.

The possibility of divorce at the wife's or husband's instigation required that forethought be given to the return of the dowry. The return of a large dowry could place the husband in an awkward situation. As a result, Greek authors over the centuries lamented the leverage that a large dowry could give to a wife over her husband.[29] If the marriage ended by divorce or death of the husband, whoever held the dotal property owed annual interest at 18 percent in support of the woman until the dowry was returned. Overall, though Athenian women did not control their dowries and it is something of a misnomer to refer to it as "theirs," an adequate dowry provided a woman with some security against mistreatment or neglect through an unpredictable life course.

Aside from the dowry, Athenian women could benefit from wills or intestate succession. They did not acquire independent control of the bequests, but were the conduit through which the property flowed to another *oikos*. The starkest illustration of this principle was the institution called the epiklerate. In those cases where an Athenian man died with an unmarried daughter and no sons, the daughter became an *epikleros* and was married to her closest male kinsman. The estate was managed by the husband and then passed to the ownership of the sons of this marriage two years after puberty. Alternatively, an aging father with only a daughter could adopt a son to be a husband to his daughter; that son had to give up his claim to his natal patrimony.[30] These rules and others left Athenian heads of households with much less testamentary discretion than their Roman counterparts, and left Athenian women with only passive roles in succession.

A later section will discuss women's labor in crafts and commerce. Here it should be noted that the sources do not reveal Athenian women using their capital to engage in large-scale commerce. Though they occasionally made loans to relatives, they do not appear as professional moneylenders.[31]

[25] Harrison 1968. [26] Cox 1998: 76. [27] Schaps 1979: 99.
[28] Schaps 1979: 78. [29] Schaps 1979: 76.
[30] Schaps 1979: ch. 3; Cox 1998: 94–9. [31] Schaps 1979: 63.

They are very rare in the Eleusinian accounts of transactions in the 320s BC, and they are absent as masters in the Athenian manumission inscriptions of the late fourth century BC.[32]

The rule limiting women's legally enforceable transactions to the value of one medimnos of barley should logically have excluded Athenian women from any major financial transaction, but such a picture would be too stark and simple. There are scattered references to women making large loans and one collecting an *eranos* loan. How should these cases be explained within the context of the law? Schaps argues that the restriction on women's transactions was designed to protect the *kyrios* and that, if he was not regarded as a threat to challenge the transaction (e.g., in a loan to a relative), it could take place. Alternatively, in the case of the woman recorded as collector of an eranos loan, she was able to rely on her *kyrios* to provide the needed standing in law.[33] These examples appear to have been exceptional in a society in which large financial transactions between households were coded as belonging to the male domain. That this was true not only in ideology but also in practice is demonstrated by the inscribed documents recording loans and manumissions.

Most of the evidence for property rights of Greek women comes from Athens; the fragmentary testimony for other *poleis* reveals quite different legal systems. The fifth century BC legal code of Cretan Gortyn was conceptualized in terms of individual rights of family members rather than the unitary household of Athenian law.[34] As a result of this code, the male *kyrios* in Gortyn no longer had the right to dispose of his wife's or mother's property. The household consisted of maternal property as well as the patrimony. Sons and daughters stood to inherit shares of both, daughters receiving shares one-half the size of sons'. For Sparta there is the famous complaint of Aristotle that women had come to own 40 percent of the property in the fourth century BC (*Pol.* 1270a23–6). That wealth, in turn, allowed them to enter the public sphere of competition for status in the Olympic chariot races with teams they owned.[35] Even in Athens, by the period of Roman rule women were more visible as landowners.

How much importance should be attached to the minimal economic prerogatives of women in classical Athenian law? Lin Foxhall has made the argument that formal property rights in law do not regulate interactions within the *oikos* in a context of generalized reciprocity.[36] As Xenophon was at pains to stress, the wife had considerable responsibility to organize and manage the household, its stores and members. Within the one-medimnos rule, the woman could carry out daily transactions to keep the household fed.[37] More informally, wives could influence their husbands' decisions

[32] De Ste. Croix 1970: 224. [33] Harris 1992. [34] Schaps 1979: 7.
[35] De Ste. Croix 1970. [36] Foxhall 1989. [37] Schaps 1979: 55.

about the management and distribution of property, as is implied by the law prohibiting the exercise of influence by a woman over a man drawing up a will.[38] And in the end, the woman had the threat to leave the husband's house with her dowry. So much is true, and Athenian women should not be depicted as entirely passive and powerless. Comparative evidence suggests that women's power to initiate divorce and take much of the property can enhance their well-being in a society.[39] Nevertheless, divorce was a fairly crude instrument of influence and, of course, limited to women with sizeable dowries relative to their husband's wealth. The Athenian wife's lack of other forms of major discretion in the disposal of property surely restricted her power and influence, to judge by a comparison with classical Rome.

(b) *Rome*

If the stories about the early Roman family are credible, Rome moved from a unitary conception of the household to highly individualized rights for spouses. In Roman law the *paterfamilias*, the oldest living male ascendant, was the head of the household with a monopoly of rights over its members and property. In early Rome, the woman upon marriage was transferred along with her dowry from her father's authority to her husband's (or that of his father, if still alive).[40] The dowry was the woman's share of her father's property, as in classical Athens. If the husband predeceased the wife, she had a right to an equal share of his estate, together with the deceased's sons and unmarried daughters (collectively known as *sui heredes*). Early Roman law permitted divorce only for serious moral transgressions and punished it severely.[41] In other words, as in later Christian Europe, marriage was regarded as a lifetime arrangement with a single property regime under the ownership and management of the husband. *Sui heredes* were conceived to have an interest in the patrimony during the father's lifetime and hence automatically inherited on his death. No documents from this era are extant to confirm this picture of unified families, and the Roman penchant to idealize their past certainly simplified realities that are beyond our grasp.

By the time of the historical era illuminated by contemporary texts (after 200 BC), family practices and the situation of women had already begun to change in the direction of individualization. Divorce without moral cause came to be possible and by the first century BC was quite frequent among the senatorial elite.[42] The most common form of marriage came to be *sine manu* – that is, without transfer of the woman to the authority of her

[38] Isae. 2.1, Dem. 48.56, Hyp. Athen. 5.17, *Ath. pol.* 35.2; Cox 1998: 75.
[39] Dercon and Kirshnan 2000. [40] Treggiari 1991b: 324–6.
[41] Watson 1975: ch. 3. [42] Bradley 1991: ch. 7; Treggiari 1991b: ch. 13.

husband. The wife remained under her father's power (*patria potestas*) and part of his property regime as long as he lived; after his death, she became independent (*sui iuris*) with property rights nearly the equal of men's. Only the woman's dowry was transferred to the ownership of her husband. The Roman jurists elaborated a full and sophisticated law of dowry based on the premise that the dowry's income would support the *onera matrimonii*, or costs of the wife in the new household.[43] Unlike Athens, in Roman society dowries often included land to produce revenue. The attested values of dowries in the late Republic and early Empire ranged from tens of thousands of sesterces for the curial class to a million sesterces for senatorial daughters. The jurists make it clear that expectations were set in accordance with the wealth of the bride's father and the status of the groom (*Dig.* 32.43). Relative to the size of the estate of the bride's father, the conventional sizes of dowries seem to have been about 5–10 percent, or roughly one year's income from the total patrimony. This relative size is consonant with the custom of paying the dowry in three annual installments out of current income without borrowing. By contrast with some other European societies in which the dowry was the daughter's full share of the patrimony and its payment strained family finances, Roman dowries were relatively modest and show no signs of inflation through the classical period.[44]

Since the dowry did not automatically satisfy the daughters' claims on their fathers' estates, they stood to inherit additional property from their fathers and also their mothers, other relatives, and friends. The recently discovered *Senatus Consultum de Pisone patre* (lines 104–5) offers an illustration in the treatment of Calpurnia, the daughter of the condemned senior senator, Cn. Calpurnius Piso.[45] Out of Piso's estate the senate, surely guided by conventional expectations, awarded Calpurnia one million sesterces as a dowry and an additional four million as her own property. After the marriage, classical Roman law kept the woman's property quite separate from her husband's, to the point that gifts of value between spouses were not permitted during the marriage. Maintaining the separation of property in a household where some of the slaves and other moveable property belonged to the husband and some to the wife presented intricate legal questions for the lawyers.[46]

After her father's death, the independent woman received a guardian (*tutor mulieris*), whose authorization was required for significant property transactions. In contrast to guardianship in Athens and many other societies, the *tutor mulieris* in Rome could not be the woman's husband, because the institution was intended, at least in part, to protect the wife's

[43] Treggiari 1991b: ch. 10. [44] Gardner 1986: 97–116; Crook 1990: 164; Saller 1994: 212–18.
[45] Text and English translation can be found in Potter and Damon (1999).
[46] Crook 1986a; 1990; Dixon 1986; Treggiari 1991b: ch. 11.

independence in marriage. Over time the authority of the tutor, his capacity to limit the woman's discretion, was diluted to the point that Romans discussed women's transactions without any allusion to the tutor's approval. Augustus gave women with three children a set of privileges (the *ius trium liberorum*) including exemption from guardianship; a generation later Claudius abolished agnatic guardians, the only type that the woman had not been able to change in case of disagreement with the *tutor*.[47] These reforms were the culmination of developments that gave women a level of discretion to manage their own affairs and to bequeath their property unparalleled in European history before the twentieth century.[48] Even the women of the Gortyn Code, who had individualized rights within the family, did not have the testamentary discretion enjoyed by Roman women.[49]

As a result of the institutional framework, women owned a substantial, but unspecifiable, share of the wealth of the Roman economy. There is impressionistic evidence that some Roman testators used wills to give sons a larger share of their estates than daughters, but, as in the case of Calpurnia, daughters often received something substantial beyond their dowry.[50] Furthermore, other testators had only daughters as *sui heredes*, and those daughter-heirs received the property unconstrained by the sort of rules that made the Athenian *epikleros* a passive conduit for the property to her sons. Roman men could use the legal device of adoption to make up for the absence of a natural son, but what evidence there is suggests that they did not do so nearly as often as they might have. On the basis of a study of the consular *fasti* it has been estimated that, even in a context of a high rate of failure in the male line of succession to high office, adoption was used to repair the male line in only about 4 percent of the cases.[51]

Altogether, there are reasons to think that women in Roman society owned a substantial fraction of the property, though it is impossible to gauge with precision. Testamentary customs and demographic realities make it likely that the estimate that 20 percent of wealth in the Roman world was owned by women is too low.[52] Perhaps half of adult women had no living brother to take a larger share of the paternal and maternal estates, according to computer simulations.[53] Interestingly, about one-third (49 of 149) of the names of owners of brickyards in Roman Italy collected by Setälä are female.[54] Although this is hardly a scientific sample measuring women's ownership of property, the very substantial presence of women

[47] Gardner 1986: 5–30. [48] Crook 1986b. [49] Schaps 1979: 67.
[50] Saller 1994: 222; *contra* Champlin 1991: 117. [51] Hopkins 1983: 74.
[52] Champlin 1991: 48, 119.
[53] Saller 1994: 49, Table 3.1.b. Roughly speaking, about one-third of fathers died without a son, and another third died with a daughter to compete with male heirs.
[54] Setälä 1977: App. 2; Dixon 2001: 97.

points in the same direction as other arguments and stands in contrast to the evidence from Athens.

How fully Roman women exploited their property rights and with what economic consequences are not clear. Examples from the elite illustrate the potential social power and status that women could derive from their discretion. The jurist Papinian assumed that wealthy women with testamentary discretion were regularly cultivated by their husbands, who commonly tried to soothe angry wives threatening to change their wills (*Dig.* 29.6.3). The letters of Cicero and Pliny provide a sense of the social power of property wielded by women within their families and beyond.[55] At a humbler level, a freedwoman named Manlia Gnome boasted on her tombstone that she had had clients – a symbol of prestige requiring resources to support (*CIL* 6.21975). Other women advertised their public benefactions, sometimes of striking size. Fabia Agrippina, for example, advertised her donation of one million sesterces to support girls in Ostia.[56]

The wooden tablets from Murecine provide a precious, albeit elliptical, glimpse of how Roman women's property rights were manifested in business activities on the Bay of Naples in the mid first century AD. The waxed tablets attest a variety of dealings, including loans, sales of slaves, and suretyship. With the exception of standing surety, women are found in all roles, but only in a handful of the 170 documents and with a male tutor acting on their behalf. In the documents, slaves are found as the business agents for their masters, both male and female.[57] The use of slaves and freedmen as agents and managers meant that in the transactions women property owners were represented in the same way as men. That is, the availability of slaves as front men and managers may have effaced gender distinctions in the management of property among the elite. Terentia had her freedman manager, Philotimus, and Cicero had his, Eros.[58]

The power of property in women's hands threatened men with an inversion of what they took to be the natural gender hierarchy. Already in the early second century BC the stern moralist Cato was decrying independently wealthy women, complaining of wives who were rich enough to loan money to their husbands and then hounded them to repay when they became unhappy. The motif of the wife who used her wealth to dominate her husband recurred in Latin literature through the centuries.[59]

Despite all the legal potential for women's rights and men's anxieties, it is certain that the sociocultural hierarchy of gender affected marital relationships so that Roman women did not utilize their discretion over property

[55] Saller 1994: 128–30; Dixon 2001: 96. [56] *CIL* 14.4450; Dixon 2001: 108.
[57] Gardner 1998. [58] Dixon 2001: 96.
[59] Cato, as reported by Gell. *NA* 17.5; similarly, Plaut., *Asin.* 87; Hor. *Carm.* 3.24; Mart. 8.12; Juv. 6.136.

to fullest effect.[60] Whatever the legal safeguards, the jurists recognized that some wives turned over their property to their husbands to manage. Although gifts between husband and wife were invalid during marriage, a spouse could validate in a will after death any *de facto* gifts bestowed while alive. On account of women's perceived vulnerability to men's blandishments and pressure, the Senatus Consultum Velleianum was passed in the first half of the first century AD to take away legal action to enforce women's suretyship on loans.[61]

Unfortunately, the meager evidence does not allow an answer to the question of whether Roman women's notably broad property rights affected investment and management in the imperial economy. It could be argued that, as in more recent societies, women were more risk-averse than men, because women had fewer opportunities to work for an income in order to recover any losses or worked at lower wages. Risk-aversion underlies the Augustan rule that husbands could not alienate the wife's dotal land in Italy without the wife's approval. However, since there was a general aversion to risk and a preference for investment in land among male owners and guardians of children's property, it is not obvious that women's property was treated differently, especially among the elite using slaves and freedmen as managers.

(c) *Property of minor children*

In the context of high mortality and late male marriage, both Athenian and Roman society included many children who inherited their father's property as orphans before adulthood. Within a legal framework of individualized property rights and a social context of nuclear family households, such orphans and their property required guardianship by adult males outside the household. The broad outlines of guardianship of underage children, and the economic implications, were broadly similar in Athens and Rome. Guardianship of orphans' property appears prominently in Athenian and Roman forensic and juristic texts. The importance of the institution is evident in the fact that in both societies very senior magistrates – the Athenian eponymous archon and the Roman praetor or consul – took general responsibility for oversight of the guardianship of orphans.[62]

Athenian and Roman law specified the age thresholds for full adult responsibility in property management somewhat differently. In Athens fatherless boys under the age or seventeen or eighteen and girls under the age of fourteen were given guardians. Roman law evolved from 200 BC to AD 200 to extend effective guardianship from *impuberes*, boys under the

[60] Cohen and Saller 1994: 48–55. [61] Crook 1986b; Dixon 2001: ch. 6.
[62] Harrison 1968: 102; Saller 1994: 183–4.

age of puberty around age fourteen, to *minores*, adolescents up to the age of twenty-five. A plausible estimate is that as many as one-third of children inherited their share of the paternal estate before adulthood. After the extension of responsibilities of the *curator minorum* in imperial Rome, perhaps two-thirds of males inherited from their fathers before they were regarded as fully competent adults. In aggregate perhaps one-sixth of the property in these societies was owned by orphans. Consequently, the institution of guardianship had important implications for the economies of Athens and Rome.[63]

Guardians in Athens and Rome were in the first instance the choice of fathers, who turned to trusted relatives and friends. In the absence of a guardian chosen by the father, the responsibility fell to adult male kin. As a last resort, the archon or praetor could appoint guardians. In both societies it was common to have more than one guardian. Multiple guardians mitigated the risk posed by the death of any one guardian before the child reached adulthood, and also created a situation in which one guardian could monitor the other to protect against embezzlement or neglect. Athenian and Roman law required guardians to provide an account of the estate when the orphan came of age, and offered legal actions against corrupt or negligent guardians.[64]

The risk of lawsuit may well have encouraged guardians to manage orphans' estates conservatively. In Athens guardians could work the wards' estates themselves or rent them to the highest bidder in a public auction supervised by the archon. The latter option amounted to public assurance that the guardian was acting in the best interests of the ward to maximize return on landed capital. Over the centuries Roman law tightened up the investment options left to guardians, culminating in the ruling of Septimius Severus in AD 195 that guardians could not sell their wards' rural or suburban properties (*Dig.* 27.9.1 pr.). Other legal texts suggest that the threat of lawsuit was an incentive for guardians to invest returns safely, and land was regarded as the preferred safe investment.[65]

Modern societies, like ancient, have laws to regulate the management of orphans' property in order to safeguard it. This is the unsurprising consequence of the perceived vulnerability of orphans. But whereas in the modern world the life expectancy of parents is such that the number of orphans is quite small, in the ancient world the proportion was high enough to have a noticeable impact on the economy and society. Though the impact cannot be quantified, it is likely to have been in the direction of conservative investment, exemplified most clearly in Septimius Severus' freeze on landed capital of orphans.

[63] For Athens, Osborne 1988: 304–10; for Rome, Saller 1994: ch. 8.
[64] Harrison 1968: 97–121; Saller 1994: 182–9.
[65] Kehoe 1997.

V WOMEN'S LABOR

Women's participation in the labor force has important implications for the total production of the economy as well as for the status and treatment of women, as the work of Ester Boserup and subsequent research have shown. The level and location of women's involvement in work for exchange in the ancient world are difficult to assess, because the ideology of the domestic wife has obscured or understated aspects of women's labor in our sources.[66] Nevertheless, I will argue that the ideology probably did have a marked effect in limiting women's range of occupation and level of participation through a gendered coding of jobs. Further, that code remained broadly similar through Greco-Roman antiquity. The likelihood that women's work remained much the same over a millennium has consequences for any consideration of economic growth. The following analysis will divide the subject along the lines of Athenian and Roman, rural and urban, free and slave.

(a) *Athens*

The basic cultural distinction between men's outdoor and women's indoor labor, associated with plough cultures, can be found in Greek literature as early as Homer.[67] The division of labor by gender is central to Xenophon's *Oeconomicus* (7.22), in which the wife has the duties of supervising the household stores, managing the domestic slaves, and overseeing the preparation of food and production of clothing.[68] Xenophon argued that this domestic labor should not be undervalued. This is certainly a male ideological simplification, but is it entirely wrong?

Comparative evidence and practical considerations suggest that when circumstances compelled an intensification of labor to feed the family, Athenian women worked in agriculture alongside men or in place of them. The household life-cycle meant that the ratio of working hands to hungry mouths changed with the birth, growth, and departure of children.[69] Furthermore, the high and unpredictable incidence of death, sickness, and war must have often left some families with less than the needed number of male hands to work in the fields. Greek authors contain scattered, explicit references to female participation in the harvest and the gleaning of corn-ears afterwards, whereas practically no evidence attests to women using the plough.[70] Demosthenes regarded female agricultural work as exceptional,

[66] So also in early modern Europe: de Vries and van der Woude 1997: 603.
[67] Scheidel 1995: 205. [68] Pomeroy 1994: 36.
[69] Gallant 1991: ch. 4, whose model is oversimplified in not allowing for infant mortality and wide variation in the number of children in a family.
[70] Scheidel 1996b: 1; Dem. 57.45; Theoc. *Id.* 3.32.

done only under the compulsion of poverty. Plato in the *Laws* (805d–e) contrasted the Athenians with the Thracians who employed their women in the fields. Foxhall finds some indirect confirmation of Plato's norm in the fact that female religious festivals were scheduled at harvest time, taking the participants away from their farms.[71] The indirect and normative evidence, and the argument from silence will not bear great weight; nevertheless, all of this points in the direction of some participation of Athenian women in agriculture, but much less than the regular, full-time work of their modern counterparts in tobacco production in Greece and Turkey.[72] Which is not to say that ancient Athenian women were idle: the grinding of grain for food and the production of textiles were time-consuming tasks.

In the city, women can be found in various jobs that fall under Boserup's rubric of the bazaar and service sector. The Athenian law limiting the value of women's transactions to one medimnos would have allowed them to engage in petty commerce such as the sale of foodstuffs and in the provision of services such as wetnursing, midwifery, innkeeping and prostitution.[73] In the manufacturing sector women are found in various crafts (e.g., as cobblers), but are heavily concentrated in wool-working, at least in our sources. In Athenian manumission inscriptions, of the forty-one female ex-slaves with known occupations thirty-one were wool-workers (*talasiourgoi*) and the remaining eleven were scattered across eight occupations.[74] This corpus of documents suggests that the ideological representation of the good woman engaged in textile production, starting with Homer's Penelope, was not a serious distortion of gendered practice that extended from the free citizen population to slaves.

(b) *Rome*

The evidence for the working women of Rome and Italy is more extensive and allows for a more textured picture. Furthermore, the Roman empire brought far greater concentrations of wealth and, concomitantly, a finer division of labor. Nevertheless, the broad outline of gender coding in the workforce is similar.

The analysis of women's rural labor should start from a rough distinction between the peasant family farm and the large estates employing slaves or other non-family labor. In the absence of fine-grained evidence, one should assume regional differences, but the specification of variation is hampered by the rhetorical coloring of the few fragments of testimony about regions. Roman authors, like Greeks, associated female field labor with marginal and barbarous peoples, such as Strabo's native Spaniards.[75] The one place

[71] Foxhall 1995. [72] Sallares 1991: 220.
[73] Brock 1994: 341–2; Herfst 1922: 48. [74] Schaps 1979: 19. [75] Saavedra 2000.

in the empire in which documents offer an alternative to literary stereotypes is Egypt, where the evidence suggests that the ideology was not at marked variance with practice. The references to women's agricultural labor (e.g., an olive-carrier) are relatively few; women laborers were paid less; and they are absent as workers in the accounts of the vast Appianus estate of the third century AD.[76] Furthermore, it has been common for peasant households in Egypt and elsewhere to lease plots of land to utilize labor through the life-cycle, but very few Egyptian women are found as lessees, whereas they are common in the role of property owners leasing land.[77] The provisional picture that emerges from the admittedly sketchy evidence is that among working families in Egypt the ideology of outdoor male/indoor female labor was a simplification but not a complete distortion of the reality. Of course, there is no justification to take the Egyptian evidence to represent the empire as a whole, but it shows that even in the face of harsh realities there could be strong asymmetries by gender in agricultural labor.

For the larger estates of Roman Italy, the estate handbooks provide a schematic view of the organization of labor, albeit tinged with moralizing advice. Columella provides a description of the responsibilities of the *vilica*, the bailiff's wife, who by virtue of her partnership with the *vilicus* had important supervisory duties. According to his pseudo-historical account, in the good old days the *dominus* and *domina* were so heavily involved in the work of the farm that little was left for the *vilicus* and *vilica* to do (*Rust.*12 pr.8). By contrast, in Columella's day the *materfamilias* was idle and self-indulgent, and shrugged off the household duties to the *vilica*, who was supposed to supervise the work and tend to the health of sick members of the *familia*. She had the major responsibility to inspect, store, and keep track of perishable and non-perishable items, according to Columella with reference to Xenophon's *Oeconomicus* (*Rust.*12.3.5). And the *vilica* was obliged to keep a stock of wool on hand, so that on cold or rainy days when women could not be expected to be outdoors doing farm work (*opus rusticum)* they could be kept busy making cloth (*Rust.*12.3.6).[78]

Columella's comment about the "farm work" of slave women raises the major question of how the majority of slave women were exploited on the farm. Some historians, citing this text, have argued that slave women were not subject to the ideology of honorable domesticity and hence were used in the fields, at least at harvest time.[79] Other historians have suggested that the outdoor male/ indoor female dichotomy affected slave women as well as free, limiting the use of female slaves in agriculture and hence lowering productivity of the rural slave labor force as a whole.[80] As a point of

[76] Rathbone 1991: 164. [77] Rowlandson 1998: 220.
[78] Carlsen 1993. [79] Erdkamp 1999: 571; Scheidel 1995: 208.
[80] Brunt 1971: 234; de Ste. Croix 1981: 231.

comparison, it is useful to consider the American Antebellum South. There a higher proportion of slave women (69 percent) than men (58 percent) were field hands.[81] Plantation owners in assigning tasks regarded women as three-quarters of a field hand, or less if they were pregnant.[82]

Roman estate owners appear to have thought of rural female slaves differently from their American counterparts, in so far as they considered slave women as adjuncts rather than a central element of the workforce in the fields.[83] Columella's reference to *opus rusticum* is vague and could encompass almost any outdoor task, including the tending of small animals, mentioned elsewhere;[84] the phrase need not imply regular work in the fields.[85] Comments of the jurists, especially their concepts of *fundus instructus* ("equipped farm") and *instrumentum instrumenti* ("equipment of the equipment") contain an assumption that many slave women did not participate in what was regarded as the central productive work of the farm and so could not be categorized as part of the *instrumentum*, defined as the productive humans, animals, and tools.[86] As part of the support staff (the *instrumentum instrumenti*) some women baked bread, kept the villa, served in the kitchen as *focariae*, spun wool (*lanificae*), and cooked the gruel for the *familia rustica* (*Dig.* 33.7.12.6). These texts, though not detailed, suggest that the slave wives' primary responsibility was domestic, though they did some farm work. The productive value of the domestic work should not be underestimated. As Boserup noted of low-technology societies, "it is not always realized how very time-consuming is this crude processing of basic foods," which in Africa and Latin America could take thirty hours per week or more.[87] But by comparison, slave women of the US South typically put in full days of work in the fields and then did the domestic work in their off-hours. A Southern planter would not have excluded slave women from the *instrumentum*, as defined by Roman jurists.[88] Overall, the juristic texts at least suggest – though they are hardly adequate to prove – that labor on Roman estates was not organized to exploit female slave labor to the fullest extent possible. If this was true, then one might ask why the equilibrium reached in the Roman economy did not press female slaves' production, despite the fact that they could be coerced.

Only a fraction of the population of the Roman empire lived and worked in the cities, perhaps 10–20 percent. Even though a minority, the urban population is far better known than the rural majority, and they were important in making the urban material culture characteristic of the empire. Consideration of women's labor in the urban artisanal class must start from

[81] Fogel 1989: 45–6. [82] White 1985: 121; Hudson 1997: 4. [83] Cf. Scheidel 1995: 212.
[84] Scheidel 1996b: 4. [85] Scheidel 1996b: 3. [86] Saller 2003. [87] Boserup 1970: 164–5.
[88] Brunt 1971: 707 suggested that "one may doubt if either women or children were used as much on Roman as on American plantations," but he did not argue or develop the point.

Susan Treggiari's studies of the funerary inscriptions from Rome listing occupations.[89] This category comprised families – free, freed, and slave – practicing a craft and/or selling goods and services. The activities ranged from the manufacture of clothing, jewelry, or perfume, to the sale of fruits and vegetables, to the provision of prepared food, wine, rooms, and sexual services.

Treggiari drew several important conclusions from the list of occupations. First, women are attested in many fewer occupations than men: thirty-five for women in comparison with 225 or so for men.[90] Furthermore, Treggiari noted the gendered distribution by occupation: "Women appear to be concentrated in 'service' jobs (catering, prostitution); dealing, particularly in foodstuffs; serving in shops; in certain crafts, particularly the production of cloth and clothes; 'fiddly' jobs such as working in gold-leaf or hairdressing; certain luxury trades such as perfumery. This is a fair reflection of at least part of reality."[91] In short, women in Rome, as in Athens, were found in what Ester Boserup dubbed the "bazaar and service sector," characteristic of a number of areas of the developing world.[92]

Sandra Joshel's quantitative summary of participation by gender in the work force of Rome reinforces Treggiari's point. A comparison of women's occupational distribution with men's in Joshel's Table 3.1 highlights the rarity or absence of women in banking, building, transportation, and administration (Table 4.1). The category of job in which women and men are most nearly balanced is "skilled service," but a breakdown of the specific jobs in this category (barber, hairdresser, masseuse, entertainer) reveals gendered patterns here as well. The funerary inscriptions listing occupations are by no means a cross-section of the workforce, but represent those workers who took enough pride in their jobs to identify with them on their tombstones.[93] The absence of women in some, but not other occupational categories may not be a direct, unmediated reflection of their absence in those jobs, but is surely related to their lower participation in certain kinds of labor. It was no doubt the case that within the Roman value system it was preferable to represent deceased women as virtuous wives, even if they were also workers. But the distribution of those women represented with occupations across sectors is likely to have been related to their actual work.

Treggiari drew a second general conclusion from the inscriptions with regard to the independence of women with jobs: "The frequency with which a woman is paired with a man, usually a husband, in the same trade suggests that many of them worked alongside husbands."[94] In view of the (male) Roman ideal of subordination of wife to husband, this "working

[89] See also Gardner 1986: 233–55. [90] Treggiari 1979: 78. [91] Treggiari 1979: 78.
[92] Boserup 1970: 91. [93] Joshel 1992: 16. [94] Treggiari 1979: 76.

Table 4.1 *Gender asymmetries in occupational participation, from Roman epitaphs (CIL 6) as tabulated by Joshel**

Occupation	Men	Women
Building	112 (100%)	0
Manufacture	282 (85%)	49 (15%)
Sales	99 (92%)	9 (8%)
Banking	42 (100%)	0
Professional	101 (84%)	19 (16%)
Skilled service	40 (53%)	35 (47%)
Domestic service	235 (73%)	86 (27%)
Transportation	55 (100%)	0
Administration	296 (97%)	10 (3%)

* Joshel 1992: 69 (Table 3.1).

alongside" is likely to have been on unequal terms and may be part of the reason for the lower epigraphic visibility of women in occupations, as suggested by Natalie Kampen.[95] The division of labor within an artisan family often left women, boys, or girls with the responsibility of minding the shop.[96]

The relative rarity of women with an *artificium*, a skilled occupation, in the epitaphs may be partially explained by the evidence for apprenticeship practices. Unfortunately, apprenticeship contracts of the sort found in Roman Egypt are not extant for Italy. Most of the Egyptian contracts concern weaving and range in duration from one to five years.[97] The terms varied by occupation and within occupations. Apprentices in weaving generally received monthly rations of wheat and oil (or the equivalent in cash) in the first year or two, and then received additional wages if they continued, presumably to compensate the increased value of their skills from training.[98] In the few dozen contracts most apprentices are free boys; some are slave boys and slave girls; and not one is a freeborn woman.[99] If a similar gendered pattern was true of Rome, the correspondence with gendered patterns of occupational distribution would be suggestive: the effect of the ideology may have been to limit the training or human capital of freeborn women. To judge from modern development economics, the gender bias against free women in the crafts could have had several interrelated consequences: less training of women, hence lower productivity and lower wages for women, hence less economic independence and possibly lower

[95] Kampen 1981: 125. [96] Treggiari 1979: 73; Kampen 1981: 112–13; *Dig.* 14.3.8.
[97] Bradley 1991: 107; Rowlandson 1998: 268.
[98] Johnson 1936: 388–91 for a summary of contract terms. [99] Bradley 1991: 108.

valuation of women in their families, and less growth in productivity for the economy as a whole.[100]

The big urban households could be very large units with scores or even hundreds of members. The basic distinction in these households was between the free owner's honorable family and the honorless slaves. One of the prominent characteristics of the large household was the fine differentiation of duties and titles that, along with the personal names, were the identities marking domestic slaves in their burials in *columbaria*.[101] Plautus' comedy, *Mercator*, revolves around a distinction among female slaves between the attractive slave attendants (*pedisequae*) and the functional *ancillae* who did the tedious chores of weaving, grinding grain, cutting wood, spinning, sweeping, cooking, and taking a beating (396–8). As in Greece, wool-spinning was the quintessential women's work, represented as honorable in the foundation legend of the Republic (Livy 1.57.9).[102] In the empire, jurists associated spinning with *ancillae* more often than any other type of labor (*Dig.* 7.8.12.6; 24.1.31.1; 33.7.16.2).[103] Wool-working was honorable enough to suit the matron and even the first empress. Other domestic duties of the *ancilla*, such as washing the latrine, were among the most sordid and degrading in the household (Plaut. *Curc.* 577; Cic. *Tusc.* 5.20.58).

In view of the broad Roman ideology of gender hierarchy, it is not surprising that women are rarely attested in administrative and managerial jobs in the household or elsewhere.[104] The limited evidence for the teaching of slaves suggests that males more than females received the benefit of an investment in their skills through education in literacy and numeracy.[105] Here again, however, the ideology is too simplistic, though not wholly misleading. Aubert's comprehensive study of business managers turned up scattered examples of women managing estates and other enterprises.[106] The largest set of data comes from the brickstamps listing *officinatores* along with owners: Setälä found twenty women among the 355 *officinatores* she catalogued, that is, just under 6 percent.[107] In the brickstamp industry women were far better represented as the owners than as the managers.

VI CHILDREN'S LABOR

The means by which children are educated or trained and are drawn into the labor force are tightly linked to the level of economic productivity. A

[100] Urbanization in the Roman empire is generally assumed by economic historians to be an index of economic growth, but Boserup points out that in some modern developing countries the migration of families from the countryside to the towns had led to increased productivity for males but less economic opportunity and lower productivity for the females. Boserup 1970: 175.

[101] Treggiari 1976: 82–5. [102] Larsson Loven 1998; Dixon 2001: 117–25.

[103] Larsson Loven 1998: 75; Treggiari 1976: 82–5.

[104] Treggiari 1973: 46; Treggiari 1976: 77; Kampen 1981: 121, 133; Joshel 1992: 69 (Table 3.1).

[105] Mohler 1940: 262–80. [106] Aubert 1994: 193, 224, 268, 292, 372, 419. [107] Setälä 1998: 106.

society's investment in human capital in the form of training is both a cause and an indicator of development.[108] In qualitative terms, the training and labor of children in classical Athens and the Roman empire are broadly similar, though limited development can be detected.[109]

An analysis of child labor must start from the basic distinction between leisured aristocratic families and working families.[110] One of the distinguishing characteristics between the two, noted by Lysias (20.11), Isocrates (*Paneg.* 68), and Aristotle (*Pol.* 6.1323), was that the children of the latter had to do the work expected of slaves in wealthier households. If manual labor was the lot of children in working families, infant exposure and enslavement was the fate of the most impoverished, attested in Greek and Latin texts (e.g., Ael. *VH* 2.7; Plut. *Mor.* 497E, Fragm. Vat. 34 of AD 313).[111] The grim outcome of exposure might well be work as a child prostitute (Ps.-Dem. 59; Justin, *Apol.* 27).

The age at which children began work must have varied but was broadly constrained by physical capacity. According to Ulpian, slave children under age five were not able to provide services of value (*Dig.* 7.7.6.1). By age seven children were regarded as capable of useful labor.[112] A few Roman funerary dedications associate occupations with children under age ten, though they may reflect sentimental, wishful thinking.[113] The apprenticeship contracts of Roman Egypt, mostly for weavers, appear to concern children in their early teens or a bit younger.[114] The maximum prices for slaves in Diocletian's Price Edict suggest that adolescent males in their mid-teens were regarded as worth two-thirds the value of adult males.[115]

The direct evidence in Greek and Latin texts for child labor consists of no more than a few dozen, scattered asides. In the rural economy poor free children or slave boys are represented as watching fowl, herding small livestock, driving donkeys, gathering fodder, trimming vines, cutting ferns, and gathering olives – in other words, light tasks of the sort also assigned to old women.[116] Because land was generally limited, rural families had the challenge of matching capital to labor through the family life-cycle, as the ratio of workers to dependants shifted as the children grew. Strategies typical of modern peasant farms and attested in antiquity include the use of the children's labor in the production of the household through intensification of arable cultivation or more extensive herding on marginal land;

[108] Becker, Murphy and Tamura 1990; Lucas 2002; Johnson 2000.
[109] Golden 1990: 32–5; Bradley 1991: 103–24; Wiedemann 1989: 153–6.
[110] Bradley 1991: 106. [111] De Ste. Croix 1981: 169–70. [112] Wiedemann 1989: 153.
[113] E.g., Pieris, a nine-year-old hairdresser (*CIL* 6.9731); Viccentia, a nine-year-old gold worker (*ILS* 7691=*CIL* 6.9213).
[114] Bradley 1991: 108. [115] Scheidel 1996b.
[116] Columella, *Rust.* 8.2.7 for *puer* or *anus* watching fowl; Varro, *Rust.* 2.1.10 and 3.17.6; Lysias 20.11; Apul., *Met.* 7.17; Plin. *HN* 13.132; Columella, *Rust.* 4.27.6.

another option was the contracting out of children's labor. In the Greco-Roman world the institution of slavery offered a more brutal method of the circulation of children to match labor to capital through exposure.[117]

In the urban and village craft economy children are represented as minding the shop and working in a range of jobs as stonemasons, mosaicists, jewelers, bakers, cobblers, and others. Most of the apprenticeship contracts from Roman Egypt (24 of 30) were in textile production.[118]

In conceptualizing the investment in the training and education of children, one might think in terms of three broad stages of development: first, learning from parents in the household; second, apprenticeship outside the household; and third, education or training for a period of time in lieu of work. The huge investments in human capital characteristic of developed economies today come in the third stage when children and young adults forgo years of earnings in costly schooling in order to acquire knowledge and skills. In the agricultural and craft sectors of the Greco-Roman world it seems likely that most of the acquisition of skills took place as children watched their parents, just as Plato posited for craftsmen such as potters (*Resp.* 5.467a) and as a law of Solon prescribed (Plut. *Sol.* 22.1).

This method of intergenerational transfer had limitations: at best, children had to follow in their parents' occupations; at worst, parents sometimes died before passing on their knowledge. Larger wealthy households offered a context to overcome these limitations, since slave children could be trained by any member of the household and in any of the skills practiced in the house. For humbler free families apprenticeship was an avenue to training beyond the family. The contracts from Roman Egypt reflect the child's acquisition of human capital, inasmuch as the child received no more than basic subsistence during the first year or two of training, and then in the later years received in addition cash compensation as skills increased. Three basic points should be made about the economics of this form of apprenticeship: (1) no labor participation need have been forgone in the training, as children gradually became involved; (2) parents did not make an investment – though they gave up the labor, they saved the cost of maintenance of the child; (3) although apprenticeship allowed for the circulation of children beyond the household with potential efficiencies, it did not markedly increase the skill level beyond what could have been achieved by the transmission of craft skills from parent to child.

The Greco-Roman era witnessed the development of the third stage, institutionalized schooling. As early as the fifth century BC the Greek sophists began to offer teaching for pay – a notion so radical that it was at first regarded with deep suspicion. This education was initially a matter of the skills and knowledge of political leadership and cultural cultivation for

[117] Gallant 1991: 131. [118] Bradley 1991: 109, 113–22.

the elite. Over the centuries, paid education and training filtered down to the point that in the late Republic and imperial eras the practical value of some wealthy Romans' slaves was enhanced by basic literacy and numeracy. Such slaves were sometimes taught in the household, but were also sent out to professional teachers paid to transmit basic learning (Nep. *Att.* 13.3).[119] This sort of training contributed to the management of large, complex estates and public institutions in the Roman empire.[120] But investment in human capital was quite limited: the vast majority of the rural working population had no schooling available, and only part of the urban population could have afforded it. Wealthy masters were willing to invest in the education of chattel slaves, who did not have the independence to leave with their human capital. It is reasonable to suppose that in total much less than 10 percent of the population would have benefited from an investment in formal education. This makes sense in a world where short life expectancy limited the returns to, and increased the risk of, investments in children's skills.[121] Furthermore, the Greco-Roman world experienced the same contradiction that modern Europe faced before effective public health measures in the later nineteenth century: that is, greater investment in human capital could be acquired and used to greatest value in the cities, precisely the places where life expectancy was lowest, depressing the length of return on the investment.[122]

VII CONCLUSION: PROPERTY, LABOR, AND ECONOMIC GROWTH

What implications did the configuration of property rights within the family and the patterns of labor participation have for economic growth in the ancient Mediterranean world? In the absence of data on growth, it will be possible only to suggest some broad hypotheses, not to test them.

With the extension of Roman citizenship around the empire, the law of highly developed, individualized property rights within the family was widely applied, at least in principle. The claims of the Neo-Institutionalists would lead us to believe that the legal framework of property rights should have had a bearing on economic growth. One might argue that the decision-making by the *paterfamilias* or *kyrios* in a unitary household in early Rome or Athens was different from that of husbands and wives with separate property in the classical Roman era. One might hypothesize that individual family members felt freer to make investment decisions than the head of a unitary household with responsibility, above all, to preserve the estate

[119] Mohler 1940. [120] Rathbone 1991. [121] Meltzer 1992.

[122] Scheidel 2003a on the appalling mortality in the city of Rome; Meltzer 1992: ch. 5 on the centrality of public health improvements to the increase in return on investment in education.

for future generations through conservative management. Although it may seem intuitively likely that greater individualism in property rights encouraged greater fluidity in investment of capital, there were countervailing tendencies. The highly individualized property rights of classical Roman law put a large share of the capital in the hands of women and fatherless children who inherited before adulthood; furthermore, the law encouraged the safe investment of this capital in land.

As for labor, what changes or development can be identified in women's and children's participation and productivity over the period from classical Athens through the early empire? Even though we lack the quantitative evidence to give a fine-grained answer to this question, the very length of time involved means that even small, sustained improvements in women's productivity or children's education would have yielded large, obvious results over seven centuries or even the four centuries of the Roman classical era. As a substitute for data on productivity, we may consider the physical and human capital invested in women's and children's production, or lack thereof.

As noted above, women in both Athenian and Roman society were associated with textile production, above all, spinning. Spinning required a simple but time-consuming technology involving a distaff and spindle.[123] No marked gains in productivity were realized here. In the subsequent stages of cloth production – weaving, dying, and finishing – urbanization brought with it specialization and professionalization, but no sustained technological advances. A. H. M. Jones argued that in the Roman empire cloth was not generally woven in the home; in place of dispersed part-time production by the women of the household, professional weavers worked full-time in cities specializing in different qualities of clothing from cheap garments for slaves to luxury clothing.[124] It seems likely that the specialization entailed some increase in per capita productivity, but the increase and its impact were probably limited by several factors. First, the archaeological evidence of loom weights in houses suggests that weaving at home was not completely displaced by professional production in the empire.[125] Second, professionalization was not accompanied by a substantial improvement in the technology of weaving. The shift from the warp-weighted loom to the foot-powered treadle loom becomes apparent in the Roman Egyptian archaeological record in late antiquity.[126] Third, to the extent that professionalization shifted the task of weaving from women to men, that shift would have resulted in an overall increase in production and higher living standards only if the women used their time in other, more productive pursuits. This may have occurred in ways that are now undetectable, but

[123] Wild 1970: 169. [124] Jones 1960: 184.
[125] Jongman 1988a: 163; Dixon 2001: 118. [126] Carroll 1985.

comparative evidence shows that this cannot be assumed.[127] Overall, in spinning and weaving of textiles there were some gains in productivity, but they were cumulatively modest over a long time span. Further, it is not clear that women workers were the main beneficiaries of the gains through specialization. That the free women of the Greco-Roman world did not fully participate in production for exchange is hardly surprising. What is perhaps more notable is that female slaves on Roman estates were not fully utilized in production for exchange, as were their counterparts in the American South. For both slave and free women there is some evidence for investment in their productive skills, but less than for men. One index of economic growth per capita from fifth-century BC Athens to second-century AD Rome is the improvement in productive techniques used by women. In the sectors principally associated with women, notably spinning, those improvements do not add up to much over the better part of a millennium.

The story of the development of children's labor and education is similar. There are indications that from archaic Greece to the Roman Empire investment increased as institutionalized education and training beyond the family emerged. But that development left the mass of agricultural workers, as well as urban freeborn women, largely untouched. Thus, the *average* skill level of the ancient working population surely increased, but only a little over a span of centuries.

[127] De Vries and van der Woude 1997: 604–5.

CHAPTER 5

LAW AND ECONOMIC INSTITUTIONS*

BRUCE W. FRIER AND DENNIS P. KEHOE

The landscape of the Greek and Roman economies (as of all other economies both past and present) is invariably configured, not just of individuals, but also of institutions, the organized activity of production and commerce. If population and technology established the basic limits within which the economies of the Greek and Roman worlds could develop, it also seems clear that law and other institutions surrounding the economy represented an exogenous factor affecting productivity in the Greek and Roman worlds.[1] An analysis of the complex relationship between legal institutions and the economy can help us to understand better the basic relationships that characterized the economy of the Greco-Roman world. Law and legal institutions helped determine the forms within which economic activity was organized and had important consequences for the basic welfare of people of all classes in the ancient world. Legal institutions shaped the distribution of wealth between the state and citizens or subjects, between city and countryside, between elite landowners and peasant farmers, and even between masters and slaves. It is thus worth examining how these institutions are likely to have influenced economic behavior, allocation of resources, and predictable outcomes in terms of performance and growth. Did legal institutions serve to promote or inhibit the type of investment that was necessary for greater productivity and ultimately for growth in the ancient economy? Did they foster the concentration of wealth in the hands of a small elite, or instead promote a more even distribution of wealth?

The institutional environment of an economy consists of "the background constraints, or 'rules of the game.' These can be both formal, explicit rules (constitutions, laws, property rights) and informal, often implicit rules (social conventions, norms)."[2] Such rules have an astounding array of forms, but most arise in three broad sectors: "firms" (economic enterprises

* In this chapter, references to the Digest take the form of "Author (Source), D." instead of the simpler abbreviation "*Dig.*" used in the other chapters.

[1] For the basic role of population as a constraint on the ancient economy, see above, Chapter 3; for the relationship between technological development and the ancient economy, see below, Chapter 6.

[2] Klein 2000: 489; cf. North 1991.

of all different sizes and degrees of complexity, including those engaged in agricultural production, manufacture of goods, and provision of customer services; those devoted to transport, storage, and wholesale and retail marketing; and those that primarily organize, facilitate, or finance commerce); "markets" (including not only physical markets such as officially sanctioned markets and fairs, urban areas associated with specific goods or crafts, and so on, but also the conceptual markets of economics); and governmental structures, such as legislatures, magistracies, and courts, that are often deeply involved in setting up, regulating, and taxing the economy.

Particularly in smaller or more informal non-governmental institutions, participants may enforce their own rules, for instance through internal rewards and sanctions administered by business associations.[3] But larger institutions, even of "traditional" origin, are commonly subjected also to external enforcement mechanisms such as judicial systems or third-party arbitration. It is here, of course, that law may be significant in the functioning of an economy; for, as modern development economics has repeatedly shown,[4] economic progress tends to occur when a government shares in, or at any rate seeks not to thwart, the economic objectives of its citizens.

Within the ancient world, to what extent was economic growth fostered or impeded by the institutional and legal framework within which the Greek and Roman economies operated? Accurate statistics are required for measuring economic performance, and since for the ancient world these are largely lacking, it might well seem that, except through conjecture, this question cannot be answered either in general or with respect to any specific times and territories. That is largely, but not quite entirely, true. The question may be at least formally addressed through modern scholarly methods associated especially with Law and Economics and with the New Institutional Economics (NIE).[5] By such methods, we can also hope to grasp the deeper implications of the question: how, on the modern understanding, economic and institutional development came to be, and remained, co-dependent. This chapter aims at providing an overview of the methods themselves, and then suggests several ways in which these methods can be applied to come to a deeper understanding of economic organization and the possibilities for economic growth in the Greek and Roman worlds.[6]

[3] Although legal rules are much easier to observe, much recent economic attention has centered on non-legal rules; see Panther 2000.

[4] Clague 1997.

[5] These two disciplines overlap to a considerable extent. For a good survey, see Mercuro and Medema 1997. A comprehensive website is devoted to Law and Economics: Bouckaert and De Geest 2000; other basic essays are collected in the *New Palgrave Dictionary* (1998). On the New Institutional Economics, see especially Furubotn and Richter 1998.

[6] For this reason most examples are drawn from Roman private law, which has the advantage of being more easily cognizable. However, the methods themselves are readily extensible to all Greek and Roman settings.

I NEOCLASSICAL ECONOMICS AND THE COASE THEOREM

Traditional economics has surprisingly little to say about law and economic institutions, and it is important to understand why. For more than half a century, mainstream economics has been dominated by the Neoclassical approach, which treats economic activity as originating in the given, stable preference functions of individuals (e.g., for wheat bread over rye, for wine over beer, and so on). The behavior of individuals is assumed to be rational in that it is calculated to maximize these preferences. Further, no chronic information problems obstruct such rational behavior; although individuals may have to deal with a measure of probabilistic risk, they do not suffer from severe ignorance, radical uncertainty, or divergent perceptions of reality. Finally, economic behavior is characterized by the attainment of, or at least the continual movement toward, states of equilibrium. The intersection of supply and demand curves is, of course, a familiar example of such an equilibrium.[7]

Of these assumptions, the most important, and the one establishing the "methodological individualism" that distinguishes Neoclassical Economics, is that individuals and their stable preferences are the irreducible starting points of analysis, while the rational efforts of individuals to maximize their personal preferences (what is referred to as Rational Choice theory) provide the basis of all economic analysis.[8] The achievements of Neoclassical Economics, though undeniably spectacular, are necessarily limited by these initial assumptions. Problematic here is less the realism of these assumptions, than whether they are "good enough" in that the theory developed from them yields accurate predictions about the real world.[9] Neoclassical Economics, an elaborate structure of high intellectual caliber, has produced many valuable insights. With respect to institutions, however, it has been far less successful.

Neoclassical analysis assigns to law and legal institutions a recessive role. Law is important because it allocates property rights to individuals, and then provides the means both to protect and to convey these rights. But law itself has little independent salience beyond serving in this paternalistic background role. In particular, law has little independent role to play in promoting efficiency within the economy.[10] To some extent, the explanation

[7] This description is adapted from Hodgson 1994: 60. On the emergence of the "Neoclassical Consensus," see Beaud and Dostaler 1995: 79–95.

[8] Rutherford 1994: 31–7.

[9] Friedman 1953. Still, it should be noted that the concept of *homo oeconomicus* as a rational chooser (with a clear picture of all available alternatives, a complete ordering among them, and the skill necessary to make whatever complicated calculations are required to discover, without mistake, the optimal course of action) is decidedly inaccurate as a predictor of much human conduct. Ulen 2000, summarizes empirical research.

[10] Efficiency is a problematic concept, of course. Perhaps the best discussion is Coleman 1988.

for such passivity is ideological opposition to government interference with the market. But much more important, from an intellectual perspective, are the implications of the Coase Theorem, widely and correctly understood as the central building block of Law and Economics.[11]

Consider the cheese factory at Minturnae, a famous problem described by the Roman jurist Titius Aristo in the first century AD.[12] Of two adjoining landowners, B has a shop, while her neighbor A runs a cheese factory that, when operating normally, would emit large quantities of smoke onto B's property. The Roman legal system, by initially allocating property rights to these two landowners, determines whether or not B can legally prevent A from emitting the smoke and hence from operating his cheese factory.

What the Coase Theorem establishes, somewhat surprisingly, is that, under the artificial friction-free conditions of Neoclassical Economics, it makes no difference which rule of property law is settled upon, whether that B has a right to stop the emissions or that A has a right to continue them. No matter the rule, an efficient outcome will still occur.

To understand why, suppose the following: the damage caused to B by A's smoke would be 100 currency units per year. B can prevent the damage by building and maintaining a wall that would cost her 50 per year, while A can prevent the damage by a smokestack that would cost him 75 per year. Under these circumstances, the efficient outcome seems to be that B should build the wall, since this outcome leaves both parties satisfied at a lower cost to both. Accordingly, in this particular situation it may seem that a rule giving B the right to prevent emissions of smoke from A's cheese factory[13] leads to a less efficient result because it forces A to build a smokestack if he wishes to continue emitting smoke, thereby causing 25 in additional expenditure.

But such a conclusion overlooks the capacity of rational actors to bargain cooperatively around the legal rules. For example, under the seemingly inefficient rule, A may still arrange a contract with B whereby A will pay B 50 per year, or a bit more, to build and maintain the wall. In the process, the two parties will split between them a cooperative surplus, the 25 that they save from A's not having to build a smokestack. So the result, even under the seemingly inefficient rule, is exactly the same: it is B who ends

[11] Named after Ronald Coase, who first formulated it. See Coase 1988: 95–156, a celebrated paper first published in 1960. Coase began by "arguing that, from an economic perspective, the goal of the legal system should be to establish a pattern of rights such that economic efficiency is attained": Medema and Zerbe 2000: 836.

[12] Cited by Ulpian (17 *ad Ed.*), D. 8.5.8.5. The facts are slightly altered to make the situation clearer. It is uncertain why a cheese factory would emit a substantial volume of smoke.

[13] For emissions, this is the rule in Roman law, absent a servitude: Alfenus (2 *Dig.*), D. 8.5.17.2; Ulpian (17 *ad Ed.*), D. 8.5.8.5–7. But the rule is reversed if, for instance, the cheese factory gave off loud and irritating noise (not an "emission").

up building the wall.[14] Given cooperative bargaining, the use of resources is efficient regardless of the legal rule.

From this perspective, it is obviously of paramount economic importance that a legal system assigns property rights clearly and also provides a secure means for conveying them. But otherwise, so long as we remain within the strict assumptions of Neoclassical Economics, the exact legal allocation of rights does not matter to efficiency. Indeed, this point can probably be put even more strongly: Under the standard assumptions of competitive markets (especially that transaction costs are zero and that actors behave rationally), and so long as property rights are well defined, negotiations among affected parties will result in an outcome that is both efficient and invariant.[15]

II TRANSACTION COSTS

The Coase Theorem might suggest that law and other institutions have only very limited consequence for the functioning of the economy. But in fact the reverse is true. What the Coase Theorem actually does is explain why transaction costs are crucial to any understanding of an actual economy. Recall the cheese factory in Minturnae. In the real world, if B can legally prevent A from operating his cheese factory, substantial resources may be required to arrange a deal whereby B agrees to forgo this right and build a wall instead. B must be contacted, the two parties must be brought together and agree on their deal, and so on. This point becomes even clearer if A's cheese factory has, not just a single neighbor B, but rather five neighbors, any one of whom can prevent the emissions, but whose collective disutility from the smoke is still just 100. In these circumstances, it may be extremely costly, perhaps even impossible, for A to strike a bargain with so many other parties. Indeed, the transaction costs could become so high that they exhaust the cooperative surplus entirely, in which case the result may well be inefficient because rational actors won't bargain to efficient outcomes if the costs of bargaining eat up the gains.

Transaction costs, though a ubiquitous feature of economies, are not always easily isolated. Broadly, they take two forms.[16] First, some outlay is

[14] Since this is true, it also makes no difference if the monetary values in the example are altered. Also, it is of no inherent economic consequence that A and B share the 25 profit, rather than A retaining it all for himself; this result is not inefficient in itself.

[15] This formulation is paraphrased from Medema and Zerbe 2000: 837. Compare Coase 1988: 104: "It is necessary to know whether the damaging business is liable or not for damage caused, since without the establishment of this initial delimitation of rights there can be no market transactions to transfer and recombine them. But the ultimate result (which maximizes the value of production) is independent of the legal position if the pricing system is assumed to work without cost." Medema and Zerbe examine criticism of the Coase Theorem, but conclude that "it has withstood all of the challenges that have been mounted against it to date" (875). See also de Meza 1998: 270–82.

[16] See generally Allen 2000. What follows draws heavily on Furubotn and Richter 1998: 42–7.

normally required in order to participate within a marketplace of economic transactions. For example, someone seeking to buy a commodity (such as wine) must seek out a seller and arrange a contract, all of which takes time, effort, and often the direct investment of resources; but likewise the buyer must both monitor the other party's execution of the contract and enforce against breach. The presence of such transaction costs tends to make markets function less efficiently. Second, also within an economic enterprise (such as a farm or workshop), there are costs associated with setting up, maintaining, and modifying its organization, as well as with running it. Particularly important here are the costs associated with decision making, monitoring the execution of orders, and measuring the performance of employees.

Whatever their form, transaction costs consistently arise because one fundamental assumption of Neoclassical Economics has been violated: the accurate information that is required for sound economic decision making is in fact not readily available, often difficult to obtain, and therefore expensive – at times prohibitively so. Therefore economic decisions must often be made with less than perfect information. But whether through evolution or conscious design, institutions provide rich information upon which actors can develop expectations regarding the future behavior of other actors.[17]

Many consequences flow from this reality, and all have enormous significance for the institutional environment of economies. In the first place, if transaction costs are considered, it is no longer true that the initial allocation of legal rights is a matter of indifference to an efficient outcome of transactions, particularly when transaction costs are heavy.

The broader point, an important one, is that institutional rules frequently arise, either spontaneously or deliberately, as a means to mitigate transaction costs, thereby encouraging parties in the real world to bargain to the same efficient outcomes they would have obtained ideally. The frictionless world of Neoclassical Economics reserves limited place for institutions; but when its more unrealistic assumptions are relaxed, these institutions become far more salient in assessing economic performance. This is not to say that such rules are always successful in their purpose. As Douglass North has shown, institutions are quite capable of acquiring a life of their own, surviving long after their original purpose has been served.[18] Nor is it always true, finally, that institutional rules aim mainly at economic efficiency. Many legal rules, in particular, may arise simply because some rule is required to resolve questions of law, the exact content of the rule being of considerably less significance. In such instances, the rule's utility may lie chiefly in its

[17] See esp. Schotter 1981. [18] North 1990, esp. 92–104.

clarity, since clear law tends to encourage cooperative bargaining.[19] But in general it repays the effort to think about institutional rules in the context of their economic operation.

III ASYMMETRICAL INFORMATION AND ADVERSE SELECTION

Some of the most interesting problems in Law and Economics arise from transactions when one party has knowledge that the other lacks. Sale often presents this problem; a seller of a slave, for instance, frequently knows far more about the slave's quirks than does a potential buyer. Such asymmetry can be so severe that it impedes exchanges and disrupts markets, as buyers either pay too much for goods or hold off from purchasing because they fear latent defects.

In this regard, it is helpful to consider the markets and fairs through which a large part of ancient commerce was channeled. Markets are organized locations for the regular sale of goods, frequently urban and subject to public regulation, and often with a degree of product specialization and a defined architecture; fairs are more episodic events. Both were familiar aspects of ancient economies, although with some regional variation.[20] From the economics standpoint, the purpose of such commercial concentrations is obvious: they facilitate market transactions, including the production of goods, their transfer, and the guarantee of their quality.[21] Sellers and buyers can initially contact one another in a competitive setting, but this is perhaps less important than the network of long-term personal relationships that arise within regular markets: patterns of trust and reliance based upon prior experience. For instance, a buyer may use experience as a substitute when the cost of searching for product information is too high; or a seller may use past bargains as good evidence for a buyer's credit. As has often been demonstrated, cultivating these long-term "relational" contracts is often of more importance than obtaining the lowest price, with the result that actual markets do not always perform in strict accord with Neoclassical predictions.

But large commercial concentrations also attract in, especially at their margins and where participants engage in "one-off" transactions, considerable numbers of less scrupulous traders. The dangers that these traders pose are particularly acute in the case of complex objects of sale, and in

[19] Cooter and Ulen 2000: 89: "One of the most robust conclusions [of experiments testing the Coase theorem] is that bargainers are more likely to cooperate when their rights are clear and less likely to agree when their rights are ambiguous." On transaction costs produced by legal mistake and uncertainty, see Schwartz 2000.

[20] Frayn 1993; de Ligt 1993a.

[21] See Furubotn and Richter 1998: 283–319, to whom the subsequent remarks are also indebted; also McMillan 2002: 9–11. On relational contracts, *ibid.* 158–69; classic is Macneil 1978.

the ancient world no object was more complex than slaves. Here, the phenomenon known as "adverse selection" could easily occur: the market is heavily influenced by sellers who are attempting to sell defective slaves while revealing to buyers as little as possible about them. The consequence is an inefficient "lemon market" in which prices are depressed not only because of the influx of poor quality slaves, but also because potential buyers are wary and demand a large discount, while the sellers of sound slaves are deterred from entering the market because its prevailing low price levels prevent them from realizing full value. What results is a market failure owing to depressed prices.[22]

As is well known, the Curule Aediles, the magistrates in charge of the large-scale slave and livestock markets at Rome, attempted to counter the problem of asymmetrical information by establishing a new liability for sellers.[23] The seller of a slave (or, *mutatis mutandis*, of livestock) was obliged to notify the buyer as to substantial but non-evident disease or physical defects in the object of sale, and also as to other important information such as whether the slave had previously run away. Unlike the usual liability in the law of sale, this market liability was established irrespective of the seller's fault, meaning that a seller was held liable regardless of whether he knew or even should have known of the defect, and indeed even if he could not have known of it. The buyer's remedies were, however, limited to either rescission of the sale within six months or the difference in price had the buyer known of the defect within one year – a generous period of time during which the buyer became knowledgeable about the slave or the livestock. The evident purpose of this new liability was to restore confidence in the market by giving buyers an opportunity to undo sales when the object of sale turned out to be defective. Though a buyer might still face formidable transaction costs in locating the original seller and proving that the defect was present at the time of sale, proof was considerably easier than in the ordinary law of sale.

This is a likely instance in which institutional development resulted from the realities of trading in the marketplace. Even the otherwise rather

[22] This paragraph was inspired by the famous study by Akerlof 1970, who sought to explain why the price of a new automobile falls so precipitously just after a dealer delivers it to a customer. For subsequent scholarship, see Furubotn and Richter 1998: 254–8. Adverse selection originated as a concept in insurance scholarship, where it was observed that insurance rates must take account of the insurer's lack of information about policy holders, since an undifferentiated insurance rate attracts undue numbers of risk takers. The major form of insurance in antiquity is the bottomry loan, on which see Millett 1983, and Cohen 1992: 30–40.

[23] The text of the edict for slaves is quoted by Ulpian (1 *ad Ed. Aed. Cur.*), D. 21.1.1.1. On the liability, see generally Buckland 1908: 52–68. Romanist literature, though recognizing the problem of asymmetrical information, did not isolate the problem from an economic perspective.

strained logic of Ulpian's comment on the Aediles' Edict[24] (this edict "was established to counter the deceit of sellers," yet "a seller ought to be held liable despite being unaware" of the defect) abruptly makes good sense. What is even more singular is another feature of the Aedilician liability for market sellers. Economists have been greatly interested in "signaling devices," institutions that arise, often informally, to counteract the effects of quality uncertainty and consequent adverse selection.[25] These devices indirectly communicate information about quality. In the case of the Roman slave market, one device was buyer insistence on knowing the "nationality" (*natio*) of slaves. Eventually, sellers were required to disclose this information, and Ulpian explains why it was sought: "there is a presumption that some slaves are good because they come from a nationality that is not of bad repute."[26] In other words, stereotypes about ethnic characteristics are used as an indirect signal of an individual slave's quality, under circumstances where direct knowledge of quality is difficult to obtain.

In broader terms, one of the contributions that NIE has made to the study of economic institutions is recognizing that the type of rationality assumed in Neoclassical Economics does not obtain in the real world. In Neoclassical Economics, economic actors have perfect knowledge about the transactions in which they are engaging, and this knowledge can be costlessly obtained. One of the general assumptions of NIE, by contrast, is that knowledge is costly, and as a consequence economic actors are limited in their ability to pursue rational goals. NIE analysis has thus tended to adopt Herbert Simon's concept of "bounded rationality," according to which people act rationally in pursuit of their goals, subject to the constraints on their ability and willingness to acquire knowledge. Simon also introduces the concept of the "satisficing solution," that is, a solution that is not necessarily the one that would be adopted under conditions of costless knowledge, but rather one that achieves a desired goal given the information available.[27] The implications of this concept of "bounded rationality" for economic analysis are complex and controversial. The concept helps to explain why most contracts tend to be incomplete, in the sense of not covering every eventuality that might arise. They are incomplete because the parties are handicapped in forecasting the future; it would be prohibitively costly, even if it were possible, to account for every conceivable contingency

[24] Ulpian (1 *ad Ed. Aed. Cur.*), D. 21.1.1.2 ("*Causa huius edicti proponendi est, ut occurratur fallaciis vendentium et emptoribus succurratur, quicumque decepti a venditoribus fuerint: dummodo sciamus venditorem, etiamsi ignoravit ea quae aediles praestari iubent, tamen teneri debere.*").

[25] The literature begins with Spence 1974; for a summary, see McMillan 2002: 53–64.

[26] Ulpian (1 *ad Ed. Aed. Cur.*), D. 21.1.31.21 ("*praesumptum etenim est quosdam servos bonos esse, quia natione sunt non infamata*").

[27] Simon 1983: 19–23, 84–5; cf. Williamson 1996: 10, 36–7.

that might affect the contractual relationship between the two parties. Bounded rationality is thus linked with transaction costs.

However, if knowledge is simply treated as a cost, then, as some would argue, there is very little to distinguish NIE analysis from that of Neoclassical Economics, since economic actors leaving contracts incomplete or not bothering to seek costly information in other types of transactions could simply be viewed as maximizing their utility by minimizing a cost that they have to bear. Another approach is to see economic actors as fully incapable of seeing the full implications of the decisions that they make. In the view of Geoffrey Hodgson, who argues for an "evolutionary" approach to economics, people organizing a firm have limited capacity to see how the transaction costs associated with one form of organization would compare with those of another. Instead, in his view, the actors will adopt a "satisficing" solution that accounts for a number of factors, including the actors' estimate of costs but a variety of other considerations, such as their values. Once an institution exists, however, it will tend to foster its own continuation, whether or not it continues to represent or ever represented the most efficient allocation of resources. Thus bounded rationality has an important effect on institutional "path dependence" (to be addressed below).[28]

IV THE PROBLEM OF AGENCY

Adverse selection is an example of how asymmetrical information can affect entry into a market. But also within long-established economic and legal relationships, the problem of information imbalance can cause difficulty. The most common form of this situation is somewhat confusingly described, in the Law and Economics literature, as "agency," where what is meant is not legal agency, but rather a situation in which: "a principal delegates some rights – for example, user rights over a resource – to an agent who is bound by a (formal or informal) contract to represent the principal's interest in return for payment of some kind."[29] The general problem here is that the agent operates on behalf of the principal, but has considerable control over the actual day-to-day operation of the activity; and because of this control, the agent usually has considerably greater information about the activity than does the principal, who often may be unable to monitor the agent's conduct directly.

Agency relationships are pervasive elements of social and economic life. In the modern world they assume protean forms: not just obvious examples like the relationship between stockholders and management, management and employees, or landowners and tenant farmers, but also subtler ones

[28] Hodgson 1999: 199–219.

[29] Eggertsson 1990: 40–1; see Furubotn and Richter 1998: 148–56, for further discussion.

like that between patients and physicians, clients and lawyers, constituents and their elected representatives, and so on. The ancient world also offers many examples, some unusual and highly interesting; the slave *peculium* is one obvious illustration, which will be discussed later in the chapter. This section concentrates on two types of agents: a tenant operating a farm leased from a landlord, and a husband holding a dowry that derives from his wife or her family.

The problem in agency relationships is how to counter the asymmetry of information. The agent's superior knowledge may lead him to engage in two related forms of misconduct: first, shirking, failing to pursue aggressively the principal's interest because the agent has only a limited interest in the venture's success; and opportunism, attempting to capture for himself either a portion of his principal's capital or a larger share of the profit. Usually this problem is resolved by constructing a contract providing the agent with sufficient incentive to perform effectively on the principal's behalf (often this means giving the agent a share of the income from the activity), while also permitting the principal to monitor for misconduct and to exact sanctions.

In a famous letter, Pliny the Younger, a Roman senator and landowner, discusses his anxieties about moving his farm tenants from fixed payment leases (the tenant pays a contractually set sum each year, normally after the harvest) to sharecropping (the tenant pays a set portion of the yield).[30] In Neoclassical Economics, a fixed payment lease is clearly preferable since it maximizes returns for both parties; so long as the leasehold remains productive, the tenant has a strong incentive to invest additional labor, over and above what is required to pay the rent, since he keeps all the surplus income. But the matter becomes far more complex when transaction costs are factored in.[31] Among the things that Pliny was obliged to consider are the following: risk resulting from climate and other exogenous circumstances (this risk is borne by the tenant in a fixed payment contract, but divided up in sharecropping); constraints on the tenant's financial ability to contribute both labor and human and physical capital; the danger that the tenant might prematurely abandon the lease, for example just before the harvest; the owner's need to protect the leasehold against undue depreciation caused by the tenant's carelessness; and the general costs of supervision by the owner. Transaction costs appear to be significant in explaining why contractual arrangements have varied so markedly across history.

[30] Plin. *Ep.* 9.37. On Pliny's agricultural practices, see Kehoe 1988b. Pliny was "risk averse"; he wanted steady income rather than maximum income; for the significance of this attitude for investment in agriculture and other industries in the Roman empire, see Chapter 20. Personal attitudes toward risk become very important when the Neoclassical assumption of free information is relaxed; see Cooter and Ulen 2000: 44–50.

[31] The following discussion draws heavily on Eggertsson 1990: 223–31.

In this situation, the role of law is often to leave ultimate economic decisions to the parties, but to create institutions that clarify their choices, especially through default rules applicable when the express contract is silent. Such default rules can lower bargaining costs considerably, since parties need not bother to negotiate terms allocating risks they may well deem remote.[32] But it is important that such rules be framed with a weather eye to their probable economic effects. Generally, default rules should approximate what the parties would have agreed to had they actually bargained over all relevant risk, which usually means that risk should be borne by the party that can more easily guard against the occurrence of the risk. Thus, for instance, absent express provision in the lease, a fixed rent tenant bears the risk of both crop shortfall and declining market prices, the reason being that the tenant is in control of cultivation and normally better informed on the local market; but an exception may occur when crop failure is owing to uncontrollable catastrophes such as hailstorms.[33]

At times, default rules may go further, to overtly encourage productive investment. In this respect, the legal position of the tenant farmer is well known and has recently been discussed.[34] Briefly, the tenant is entitled to recover the cost of useful expenditures made on the landlord's property; in addition, his recovery is not predicated upon the landlord's prior or subsequent assent to the outlay. It will usually make sense to require full repayment by the landlord, since new farm buildings or orchards are more or less permanent and he will draw the long-term benefit of them. The relationship between a landlord and tenant is essentially an arm's length one, and the Roman jurists seem to treat the issue of expenditures as basically a matter of accounting; the tenant is envisaged as potentially willing to invest in the hope of increased income from the farm, all of which (in the standard Roman cash lease) he can capture for himself during the term of the lease. But an interesting text of Scaevola deals with a situation where the tenant's planting of vines results in the landlord increasing the rent during the ensuing term. Scaevola holds that even when the tenant is expelled for being unable to meet the higher payments, he is still allowed to recapture his expenses.[35] All of this seems to be entirely reasonable, and well calculated to encouraging tenant investment.

The legal position of a husband who is administering his wife's dowry is quite different.[36] Clearly it is in the interest of both husband and wife that dowry property be productively developed, since, depending on how their marriage ends, the property could ultimately pass to either one. But,

[32] Cooter and Ulen 2000: 199–205.

[33] Frier 1993a. Gaius (10 *ad Ed. Prov.*), D. 19.2.25.6, notes that this exception does not apply to sharecroppers, who by contract divide the risk of catastrophic crop failures with the landlord.

[34] Kehoe 1997: 193–209, discussing the major sources.

[35] Scaevola (7 *Dig.*), D. 19.2.61 pr.

[36] On administration of dowries, see generally Treggiari 1991b: 327–40.

with a few exceptions, it is the husband who controls the dowry during the marriage, and his wife has very limited opportunity to determine whether his administration is competent and beneficial; her only real leverage, in most instances, is the threat of divorce. The situation is a difficult one, since it is not even controlled by the indirect mechanism of annual rental payments, which can broadly signal if the agency relationship is working properly. On the other hand, it is easy to see why the jurists were reluctant to impose any direct means for the wife to audit her husband's conduct, since that would be arguably destructive of marital harmony. And although it was theoretically possible for the husband to post security for his performance (such bonding is a common way to handle agency problems), the absence of surviving juristic discussion presumably indicates that this was rare despite the lengthy negotiations over dowry that regularly preceded marriage; the reason is doubtless that provisions concerning a husband's honesty were awkward in the pre-marital setting.

Instead, the jurists appear to resort to a somewhat indirect device. According to Paul,[37] the husband cannot recover useful expenses unless he had first obtained his wife's assent to making them. But the phrasing of the Latin text is equivocal; this is the holding of "some" jurists (*quidam*), apparently indicating that others held differently. The dissenting view may well have been that the wife's assent was not required, as other texts seem indeed to hold.[38] In deciding between the two rules, it is necessary to consider a number of aspects of the dowry situation: the desirability of the wife consenting to any long-term improvements in her dowry property; the instability of Roman marriage (high death rates, and the ease of divorce), which meant that the husband might not profit from long-term improvements; the husband's capacity to engage in embezzlement and other forms of opportunism, and the wife's limited means to prevent such misconduct during the marriage; and the perspective of public policy on all these issues. In any case, as is clear especially from the contradictory texts on opening quarries,[39] the economic interests of a husband and wife might diverge when it came to "improving" the dowry property; for instance, the husband might opportunistically seek quick profit even at the expense of the farm's long-term profitability.

Under these conditions, Paul's rule seems clearly superior, and it is a standpoint that is indirectly endorsed by public policy as well, in the form of the Augustan legislation forbidding the husband from alienating dowry land or manumitting slaves without his wife's consent.[40] The basic

[37] Paul (7 *ad Sab.*), D. 25.1.8. Similarly, Paul (79 *ad Plaut.*), D. 50.16.79.1.

[38] So, as it seems, Javolenus (6 *ex Post. Lab.*), D. 23.5.18 pr.; Ulpian (31 *ad Sab.*), D. 24.3.7.16.

[39] See esp. Javolenus (6 *ex Post. Lab.*), D. 23.5.18 pr.; Ulpian (31 *ad Sab.*), D. 24.3.7.13–14; Paul (7 *ad Sab.*), D. 24.3.8 pr. The issue is whether the husband can open a quarry that destroys existing agricultural land; comparable is strip-mining for coal.

[40] On land, Gai. *Inst.* 2.62–3; Paul *Sent.* 2.21b.2. On slaves, see Papinian, Ulpian, and Paul, D. 24.3.61–4.

framework here is a cooperative model of marriage, in which, as a matter of course, the husband makes no major decisions about the dowry without first seeking his wife's consent. The legal rules are founded, in other words, on a desire to foster marital relationships.

There is a deeper point here regarding the construction of institutions, particularly legal institutions. In the large literature that has grown up around New Institutional Economics, the suggestion is sometimes bruited that institutions can profitably be analyzed as though they are and should be constructed solely with an aim to promoting efficiency.[41] Caution is required in accepting so narrow a view of the genesis and development of legal institutions. As the example of Roman dowry should at least suggest, legal rules can often be related to underlying economic rationales, and where that is true such rationales are helpfully considered; but in the last analysis the benefit of this approach is sharply limited unless it is realized that other considerations (such as a public interest in preserving marital harmony by preventing dowries from becoming a source of wrangling between spouses) are also important in constructing rules.

This caveat notwithstanding, a cardinal implication of the Coase theorem should now be clear. Markets cannot and do not exist in isolation from their institutional context. Indeed, "for anything approaching perfect competition to exist, an intricate system of rules and regulations would normally be needed . . . Economic policy involves a choice among alternative social institutions, and these are created by the law or are dependent on it."[42]

V FIRMS

In Neoclassical Economics, a "firm" is defined as an "institution in which output (products and services) is fabricated from inputs (capital, labor, land, etc.). Just as we assume that consumers rationally maximize utility subject to their income constraint, we assume that firms maximize profits subject to the constraints imposed on them by consumer demand and the technology of production."[43] That is, firms are just individuals writ large. No special account need be taken of their internal form and organization, nor does their contribution to the economy require more detailed analysis.

This position is quite unsatisfactory. Imagine a Roman who wishes to acquire a carriage. She has the choice, either of purchasing one from a carriage manufacturer, or of arranging for a series of individual contracts with

[41] See, e.g., North 1981: 201–2 (emphasis added): "Institutions are a set of rules, compliance procedures, and moral and ethical behavioral norms designed to constrain the behavior of individuals *in the interests of maximizing the wealth or utility of principals*." North has since apparently abandoned this position.

[42] Coase 1988: 9, 28. [43] Cooter and Ulen 2000: 26 (emphasis in original removed).

the suppliers of each part of the carriage, from the raw materials through to the completed product. In the Neoclassical universe she already has all the knowledge required to pursue the latter course, and she also faces no costs in arranging and enforcing contracts, so that she is predictably indifferent as between these alternatives. The irreality of such a view has long been apparent, but the economic explanation for not only the existence, but also the attributes of firms was a long time coming, and again, much of the current debate on this issue has been inspired by a seminal article of Ronald Coase, "On the Nature of the Firm" (1937).[44] One of the most valuable insights of New Institutional Economics is that, in reality, institutionalized firms are not, or not simply, participants in a "market." Rather, firms are better described as *an alternative* to the market. Firms promote efficiency when they can marshal investments, in both physical and human capital, that would be more costly to acquire by means of individualized market transactions. Firms also lower costs by taking some transactions off the market and coordinating them internally. At the same time, the hierarchical structure of a firm gives the firm's owners, the principals, more control over the actions of their agents, the firm's employees, who, in a firmless world, would be individual external actors engaging in constant market transactions with the principals. The difficult challenge facing firms is to develop governance structures that promote economically efficient investment in physical and human capital and create the incentives for employees or agents to carry out the wishes of the owners.[45]

The recent debate in New Institutional Economics on the nature and governance of firms can help us to understand better the organization of business in the ancient world.[46] For our purposes, the issue is whether, in the Greek and Roman worlds, governance structures were developed that facilitated business and commercial activity by lowering transaction costs, or whether businesses limped along with inefficient forms of organization that restrained economic activity. Ancient governance structures could have simply preserved particular social structures or rewarded particular groups within society at the expense of others, but without fostering growth.[47] It has often been suggested that economic development in the Roman world was hampered by certain shortcomings in Roman law. One shortcoming was in the law of partnership (*societas*). In the Roman law of *societas*, partnerships never achieved a juristic personality that allowed them to function as a legal

[44] This paper is reprinted in Coase 1988: 33–55, and also in Williamson and Winter 1993: 18–33.

[45] Williamson 1985; Williamson 1996.

[46] This approach posits that there can be many types of firms other than the "capitalist firm" that is the focal point of many contemporary analyses. For a broad definition of the firm, see Hodgson 1999: 220–46.

[47] For this question as a basic aspect of research in New Institutional Economics, see Becker 1992: 67.

entity distinct from the individuals comprising the partnership. Indeed, in the Roman law of *societas*, a partnership would dissolve at the death or withdrawal of one of the partners.[48] The one exception to this rule consisted of the *societates* that contracted to collect taxes for the state, particularly in the late Republic. In addition, the Roman law of agency, at least from a contemporary perspective, was also incomplete, since it lacked a legal category of an agent who could have full power to act on behalf of a principal.[49] As a consequence, Roman law does not seem to have provided an institutional setting to accommodate ongoing, complex business enterprises that would continue to function regardless of who the owners or employees were.

To be sure, there were some legal developments that fostered economic activity by defining property rights and reducing the costs of defending them. As Harris suggests (in this volume), the development of the consensual contracts, probably in the second century BC, including sale (*emptio-venditio*), lease (*locatio-conductio*), partnership (*societas*), and mandate (*mandatum*), established legal definitions for contractual relationships key to the Roman economy. Their enforcement by the state served to define property rights clearly and thereby to the lower transaction costs involved in doing business. In either the third century or second century BC, Roman law also introduced six remedies, later called the *actiones adiecticiae qualitatis*, that gave protection to people engaging in contracts with agents representing principals.[50] It is difficult to determine when these actions might have been instituted, and the connection between the creation of such actions involving agency and the use of agents in the Roman economy is likely to have been quite complex.[51] These actions did not create "agency" in the Roman economy, but they surely facilitated the employment of agents in increasingly complex business arrangements by defining the rights of third parties who contracted with agents as well as the liabilities of the principals who employed them. In as much as the *actiones adiecticiae qualitatis* limited the liability of principals, in all likelihood they were developed with a view to the interests of members of the Roman elite.

But analyzing the role of agency in the Roman economy by focusing on these remedies and their limitations seems to treat Roman law and society from the perspective of what was missing, rather than in terms of how the economy functioned. No economy can function without principals and agents, and recent work in New Institutional Economics sheds light on how ongoing relationships between principals and agents operated in the Greek and Roman worlds.

[48] Kaser 1971: 572–6; Garnsey and Saller 1987: 54.
[49] Plescia 1984. [50] De Ligt 1999; Plescia 1984: 178–80, 186–7; Kaser 1971: 605–9.
[51] For discussion of the origins of these remedies, see Aubert 1994: 46–91, who dates them to the late second century BC, and de Ligt 1999, who situates them earlier, in the third century BC.

Take the banking industry of fourth-century BC Athens. Athenian banks played a key role in arranging the financing of seaborne commerce that contributed significantly to the vibrant economy of Athens in the fourth century. In addition, they provided rich Athenians with a way to invest their wealth beyond the reach of state authorities seeking to impose taxes and liturgical obligations.[52] The organization of Athenian banking was affected by both formal legal institutions and informal social practices. Bankers were often foreign-born residents of Athens, but their employees were invariably slaves or foreigners. The Athenian prohibition against the ownership of land in Attica by non-citizens surely made banking an attractive occupation for foreign residents in Athens.[53] Although the prohibition ostensibly made it impossible for many bankers to extend credit against real security, bankers found many ways around this law by channeling such loans through Athenian citizens.[54] At the same time, banking provided opportunities for non-citizens in Athens because freeborn citizens retained a deep-seated social prejudice against being in the employ of other people for protracted periods of time. Indeed, Athenian law seems to have been quite flexible in allowing for arrangements that would result in women acting as owners of property, in contrast with the situation in conventional Athenian law.

If social institutions helped to shape the organization of the Athenian banking industry, it also seems clear that the particular form of Athenian banking arose in response to the efforts of bank-owners to find appropriate governance structures to allow them to manage their businesses profitably. In fourth-century Athens, it was commonplace for slaves to engage in business independently from their owners, and the banking industry took advantage of this opportunity to establish governance structures that gave bankers a great deal of control and flexibility in managing their banks. We can appreciate the role played by slaves by considering the case of Pasion, perhaps the wealthiest Athenian banker in the fourth century. This banker's affairs are revealed in several speeches in the Demosthenic corpus that show the efforts of his son, Apollodorus, to regain his inheritance.[55] Pasion, himself a non-citizen, operated one of the most important banks for several decades in the fourth century. He employed a slave, Phormion, as the manager of his bank. Shortly before his death in 370/69, Pasion leased his bank to Phormion, and when Pasion died, he passed the bank on to Phormion and also had Phormion marry his widow, Archippe. The use of a slave like Phormion as a manager allowed the owner of a bank to set someone up in business with some independence and discretion. Since a

[52] On the economic significance of Athenian banks, see Cohen 1992. For a very different interpretation, see Millett 1983.

[53] Cohen 2000: 141–3, 186–7. [54] Cohen 1992: 133–6. [55] Cohen 1992: 61–110.

bank was identified through its proprietor, the use of a slave agent did not compromise the exclusive status of the bank's owner, so the principal did not have to worry that the slave manager would set up a rival bank on his own and take clients with him. Leasing provided an additional advantage, in that it reduced the liability that the bank owners bore for the actions of his slave agent.

The use of slaves and social dependants in key business functions was perhaps an even more fundamental characteristic of Roman society. This practice finds its origin partly in the informal institutions of ancient Rome. The *familia* structure was so ingrained in Roman society that it provided a ready made structure around which to organize business activities, just as it did in the empire to organize the bureaucracy of the Roman government, as represented by the *familia Caesaris*. At the same time, the use of slaves or freedmen as agents, as D'Arms argues, allowed upper-class Romans to avoid the opprobrium associated with too close and direct an involvement in sordid business affairs.[56] From the perspective of NIE, this form of business organization was an appropriate response to the general constraints surrounding economic activity in the ancient world, especially the difficulty of obtaining the costly information that would allow a business owner or principal to enforce the obligations of his employee or agent. In any contractual relationship, one of the key concerns for each party is to protect against "opportunistic behavior," the tendency of a party to take advantage of asymmetries of information to create gain for himself at the expense of the other.[57] This consideration would be especially important when the agent was managing affairs at a distant location that the principal could not easily visit – we might think of a slave bailiff or *vilicus* managing a distant estate for a wealthy absentee landowner, or a business agent arranging commercial transactions for a trader in a far off port.

We can appreciate how Roman property owners dealt with this problem by considering the principal–agent relationship from the perspective of the "relational contract." The "relational contract" is a concept used by contemporary legal scholars to analyze long-term, dynamic business relationships (including employment), when the contracting parties at the outset are unable to anticipate or provide for all the future contingencies, but both sides have a vested interest in the continuation of the relationship. The theory of the "relational contract" posits that economic actors make decisions on the basis of limited, costly information. This conception of a contract is to be contrasted to that of Neoclassical Economics, which views the contract as a "discrete transaction" negotiated by parties with full knowledge of future contingencies.[58] To take the example of Roman

[56] D'Arms 1981. [57] Williamson 1979; Williamson 1985: 30.
[58] See above, in section III, as well as Hviid 2000, and Furubotn and Richter 1998: 158–69.

law, the most likely formal arrangements that existed between principals and legally independent agents (say, between the owner of a business and the free manager assigned to oversee its operations) would be based on the consensual contracts of lease and hire or mandate.[59] From a purely formal perspective, these contracts gave principals legal recourse against an agent deemed deficient. But from the perspective of the relational contract, taking an employee or business partner to court is really a last recourse; such a step ends the relationship, and the court proceedings serve simply to satisfy the legal claims of the two parties, and to divide whatever assets remain from the contractual relationship, with no consideration of any future relationship.

The use of social dependants as agents provided property owners with a great deal more leverage in negotiating the adjustments necessary to a long-term business relationship. Because of the social dependence involved, negotiations between a principal and slave agent in Rome were doubtless often one-sided, even if the agent preferred a different arrangement. But it is also not the case that slaves had no leverage of their own, and analysts of the slave economy have shown how slaves bargain with their masters, exchanging effort for privileges.[60] This observation, made in connection with agricultural slaves performing drudge labor, applies much more unmistakably to slaves working in positions of responsibility and discretion, over whom it is clear that masters exercised only limited control.

A business person managing affairs through his or her slave or even freedman enjoyed certain advantages over those from other governance structures to make periodic adjustments to the contractual relationship. In the Roman world, it is not simply that the owner could sanction a slave manager by confiscating the *peculium*, the property that the owner allowed the slave to control to manage a business, or that he or she could invoke social sanctions against an uncooperative freedman. The element of social dependence gave property owners a recourse lacking to their counterparts with free employees, whose employment they could terminate at will or sue in a court of law. One consequence of the use of social dependants as agents is that many aspects of the principal–agent relationships transpired outside the framework of the law, rather than in "the shadow of the law."[61] But the private rewards and sanctions that a property owner could use to influence the behavior of a slave were largely outside the purview of the law.

The Roman system of establishing slaves in business and providing them with *peculia* also contributed to solving one of the central problems

[59] Aubert 1994: 110–12. [60] Eggertsson 1990: 203–13.

[61] This now famous phrase has been used to characterize negotiations in divorce settlements in the US, in which the legal rules surrounding divorce establish overall constraints affecting the negotiations of the two parties: Mnookin and Kornhauser 1979.

identified by analysts of the firm, that of monitoring the firm's employees. In a modern firm, it is often difficult to ascertain whether employees are working to achieve the goals of the principals or the firm's owners. The problem of monitoring performance becomes especially difficult if, as is likely, the firm's managers have goals different from the firm's owners; their incentive will be to induce their employees to serve their own interests, rather than those of the owners.[62] So even employees who might be shirking from the point of view of the ownership of a firm may be responding rationally to incentives established by their immediate managers. Recent scholarship on this issue suggests that firms can be most effectively governed when those participating in governance, whether owners, managers, or employees in employee-owned or socialist firms, invest their own resources and so share in the risk of running the business. As "residual claimants," or owners of the proceeds of the firm, they have an incentive to invest the funds of the firm appropriately and to avoid maximizing their immediate gain at the expense of the firm's long-term interests.[63]

To turn to ancient Rome, Roman property owners faced the challenge of creating the proper incentives for their slave managers to pursue profits without engaging in short-term strategies that might squander their assets. This problem was perhaps more salient than in a modern firm since long-distance business arrangements added to the costs of information and exacerbated problems caused by asymmetries of information between agent and principal. But by assigning the slave manager a *peculium* and allowing him to manage his business independently, Roman property owners overcame this difficulty to some degree. The slave manager acting with a *peculium* became an independent businessman in his own right and so had every incentive to monitor efficiently and rigorously the employees (including slaves) in his charge, and much less of an incentive to line his own pockets at the expense of his owner. In effect, the slave manager became a kind of "residual claimant" over the proceeds of the business, even if formally the slave's owner was the ultimate owner of the business. The incentives created by allocating *peculia* required slaves to be confident that, absent exceptional circumstances, they would retain whatever profits they earned. The major cost for property owners was that they surrendered a great deal of control over their businesses, and they probably sacrificed income that they might have received from a more centralized system of managing their business interests.

The use of social dependants as agents also stemmed from property owners' efforts to reap the benefit of their investment in human capital. Recent scholarship on the nature of the firm suggests that firms are most likely to be vertically integrated when business operations require investment in

[62] Alchian and Demsetz 1972. [63] See, in general, Furubotn and Richter 1998: 354–404.

specific assets.[64] In the ancient world, especially in businesses like banking, the most important investment was likely to have been in human capital, that is, the training of individuals capable of conducting the business of the firm. Training in crafts and trades was conducted within the confines of an *oikos* in the Greek world or a *familia* in the Roman, and it was often not available in other settings. Both the owner and the slave had a vested interest in this relationship: the owner to profit from the skills that the slave had acquired, and the slave to gain valuable training and the possibility of economic independence. In Egypt, by contrast, apprenticeship contracts indicate that training in crafts and industries was accomplished in accordance with different principles, with a skilled third party receiving compensation for the training of a child, whether slave or free, in a trade.[65] The organization of the ceramic industry in the Roman empire (see below, Chapter 20) offers an example of how investment in human capital was managed within the *familia*. In the ceramic industry, knowledge was apparently passed on from artisans of servile or freed status to their own dependants. Although it is difficult to be sure of the precise relationships involved when successful workshops spawned what appear to be branch workshops, the most likely scenario is that workers took the skills that they had acquired and set out to create their own establishments. Whether the former patrons or employers retained an interest in the new workshop is hard to determine.

The difficulty of acquiring the necessary information to manage far-flung business interests led large landowners to use friends and other people of their own social status to manage, or at least to oversee the management, of business affairs. One clear example of this comes from the Heroninos archive, which attests the management of a large estate in the Fayyum region of Egypt during the third century AD (see also Chapter 20). Aurelius Appianus, the owner of the estate with which this archive is concerned, belonged to the equestrian order and was also a member of the city council in Alexandria. The central management of the estate, located in the capital of the Arsinoite nome, exercised an exacting supervision over the performance of the managers of the village-based units of the estate; these managers, or *phrontistai*, had to present a detailed accounting for the income and expenses connected with the lands for whose cultivation they were responsible. But strikingly, Alypios, the person to whom many of these accounts were submitted was an equestrian and an estate owner in his own right.[66] It is hard to imagine that Alypios worked for Appianus under a contract such as lease or mandate, and it seems much more likely that this agency

[64] Williamson 1985: 85–102.

[65] Apprenticeship contracts were especially important in the weaving industry in Roman Egypt, as discussed in Chapter 20.

[66] Rathbone 1991 14–22, 58–61.

relationship was built largely on the personal trust between the principal and agent. Any disagreement between Appianus as principal and Alypios as agent would probably have been resolved through informal means, rather than "in the shadow of the law." How Alypios or other people in comparable decisions dealt with Heroninos or other *phrontistai* is a different matter.

This method of managing businesses through friends or social dependants had significant implications for the organization of the Roman economy. For one, it tended to reinforce the strict social hierarchy that helped to preserve the economic and social privileges of the landowning elite: there was little capacity for developing a class of artisans let alone entrepreneurs who were fully independent of elite patronage or control. Successful freedmen who gained wealth as artisans or business managers were ultimately dependent on a master or patron for an initial investment in skills and capital, and they often remained socially bound at least to some degree to their patron.

At the same time, the use of friends and social dependants suggests some of the difficulties inherent in managing property or businesses at long distance, which resulted from the difficulty of enforcing contracts, both formal ones that property owners might enter into with agents of various sorts, or the informal contracts that defined the relationship between a master and a slave. The limited degree of control that property owners could exercise over agents is likely to have affected their planning in economic matters. Instead of undertaking a potentially remunerative enterprise that required a great deal of planning and coordination, property owners might rather be content to skim off a portion of the profits from agents who themselves undertook to manage the businesses in question and used their own *peculia* as a source of operating funds. These agents, even when they were of slave status, could operate with a great deal of independence. The organization of business in the Roman empire was usually decentralized, with limited vertical integration. The tendency of the Romans (and of the Greeks) to use social dependants as agents suggests the complex interplay among the costs of information, the difficulty of using the courts or other legal sanctions to enforce contracts, the difficulty of using private means to enforce contracts, and the economic goals of property owners.

VI PROPERTY

As we have seen, Neoclassical Economics already lays stress on the vital "pre-economic" role of law in defining and distributing property rights – not only who owns what, but what ownership means and how it can be exercised – since property rights then become the basis for hypothetically friction-free

negotiations leading to efficient allocations and economic development.[67] Although this assumption remains basic in New Institutional Economics, emphasis on transaction costs produces new complications.[68]

For example, what counts as property susceptible of public or private ownership? The Roman jurists draw the lines with seeming ease and exactitude,[69] but many problems lurk just behind their bland phrasing. Nature's law (we are solemnly told) dictates that the sea is common to all, and therefore also the seashore, to the highest tidemark; it follows that anyone may build and own a fishing shack on the seashore. But try telling that to the villa owner whose seascape was thereby obstructed. The problem eventually required official intervention.[70] But why ever shouldn't a villa owner be able to own the adjacent seashore? Ostensibly, Roman law here runs up against the well-known "tragedy of the commons," an effect (observed since Aristotle) whereby commonly held and accessible property is less productively exploited than private property.[71] Private property rights offer both static benefits – the prevention of overuse by those who can ignore the costs their use imposes on others – and dynamic benefits – the long-term incentive to invest in creating or improving a resource.

However, establishing exclusive rights to property requires the state and private individuals to pay considerable costs, costs so high that they may render it economically unviable to accord exclusive ownership of a resource. Certainly it can be doubted that producing new private property always increases social welfare; the resources devoted to defining, monitoring, and enforcing exclusive rights may be worth less than the additional output that private ownership brings. This point seems obvious enough for the seashore, and so also for wild animals or running water. But even with regard to ordinary land – farms, houses, commercial buildings – the Greeks and Romans generally lacked the systematic public registries that are necessary for conclusive resolution of disputes over ownership, boundaries, land use, servitudes, and liens; adequate resources and bureaucracies were simply

[67] Landis and Posner 2003: 14 (footnote omitted): "When transaction costs . . . are low, Ronald Coase's well-known analysis of transaction costs implies that enforceable contract rights are all that society needs, beyond some underlying set of entitlements so that parties have something to contract about, to obtain optimal use and investment."

[68] On what follows, see especially Eggertsson 1990: 83–124; Furubotn and Richter 1998: 69–120. This topic is very complex, and only the briefest rehearsal is offered here.

[69] See, for instance, Gaius, *Inst.* 2.2–14; see Just. *Inst.* 2.1–2. Roman law is quite advanced in comparison with Athens: Harrison 1968: 228–35.

[70] The sea and seashore as common property: Marcian (3 *Inst.*), D. 1.8.2; Just. *Inst.* 1.1.1, 5. Resulting conflict with local property owners: Ulpian (57 *ad Ed.*), D. 47.10.13.7. Legal intervention: Pomponius (6 *ex Plaut.*), D. 41.1.50 (shack builders need praetor's permission). Celsus (39 *Dig.*), D. 43.8.3, is apparently the first jurist to solve the problem by expropriating the seashore for the government – a harbinger of things to come.

[71] Arist. *Pol.* 2.3.1261b 33–8. See Cooter and Ulen 2000: 123–6, 159–62.

unavailable. And beyond this come the exclusion costs: initially to assign property rights, and then to enforce them. The former are sunk costs that do not affect private decisions once the transfer of rights has occurred, but the latter are variable costs that both individual property owners and the state must recurrently sustain.[72]

Such considerations help when we turn to consider two other kinds of property, one largely absent from the ancient world, and the other largely absent from our own. First, intellectual property: "ideas, inventions, discoveries, symbols, images, expressive works (verbal, visual, musical, theatrical), or in short any potentially human product (broadly, 'information') that has an existence separable from a unique physical embodiment, whether or not the product has actually been . . . brought under a legal regime of property rights."[73] In modern law, intellectual property rights involve a delicate trade-off between the social good of allowing the property's creator to appropriate its social value (thereby encouraging innovation) and the social cost of permitting the property's owner to exclude others (thereby possibly impeding an idea's dissemination). But for many reasons the cost of establishing intellectual property rights tends to be very high: such property is hard to identify because it has no unique physical site; ideas, because they often "await discovery" (as it were), tend to provoke wasteful overinvestment by competitors racing to seize a monopoly on them; and they are particularly costly to protect from replication.[74] Although the ancient world already witnessed the modest origins of intellectual property (for instance, symbolic trademarks indicating the source of traded goods), in general even the fairly well developed Roman law of intangible property never extended far enough to embrace ideas as objects of dominion.[75] This helps to explain why literature remains the preserve of the leisure class.

Far more difficult is the issue of slavery, property rights in human beings. The same issues bedevil scholarly discussion, which has been extensive.[76] Briefly, the key question is not whether slavery is profitable in itself, but rather whether widespread slavery can be an economically stable institution in the very long run, granted the underlying certainty that human capital will never be more valuable to someone other than the person who embodies it – with the consequence that, in the absence of countervailing factors, slaves will eventually buy back from their masters the rights to their human capital. This argument assumes that slaves, who for their labor receive little beyond subsistence, will shirk or engage in opportunistic behavior

[72] Eggertsson 1990: 96. See also Bouckaert 2000 on original assignment.

[73] Landis and Posner 2003: 1.

[74] Landis and Posner 2003: 16–21. The social costs of intellectual property are so high that some have doubted whether the current system is justified at all.

[75] Trademarks: Greenberg 1951: 879–80. Roman law on intangibles: Kaser 1971: 376–7; on intellectual property: Schickert 2005.

[76] See the review by Engerman 1986; and especially Eggertsson 1990: 203–13.

unless prevented (meaning high agency costs for the master), that they can negotiate with masters for their freedom (despite the high costs of enforcing such contracts),[77] and that manumitted slaves can then find work for pay based on their effort. Under these conditions, slavery should disappear not because it is unprofitable, but because masters will find it even more profitable to let slaves buy themselves back.

It remains unclear, as well, under what conditions slave labor will enjoy an actual competitive edge over free labor, particularly in light of high agency costs for monitoring slaves. It has been hypothesized that pain incentives (as opposed to ordinary rewards) can significantly enhance productivity in activities that are effort- and land-intensive, such as forms of agriculture, mining, quarrying, and public works that utilize primitive technology.[78] What this hypothesis suggests is that slavery arises earliest and is most durable in effort-intensive economic sectors where pain works as an incentive; but to the extent that slave labor spills over into care- and capital-intensive sectors (such as viticulture or domestic service), ordinary rewards, including manumission, will be preferred to mitigate agency costs.

VII PATH DEPENDENCE

One theme addressed in NIE literature is the degree to which the establishment of social and economic institutions locks a society on a particular path, to the exclusion of potentially more efficient institutional arrangements.[79] In the NIE literature, the concept of "path dependence" typically refers to the choice of technologies, when network effects or other factors result in the choice of one technology over another possibly preferable technology, but society eventually has so much invested in the first technology that it is too costly to switch to the superior alternative.[80] Douglass North has extended the idea from technology to institutions, arguing that the choice of particular economic institutions can create a path dependence that makes the choice of potentially more efficient alternatives prohibitively costly.[81] In this connection, we must also consider the uncertainty, resulting costly information or "bounded rationality," that surrounds the original choice of investment strategy or institutional arrangement.[82]

[77] From Marcus Aurelius on, such contracts could be accomplished through a legal fiction: Ulpian (6 *Disp.*), D. 40.1.4 pr.–1. But informal arrangements of this type are referred to already in the late Republic: e.g., Alfenus (4 *Dig.*), D. 40.1.6. See Buckland 1908: 636–40. It is also worth noting the statutory limits placed on manumission (*ibid.* 533–51), since they may conceivably result from the ultimate inviability of slavery.

[78] Fenoaltea 1984, with an examination of Roman slavery at 647–50. See also Domar 1970.

[79] North 1990.

[80] Liebowitz and Margolis 2000. This theory remains controversial, however, even for technology, since historical examples have proven difficult to isolate.

[81] North 1990: 92–104. [82] Liebowitz and Margolis 2000: 985–6, 994–5.

The significant role that institutional path dependence played in the ancient economy can be illustrated with three examples drawn from the agrarian history of the Roman empire. The first is the development of the slave-based villa in late Republican Italy. This form of agriculture involved the intensive cultivation of relatively compact estates to produce wine, olive oil, and other crops for Rome and other markets, especially in southern Gaul, accessible by sea from the western coast of Italy, where this form of agriculture was concentrated (see below, Chapter 20). These estates were organized in such a way as to make intensive use of the land by pressing slaves into service as laborers. The development of the villa economy provided elite Romans with a way to invest newfound wealth in expanding markets for agricultural produce, and the elite were able to take advantage of wars to create a slave labor force that they could exploit profitably.

The villa economy may have increased productivity in the Roman economy, but it carried with it significant costs, some of which were recognized by contemporary Roman observers. Agrarian reformers in the late Republic decried the use of large numbers of slaves in agriculture. The use of slaves probably helped Rome to develop commercial agriculture, but the economic growth that resulted from the villa economy was uneven, with the lion's share of the newly created wealth going to a small class of elite landowners, while the earning capacity of free farmers probably suffered. The loss of income for free farmers that is likely to have resulted from the villa economy reduced their cumulative demand for goods and so tended to depress economic growth.[83] The intensive use of slave labor in agriculture required landowners to develop structures to monitor how their estates were run, and to police against revolt by the slaves. Moreover, the investment that landowners made in slaves used funds that might have been used for other forms of investment, but it presumably provided landowners with an adequate level of profit. So the very powerful people in Rome had a lot invested in this system and sought to promote structures that would foster its profitability in the future. Thus, as in the US South before the Civil War, the substantial investment that landowners had in slaves gave them an incentive to struggle to maintain this form of agriculture in the face of political and economic changes that threatened its profitability.[84] Gradually, beginning in the first century and increasingly in the second century AD, this form of agriculture gave way to a more decentralized organization of estates.

[83] See E. L. Jones 1988: 59, 103.

[84] For the South, cf. Wright 1978: 128–57. Other manifestations of path dependence involve the creation of ideologies and legal rules that support an initially efficient institution, but tend to impede its alteration if it later becomes inefficient. In Roman law, an example is probably the emergence, during the late Republic, of the harsh distinction between slaves and freemen, along with strong conceptions of property ownership. See Kaser 1971: 283–9, 400–4.

We can trace a different aspect of institutional path dependence in the Roman state's policies for administering state-owned property, or imperial estates, during the early empire. The Roman state owned property in virtually all provinces of the Roman empire, and the revenues from these estates represented a significant portion of the state's income. Imperial property included the private property of the emperor and other categories of state-owned lands, the administration of which was gradually subsumed under the imperial treasury, or *fiscus* (see below, Chapters 20 and 23). Imperial lands in Africa and Egypt were especially important for supporting the politically crucial programs of food distributions in Rome, and later in Constantinople. As a general rule, the imperial administration exploited these properties by leasing them out, in various forms, to individual small-scale cultivators. This type of land tenure is attested in north Africa, Asia Minor, Syria, and Egypt, and comparable systems of land tenure are likely in other provinces as well.[85] By exploiting its properties in this way, the administration was to some extent adapting tenure arrangements existing when the properties passed into imperial control. But the policy of the Roman state was to maintain the property rights of the small cultivators occupying the land. In North Africa, the Roman administration offered incentives, embodied in the *lex Manciana* and the *lex Hadriana*, encouraging farmers to bring unused lands under cultivation and to make a long-term commitment to them by investing in the cultivation of vines and olives. Indeed, the state consistently defended the rights of the small-scale imperial tenants to their lands, even when the claims of imperial tenants came into conflict with powerful interests, such as the large-scale lessees, or *conductores*, who collected the rent on imperial estates in Africa, or the landowners in towns in Asia Minor, who sought to reduce their own fiscal obligations by imposing a share of them on tenants of imperial estates adjacent to their towns.[86]

The policy that the Roman government followed in exploiting its properties carried substantial costs. Relying on small-scale cultivators no doubt helped secure stable and predictable revenues. Arguably, the state also promoted "distributional" goals by continuing the leasing out to small-scale cultivators, since this policy promoted the welfare of small farmers and protected them from large landowners. In broader terms, the state's policy of maintaining ownership over vast tracts of land across the empire provided the emperor with some security against the power of the increasingly wealthy landowners who comprised the senatorial and equestrian aristocracies of this period and who represented potential rivals to the emperor's authority. At the same time, this system of leasing, based as it was on secure property rights for the small-scale cultivators, made it virtually impossible

[85] Crawford 1976.
[86] The texts are collected in Hauken 1998; for what follows, see also Kehoe 2007.

to put the land to alternative uses, such as selling it back to private ownership and allowing the new private owners to develop their own methods of cultivating it. Such a policy might ultimately have promoted a greater social product, since it would have promoted the tendency of resources to find their most valued use, but the government's immediate and continued policy of leasing to small-scale cultivators precluded such options.

However, once a policy of relying on small-scale cultivators was developed – possibly as the result of a decision grounded in tradition of what to do with state property – it created a whole complex of property rights and established a basic institutional framework for a significant portion of the Roman economy. The strong property rights that the state accorded to imperial tenants probably also affected the conditions under which privately owned land was cultivated, since private landowners could only compete for tenants if they offered terms comparable to those on imperial estates. The likely result is that tenants cultivating land on private estates also enjoyed substantial security of tenure, a situation that affected the incentives of both large landowners and tenants to invest in agriculture. With some incentives for investment in agriculture diminished, many private landowners will have contented themselves with extracting a portion of the surplus produced by tenants who were cultivating their land autonomously, with little landowner investment. Such a relationship between landowner and tenant affected the balance of payments between countryside and city and the development of the urban economy.[87] These conclusions are admittedly hypothetical, but it seems clear that the policies that the imperial government followed in exploiting its own estates had broad implications for the Roman economy as a whole. In the later empire, the fiscal policy of the Roman government rested to a large degree on its ability to manage the relationships between landowners and the *coloni* cultivating their land.

Finally, we can trace another aspect of institutional path dependence in the agrarian history of Egypt, where the experiences of the Ptolemaic and Roman administrations indicate the ancient state's limited capacity to transform an agrarian economy. If Egypt in the early empire enjoyed conditions that promoted growth such as the development of secure private property rights (Rathbone, in this volume), we should expect to see an elite class in Egypt taking advantage of the increasing opportunities for commercial agriculture brought about by Roman rule by investing heavily in agriculture. However, the development of large estates and an elite landowning class comparable to that of other urbanized parts of the empire came relatively late to Egypt, in the third century AD.[88] To some

[87] Erdkamp 2001. [88] Rathbone 1991.

extent, at least, the delayed development of large estates in Egypt is the result of the complex set of legal and political institutions surrounding the agrarian economy that the Romans inherited from the Ptolemies. As Manning argues (in this volume), the Ptolemies sought to stabilize and broaden their base of revenues by adapting the land tenure system that the Saite and Persian rulers of Egypt had established. Much of their revenue came from land nominally belonging to the crown, or "royal land," but cultivated by people with secure tenure rights. In many parts of Egypt, in particular Upper Egypt, the Ptolemies had no choice but to rule through traditional local elites, often connected with the very powerful and wealthy temples. The local elite classes represented the link between the cultivators and the crown, and they played a crucial role in the collection of the taxes on which the Ptolemaic state depended. As a counter to these traditional bases of power, the Ptolemies also promoted urbanism and the interests of a Greek ruling class. The efforts of the Ptolemies to transform the agrarian economy can be seen especially in the Fayyum region, where, beginning with Ptolemy II Philadelphus, they reclaimed a great deal of farmland by lowering the level of Lake Moeris, settled a Greek military class as cleruchs, and organized economic and political life around the metropolis and villages. The Fayyum was also the site of experimentation with agricultural techniques, the introduction of new crops, and investment in more intensive forms of agriculture, especially viticulture. Elsewhere, it is doubtful whether the Ptolemies displayed the same capacity for creating new institutions.

The agrarian economy of Ptolemaic Egypt, then, was characterized by the small-scale cultivation of lands held by corporate entities, whether the crown or the temples. This situation continued when Egypt passed into Roman rule, except that the temples lost much of their land, which was then administered by the Roman state as public land, or *ge demosie*. Under Roman rule, some categories of land, in particular cleruchic land, nominally held at the pleasure of the crown in Ptolemaic times, became private land for all intents and purposes. By the third century, royal land had become largely assimilated with private land, the one significant difference being a separate rate of taxation. It seems clear that the institutional history of Egypt under Ptolemaic rule slowed developments that happened in other parts of the Roman empire with less firmly established agrarian regimes. But the really intriguing question concerns how this situation affected Egypt's capacity for agricultural growth, as well as the welfare of the various classes of people involved in Egypt's agrarian economy. Certainly, the creation of large estates by itself was no guarantee of economic growth. In the Ptolemaic period, the gift estates awarded to members of the Ptolemaic court, such as the estate of the financial minister or *dioiketes* Apollonius that was administered

by Zenon, may have been the locus for experimentation in agricultural techniques and for substantial investment in intensively cultivated crops. But it is unclear whether the same claim can be made for the first-century AD *ousiai*, complexes of agricultural properties set at the disposal of members of the Julio-Claudian court. These "estates" are better characterized as sets of properties from which the beneficiaries acquired the right to exact a rent, rather than an economic resource in which they invested in hopes of greater production.[89] The *ousiai* were, in effect, estates superimposed on an agrarian economy characterized by the small-scale cultivation of modest parcels. When the Julio-Claudian dynasty collapsed, ousiac land reverted to the state and was administered just like other state land.

The agrarian policy pursued by both the Ptolemies and the Romans represented an adaptation to the unique geographical conditions of Egypt and to Egypt's institutional history. The policy of both the Ptolemaic and Roman governments to maintain control over substantial portions of the country's land, from one perspective, represented a brake on agrarian growth, since it inhibited investment in agriculture by wealthy people able to take advantage of commercial opportunities.[90] At the same time, one could argue that, by assuring access to land and tenure rights to a broad population, both the Ptolemies and the Romans helped to maintain a viable peasant class with resources to create the type of demand needed to sustain economic growth. In this circumstance, the legal and administrative system of Egypt would have had far-reaching and potentially positive consequences for the economy.[91] It is not possible in this space to arrive at any conclusion about the Egyptian agrarian economy, but the contribution of NIE is to help formulate the questions, provide analytical tools with which to analyze the ancient evidence, and develop theories that advance the debate.

VIII CONCLUSION

In the absence of more robust empirical data, ancient evidence can seldom if ever be used to test the hypotheses that are characteristic of the current research agenda in New Institutional Economics. The use of these theories must be more indirect: to provide a richer account of how the ancient economy worked, what strains are likely to have affected its operation, and the ways in which ancient institutions were contrived in response to these strains. Above all, NIE affords us the opportunity to reconsider institutional aspects of the ancient economy that may initially strike us as bizarre or even counterproductive. NIE offers us an array of tools for taking a closer look.

[89] Parássoglou 1978; Kehoe 1992: 16–57. [90] Cf. E. L. Jones 1988: 49. [91] Cf. Field 1991.

From such research it may emerge – indeed, in numerous instances it predictably will emerge – that many curious economic institutions of the Greek and Roman world were, at least in their origins, the consequence of individuals struggling rationally (within their lights) to maximize their personal gain. To the extent that this is true, the "invisible hand" of Adam Smith should no longer be counted as generally missing from the ancient economy. Only, the hand was made flesh.

CHAPTER 6

TECHNOLOGY

HELMUTH SCHNEIDER

I ANCIENT TECHNOLOGY IN MODERN HISTORIOGRAPHY

Ancient technology has been a subject of controversial scholarly debate since the beginning of the twentieth century. So far, a consensus has proved unattainable, whether about the issues and topics of a modern history of ancient technology, about the criteria of evaluation of technological developments in pre-industrial societies, or about the actual spread of technological innovations. In such circumstances, this chapter must begin by taking up a position in relation to the views expressed in earlier research, and at the same time offering some methodological justification for my own view.

Almost all work on the history of technology published before 1984 espoused the opinion that technological development in antiquity never implemented advances that were actually quite possible; that ancient technology had, on the whole, been characterized by stagnation; and that it had only few inventions to show which could be compared in importance to the accomplishments of the ancient civilizations in such areas as literature, art, philosophy, mathematics or medicine. It was further held that those few technological innovations which are documented had scarcely been put to economic use, and had therefore only had scant influence on work, production, and productivity. Various reasons were given for the perceived primitive and backward nature of ancient technology, such as a reverence for nature that was rooted in religion, the preponderance of thought structures shaped by rhetoric and therefore unsuitable for the understanding of technical facts, or the elitist self-perception of ancient scholars who had had no interest in making practical use of their scientific knowledge. Economic factors were also brought into play, such as the lack of markets for the yields of mass-production based on the mechanization of work processes, the lack of capital for the building up of industries, the lack of suitable energy sources for industrial production and, not least, the existence of slavery, which had

Translation by Annemarie Künzl-Snodgrass, with the help of Anthony Snodgrass.

supplied the ancient economy with sufficient cheap labor, so as to make the use of labor-saving machinery superfluous.[1]

This critical view of ancient technology is in many cases based less on a comprehensive evaluation of the sources for the history of technology in antiquity, than on generalized statements that can hardly be adequately substantiated. A characteristic example of this can be found in Finley's observations at the beginning of his much-cited 1965 essay on "Technical innovation and economic progress in the ancient world." His statement "it is a commonplace that the Greeks and Romans together added little to the world's store of technical knowledge and equipment," an older position in scholarship, which should have been critically evaluated, is instead accepted as a *communis opinio* and used as the starting point for the deliberations on ancient technology which follow. In this same context it is significant that Finley, after giving a (by no means comprehensive, yet still impressive) list of technical innovations, comprising amongst others the cog wheel, screw, rotary and water mill, screw press, glass production, concrete, hollow-cast bronzes and torsion catapult, comments on this list by saying that "it adds up to not very much for a great civilisation over fifteen hundred years."[2] The criteria for such an evaluation of ancient technology remain unclear; the question arises whether, in the light of the inventions listed by Finley, it would not be more appropriate to credit ancient society with a considerable potential for technological innovation and to analyze the causes of the technological development achieved, rather than to postulate a technological backwardness in antiquity and then discuss the reasons for the perceived stagnation.

Behind much of the work published in the twentieth century on ancient technology lies an understanding of technology which is, to a high degree, shaped by technological progress in the age of industrialization. Since the beginning of the Industrial Revolution, an acceleration in technological change has taken place, which through the mechanization of work processes and the use of machinery led, from the first, to a fundamental change of production and thus to a hitherto unimagined increase in productivity. The interdependency of technological progress and economic growth, so characteristic for modern industrialized societies, is reflected in the fact that inventions are very swiftly put to economic use. From early on, industry went over to pushing technological developments ahead in their own research laboratories, in order to secure advantages for themselves in the competition of the markets. Through competition between businesses as well as between nation states, through patency laws which guaranteed

[1] Lombroso-Ferrero 1920; Lämmli 1968: 44–9, 58–67; Kiechle 1969; Vernant 1974; Gille 1980: 170–95; Greene 1990; Schneider 1992: 22–30; Wilson 2002; compare also the criticism of such positions in Persson 1988.

[2] Finley 1965b: 29.

the economic utilization of inventions, and through the development of joint-stock companies, these processes were still further accelerated, so that innovations followed each other in ever quicker succession. Railways, motor cars, and aeroplanes revolutionized transport in the nineteenth and early twentieth centuries, as did telephone and radio with communication systems and electricity and power stations with power supply. Technological change spread beyond industry into agriculture, private households and, with electronic data-processing in the past two decades, into office work as well as the whole area of communication. Far-reaching social change sprang from industrialization: while the number of workers in farming decreased strongly, the number of industrial and office workers increased, production came to be concentrated in industrial cities, which developed into conurbations with millions of inhabitants; in the longer term, the supply of food and consumer goods to the population improved.

Impressed by the technological progress of the nineteenth and twentieth centuries, ancient historians had to grant the superiority of modern technology over ancient; yet at the same time it was held that it had been in principle possible for antiquity to anticipate modern technological developments. It was pointed out in this context that the principle of steam power had been known in antiquity and that the building of steam engines had thus been a possibility.[3] On this premise, it needed to be explained why technological progress comparable with that of the Industrial Revolution had not taken place in the Roman empire, although the empire had at its disposal considerable technical means and great progress had been made in the understanding of nature.

Such argumentation understands industrialization as the model for a technological development which can serve as a yardstick for other epochs and societies; every deviation from this model therefore needed an explanation. What was not taken into account was the fact that the Industrial Revolution was based on specific economic and technological, not to mention social, scientific and political, conditions which only became present in the eighteenth and nineteenth centuries; it is impossible to detach industrialization from the context of European, and particularly British, history of that time.

The conditions for technological development changed fundamentally with the Industrial Revolution; therefore, when describing the technology of pre-modern agricultural societies, it makes little sense to take as a starting point the expectations and horizons of modern industrialized societies. Rather, the attempt should be made to understand technological development and the potential for innovation in agricultural societies from the standpoint of their own conditions. One part of this is the examination of

[3] Diels 1920: 29–33; Kiechle 1969: 148–55.

individual inventions or minor improvements precisely in terms of their importance in the context of agriculture and craft.

A new view of ancient technology was formulated in 1984 by White and Wikander. In a longish section of his *Greek and Roman Technology*, White gives an impressive overview of "Innovation and Development" in antiquity, taking into account all areas of technology ranging from agriculture and craftsmanship to the military sector. Independently of White, Wikander addressed the problem of "technological stagnation" in a study of the diffusion of the water mill in antiquity, contradicting the accepted opinion that water power had scarcely been put to economic use in the Roman empire, even though the principle of constructing a water mill had already been known in Augustan times. Lately, Greene and Wilson have pointed in a series of articles to the technological advances of Roman times especially, decisively supporting the view that ancient technology must be freshly evaluated.[4]

More recent studies of the history of technology increasingly take as their theme, besides invention, the transfer of technology, that is the adoption of technological knowledge from other societies or the transfer of one's own technology to other regions. This aspect is of considerable importance for the history of antiquity, in as much as the development of Greek civilization in archaic times was to a high degree based on the appropriation of the technological achievements of Egypt and Mesopotamia; while the historically relevant process of Romanization, especially in the western Mediterranean and in north-western Europe, also included the spread of Roman technology in the provinces.

One of the most important results of modern research in the history of technology is, without doubt, the insight into the interdependency of technological and economic developments. Economic activities are, on the one hand, dependent on the technological equipment of a society; on the other, they favor innovation and thus create the conditions for technological progress. This by no means applies to modern industrial societies only, but also – within limits – to pre-modern agricultural societies. Economic development in antiquity can only be understood when studies of economic history sufficiently take into consideration the technological levels reached in Greece and in the Roman empire. The production and distribution of goods depended on the use of tools, equipment, and means of transport, as well as on the application of technological procedures in the production and transformation of substances; the use of certain tools and equipment shaped the work processes, and the productivity of agriculture and craft had a considerable influence on the prosperity of urban centers.

[4] White 1984: 27–48; Wikander 1984: 5–15; Greene 2000; Wilson 2002.

II THE TECHNOLOGICAL SYSTEMS IN ANTIQUITY: AGRICULTURAL TECHNOLOGY, TOOLS, ENERGY

Agricultural technology, mining, the various branches of craftsmanship and transport represent areas of technology by no means independent of each other, but showing numerous mutual dependencies and thus forming a technological system.[5] For example, the level of metal-working is of decisive importance for building, the working of wood for ship-building. Plato already clearly sees this connection: he points out that craftsmen produce the tools for other crafts – thus a carpenter produces a loom for a weaver – and emphasizes the specialization of the individual craftsman. Thus, in a bigger city, craftsmanship is directed not only to goods for consumption, but also to tools and equipment for production.[6]

For an adequate and comprehensive description of a technological system it is necessary, first to establish the economic significance of the various branches of the economy; then to work out the characteristics of the means of production typical for the system; finally to record the energy sources at the disposal of the economy. For the technological system of antiquity, three fundamental facts call for notice:

1 Ancient societies were agricultural societies: agriculture was their economic basis. This means that particular weight must be given to agricultural technology in the description of ancient technology.
2 Ancient technology must primarily be characterized as a tool-based technology; the use of tools was indispensable for all important processes of work and production.
3 Human and animal muscle power remained the crucial sources of power until the end of antiquity. The thermal energy needed for the preparation of food, as well as for metal-working or for the production of glass or ceramics, was delivered by wood or charcoal. From Augustan times, water power was used for the grinding of grain; for late antiquity it is also documented for the sawing of marble.

Agriculture had as its primary function the production of food, with the cultivation of grain, wine and olive trees being prominent; fruit and vegetable growing also played an important part. The mainly vegetarian diet was supplemented by products of animal husbandry, in particular cheese and pork. It must not be overlooked here that agriculture also delivered the raw materials for the production of textiles – wool and flax – and that animal breeding supplied both agriculture and transport with work animals – oxen, mules, and donkeys – and the army with horses for the cavalry. The most important aim of cattle husbandry was the rearing of oxen.[7]

[5] Gille 1978: 19. [6] Pl. *Cra.* 387d–389d; *Resp.* 370c–e; *Leg.* 678c–679b.
[7] Isager-Skydsgaard 1992; White 1970b; White 1984: 58–72.

In ancient agriculture there existed not only farmsteads where farmers farmed either their own or leased land, but also bigger estates specializing in a market-oriented production with particular products, and gigantic *latifundia*, which were normally managed extensively. While small farmers usually clung to traditional equipment and procedures and hardly had the economic scope for experimentation with new technologies, the owners of big estates in Roman times were really interested in using new or improved equipment and adopting new methods of cultivation or animal husbandry; they had financial resources at their disposal to increase the output of their estates through the acquisition and use of new or improved equipment.

In ancient agriculture, certainly, much of the work hardly changed over long periods of time: for example, ploughing with a pair of oxen, hoeing of the ground to eliminate weeds, harvesting the grain with a simple sickle, winnowing, or harvesting olives with long sticks. Numerous innovations are however attested, for example in the threshing of grain; in many estates in Italy, grain was not trodden out by animals, but rotating sledges were used. At the same time, threshing with threshing sticks was common. Wine- and oil-presses were significantly improved in Roman times. Yet in many cases, innovations in agricultural technology were not established throughout the empire, but only in individual regions. Moreover, inventions did not at all always result in the immediate suppression of the older technology. This is especially true of wine- and olive-presses: they were expensive acquisitions and had a relatively long life-span; therefore they were not replaced immediately even when construction had been partially improved. Thus it was possible to have various types of press simultaneously in use.

For ancient craftsmanship, working with a tool was characteristic; both Plato and Aristotle analyzed the function of tools and described it in precise terms. According to Aristotle, it is his soul, which already bears in itself the form of the product, and his knowledge that move the hands of the craftsman; his hands in turn move the tool which has an effect on the material.[8] Thus the structure of craft-production can be understood in its essence: the craftsman directs a tool with his hand and so shapes the material; the work of the craftsman is based on a clear idea of the object which is to be produced, on knowledge of the properties of the material used for working and not least on manual dexterity. Craftsmanship of this kind dominated many branches of manual work in antiquity.

Under ancient technological conditions, a mechanization of production, that is the transfer of individual steps in the course of the work to a machine, could be realized only within certain limits. Besides tools, use was also made of mechanical equipment, which either made certain work easier or else made it possible at all. In an illuminating section, Vitruvius differentiates

[8] Arist., *Gen. an.* 730b.

between tools (*organa*) and mechanical equipment (*machinae*), which in his opinion differ from each other in that *machinae* are moved by several workers and by bigger forces, whereas a tool is used by a single craftsman in a intelligent way.[9] So the operation of mechanical equipment did not need the technical expertise of a craftsman, and was therefore not comparable with the use of a tool. The effectiveness of mechanical equipment was based on the use of mechanical instruments such as the roller, the pulley, the lever, the winch or the screw; examples are on the one hand lifting equipment, which enabled heavy stone blocks to be lifted on building sites; on the other, the big wine- and oil-presses. This by no means rendered superfluous the use of human labor; rather, the physical force needed for certain work was reduced through the use of mechanical equipment. The analysis of simple mechanical instruments such as roller, pulley, lever, winch or screw, and the construction of mechanical equipment needed a kind of competence which far exceeded the knowledge and experience of a craftsman: a new scientific discipline emerged in mechanics, which employed mathematical methods to enable the most efficient use of mechanical instruments.

Under the conditions of ancient technology, human muscle power remained one of the most important energy sources.[10] Agricultural work in particular was highly physical work, done with simple tools such as hoe, sickle, or scythe. Craftsmen use muscle power to handle their tools: this is true for all branches of craft, for the working of metal or ceramics as well as for textile production; in a similar way, the mechanical crushing of ore, the forging of iron by hammering the piece, the shaping of silver or bronze objects by cold-working, the shaping of clay vessels, the weaving or fulling of cloth all demanded the use of human labor. On top of that, human muscle power served as driving-force: thus the potter's wheel was driven by an assistant while the potter shaped the vessel, and the big water-sluicing installations in Roman mines were operated by manpower, as were the Archimedean screws used for irrigation in Egypt. As is shown on Roman reliefs, the big cranes used to lift big loads on building sites were equipped with tread-wheels, set in motion by manpower.

Above all, the part played by human labor in the transport of goods should not be underestimated; in particular, it was people who carried the loads at harbors or in the middle of cities – amphoras filled with wine or oil as well as sacks of grain. The distances were usually fairly short, but such transports made up a substantial portion of the whole. Even in the transport of human beings, people as carriers played a considerable part: the sedan-chair carried by slaves served as a normal means of transport for the members of the upper classes in the cities, but also in rural districts.

[9] Vitr. *De arch.* 10. 1. 3. [10] Halleux 1977; Landels 1978: 9–33; Casson 1984a; White 1984: 49–57.

After human labor, animal muscle power was the second most important source of energy in antiquity. In the ancient economy, the prime function of animals was that of supporting people in their work, and many of the domesticated animals were work animals.[11] Oxen were used in agriculture above all for ploughing, for the necessary preparation of the soil for sowing; oxen also pulled heavy, mostly two-wheeled carts and thus transported loads such as the monumental stone blocks which had to be carried from the quarries to the building sites. Donkeys carried loads with the help of pack saddles and baskets; they brought agricultural products from the hinterland to the cities on a daily basis, as Libanios describes for Antioch; in particular, the transport of wood for fuel by donkeys is also widely attested.[12] Mules, which were better suited to certain tasks than horses or donkeys, were harnessed to light carts or even ploughs and were also valued as riding or transport animals. In the eastern parts of the Roman empire the camel, which is superbly suited to the climatic conditions of desert regions, became quite important for transport.

Although horses are more powerful than oxen, their use in ancient economies remained problematic: not because the type of ancient harness presented a decisive obstacle, as an older thesis held, but because of the difficult temperament of the horse, and in addition its susceptibility to injury and illness, as well as the need for high-quality food. Only when overland transport in the north-western provinces grew commoner and wider inland regions were increasingly opened up to carriage-roads did the use of the horse as a draught animal catch on.[13]

In many cases animal power was confined to the simple function of driving a mill or raising water. The grinding of grain is widely documented, and represented in images too, as the work of donkeys, mules and, above all, horses. Harnessed to a rotary mill, the blindfolded animal had to drive the heavy millstone in the narrowest of circles and with extreme flexion of its body; in addition, the use of oxen for the scooping of water is documented for Roman Egypt.[14]

Thermal energy was as necessary for the preparation of food, the baking of bread, or the cooking of meat as for the smelting of ore, the forging of iron, the casting of bronze, the firing of lime, bricks or ceramics, or for glass production. The fuel most used in the Mediterranean lands was wood and charcoal, the use of coal being widespread only in the Roman province of Britannia. Charcoal has several advantages in comparison with wood; its calorific value is higher than that of wood, so that higher temperatures can be reached, and it burns more or less smoke-free. Since charcoal kilns were

[11] Xen. *Mem.* 4.3.10; Pl. *Resp.* 370d–e; Cic. *Nat. D.* 3.159.
[12] Lib. 50; Dem. 42.7; Apul. *Met.* 7.17f. [13] Amouretti 1991; Raepsaet 2002.
[14] Moritz 1958: 74–102.

often situated in remote forest areas, charcoal had to be transported over longish distances to the consumers. Charcoal from different woods was used for different purposes; young trees were mostly used for the production of charcoal, which could have negative consequences on forestation.[15]

Wind power was used only for shipping: Greek merchantmen had a high mast and a square-rigged sail, which offered a big enough surface to the wind to drive the ship. Merchantmen made use of rowers only in exceptional cases; there was a type of fast ship which could deliver wares to their destination even when the wind failed. Warships, on the other hand, having to remain capable of maneuver even when the winds were unfavorable, were driven by crews of oarsmen during military operations.[16]

The use of water power is without doubt to be considered as a breakthrough in technological history; it was probably the construction of water-wheels that constituted the first use of machines driven by running water. A transmitting mechanism then made it possible to transfer the rotary movement of the water-wheel to the grindstone. With the mill driven by water power, which according to recent research was in widespread use throughout the Roman empire, the foundation for the technological system of the Middle Ages was created.[17]

III AREAS OF TECHNOLOGICAL PROGRESS

Technical advances that were of economic relevance can be substantiated in various areas of the ancient economy: these at times changed fundamentally the processes of production, the kinds of work and the products themselves, or generated new products. In building, technological innovations such as the use of concrete (*opus caementicium*) and the superior command of the construction of the arch had opened up completely new possibilities for architecture and had, more especially, made possible an accelerated development of the infrastructure of the Roman empire. The sources may not allow us to follow these processes in detail; but a few examples can nevertheless well demonstrate the characteristics, the economic consequences and the limitations of technological change in antiquity.

(a) *The development of the grain mill*

Since grain, containing in sufficient quantity almost all the nutritional elements needed by human beings, plays a decisive role in ancient nutrition, the grinding of corn, along with ploughing, sowing, and harvesting, was part of the agricultural work necessary for sustaining life. The machine

[15] Reece 1969: 43–6. [16] Casson 1971; Landels 1978: 133–66.
[17] Landels 1978: 16–26; Wikander 1981; 1984.

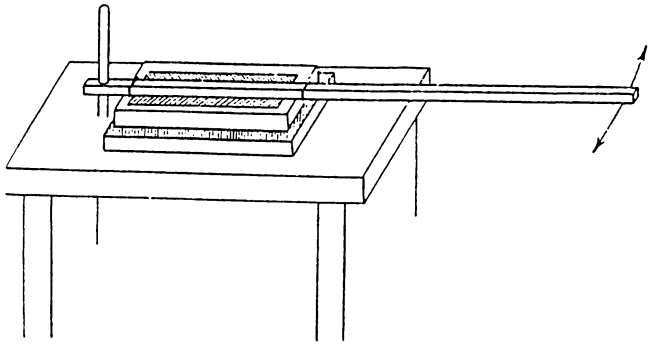


Figure 6.1 Olynthian grain mill with upper stone and long handle
Source: Moritz 1958: 45

used for this was the mill, which underwent several significant changes in the course of antiquity. For any evaluation of ancient technology, it is indispensable to describe these changes, together with their effects on the work process and work productivity, with precision.[18] The earliest reference in Greek literature to the grinding of corn is in Homer: in Odysseus' palace on Ithaca, twelve women work on the mills;[19] these would be saddle querns, which had a firmly fixed lower stone and a smaller moveable upper stone. The upper surface of the lower stone was inclined at about 25 degrees; the corn was usually ground by women who knelt at the upper end of the lower stone, moving the upper stone forwards and backwards; this procedure had to be interrupted frequently to remove the flour and to put more corn grains between the millstones. Corn-grinding was labour-intensive, and tiring and monotonous work for those who undertook it.

Millstones found at Olynthus, which was destroyed in 348 BC, show that in classical times the grain mill was considerably improved by two innovations. The upper millstone was now fitted with a large funnel, so that grains fed into it while grinding could run slowly down into the space between the millstones. The lower, horizontal millstone rested on a table, while a long horizontal pole was fixed to the upper millstone, which was attached at one end to a vertical upright, while the other end, protruding beyond the upper stone, served as a handle. With this device, efficient use could be made of leverage in the grinding operation.

The rotary mill probably originated in the western Mediterranean, through the use of two circular millstones; a rotary movement now replaced the backward-and-forward one. This type of mill was probably first used

[18] Moritz 1958; Maróti 1975; Wikander 1981; Wikander 2000: 371–400; Wilson 2002: 9–15.
[19] Hom. *Od.* 20.106–11.

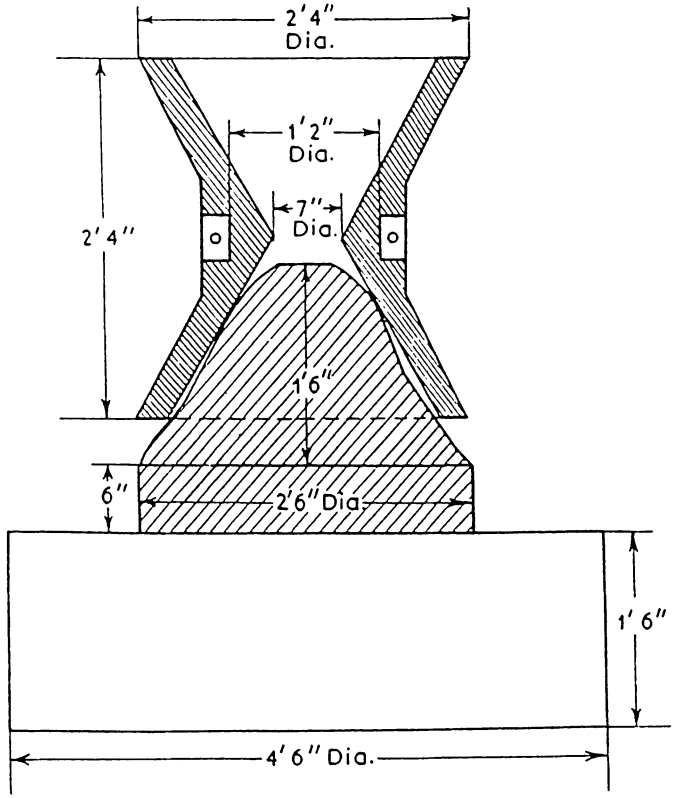


Figure 6.2 Pompeian mill with *meta* and *catillus*, the upper stone
Source: Moritz 1958: 75

as a hand mill. Soon it proved possible to have an animal carry out the continuous rotary movement. Portrayals of this donkey mill can be found on several Roman reliefs, while numerous actual mills have survived in Pompeii. It consisted of a bell-shaped lower stone and a hollow, hour-glass shaped upper stone. This was not in direct contact with the lower stone, but was suspended on a wooden frame, whose center rested on a vertical iron axis. In this way, the mill could be adjusted exactly to different types of flour, while abraded stone was prevented from getting mixed in with the flour. In comparison with the saddle quern and the rotary hand mill, which were above all for domestic use, the Pompeian donkey mill was a complex appliance, which brought a higher level of mechanization to grain milling and was used mainly by commercial bakeries to produce flour for bread production. The donkey mill freed people from a monotonous labor which was now loaded on to animals.

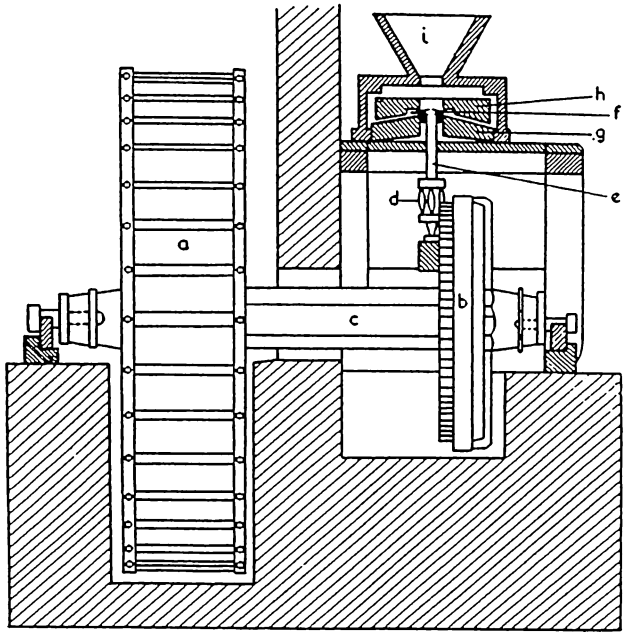


Figure 6.3 Water mill as described by Vitruvius (10.5.2)
Source: Moritz 1958: 123

From the first century BC on, water power generated by water mills was used for the grinding of grain; knowledge of the cog wheel was the prerequisite for the mechanism of transmission by which the rotary movement of the water wheel was brought to bear on the millstone.

Besides single water mills in various provinces of the Roman empire, large mill complexes, which were erected on slopes and had several milling stations, are documented in archaeological remains and literary sources; water was supplied by aqueducts. One such facility near Barbegal, in the vicinity of Arles, has now been dated to the period of Trajan.[20]

In fourth-century Rome, the mills on the Janiculan hill delivered the flour for the city's population.[21] When the Goths at the siege of Rome interrupted the water supply for these mills, Belisarius in AD 537 had mills installed on ships moored by a bridge over the Tiber. The ship mill, originating in a military crisis, has been shown to have existed in many European cities down to early modern times. Its advantage lay above all in the fact that the water wheel could be adapted without difficulty to the changing water level of the river.[22]

[20] Leveau 1996. [21] *Cod. Theod.* 14.15.4. [22] Procop. *Goth.* 1.19.8–29.

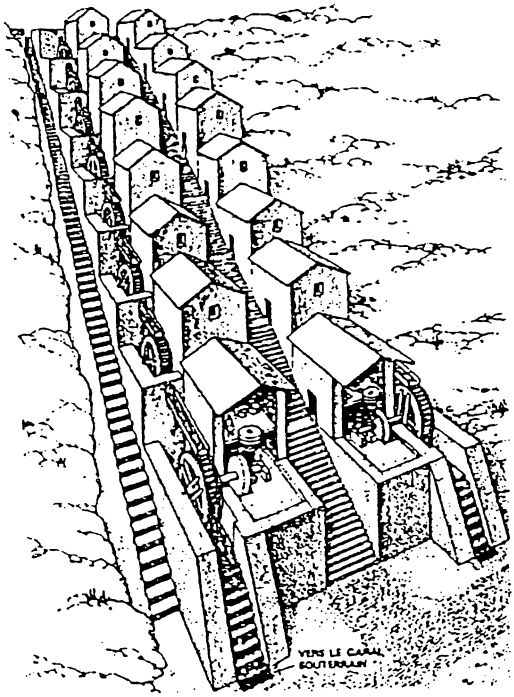


Figure 6.4 Barbegal multiple system with 16 wheels
Reproduced from Sagui 1948: 225–31

An overview of the development of the mill, from the primitive saddle quern to the water mill and then the ship mill, makes it clear that the step-by-step improvement of this invention had achieved a notable lightening of the work necessary for everyday subsistence. People were relieved from heavy physical labor; human labor as the driving force was replaced first by animal muscle power and then by water power. The transition from backward-and-forward to rotary movement was a precondition for the mechanization of the mill. For the construction of the water mill, a transfer from one area of technology to another was necessary: the water wheel driven by running water, which combined the functions of a driving wheel and scooping wheel, was now used, by the transmission of power through cog wheels, as the drive for the mill.

(b) *Oil and wine presses*

For the production of olive oil and wine, which together with grain were an important component of the ancient diet, equipment was needed for

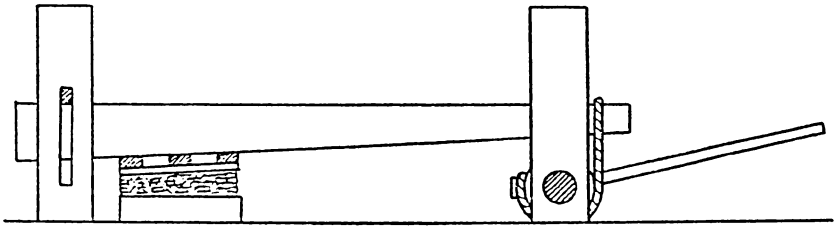


Figure 6.5 Roman lever-press as described by Cato the Elder
Reproduced from Drachmann 1967: 31

the pressing of the olives or the grapes. Although it was not at all unusual to tread grapes with the feet, from archaic times use was also made of the lever-press, whose press-beams were pulled down by weights, such as large stones, so that continuous pressure was put on the material to be pressed. The improvements made to this press were generally aimed at increasing the efficiency of the pressing process by technical means and, at the same time, decreasing the danger of injury to the people working with the press; in addition, it was desirable to save as much space as possible when setting up the press-beam, so as to limit the size of the press-rooms.[23]

While the press-beams of the early Roman presses were pulled down by a rope winch and a long lever, attempts were made in the ensuing period to construct a press in which continuous pressure could be applied to the material, without the need to employ uninterrupted human labor. For that purpose, a heavy stone was used as weight, but the rope winch was retained. This was now used to lift the stone, which in turn pulled down the press-beam by its weight. There were, however, serious disadvantages to this construction: the long levers turning the winch could break or jump out of their fastenings; the rope, too did not always run smoothly over the roller. These problems were only overcome when the rope winch had been replaced by a big wooden screw, which was fitted into a thread on the press-beam and had the weight at its lower end.

Through rotation of the screw the weight, which to start with was on the floor, could be lifted up, and the press-beam lowered accordingly. There were various types of screw-press, amongst them also presses without a stone weight, where the press-beam was pulled down by a screw fixed to the floor.

Towards the middle of the first century AD a new type of press emerged, where direct pressure was put on the material to be pressed by the rotation of a screw fitted vertically into a wooden frame. There were several advantages

[23] Drachmann 1932; Rossiter 1981; White 1984: 67–72; Brun 1986; Amouretti 1986: 166–75; Cato, *Agr.*18–22; Vitr. *De arch.* 6.6.3; Plin. *HN.* 18.317; Heron, *Mechanica* 3.13–21.

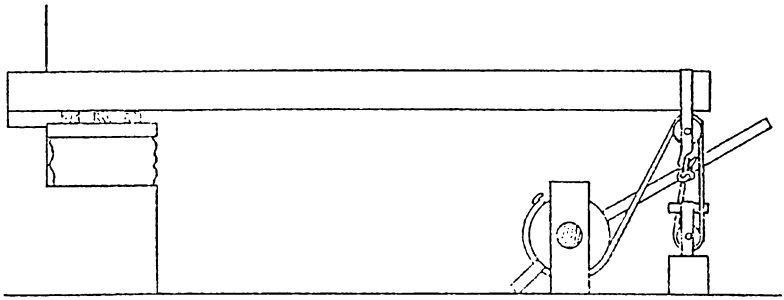


Figure 6.6 Lever-and-stone press according to Heron's *Mechanika* (3.13f.)
Source: Drachmann 1967: 32 (top)

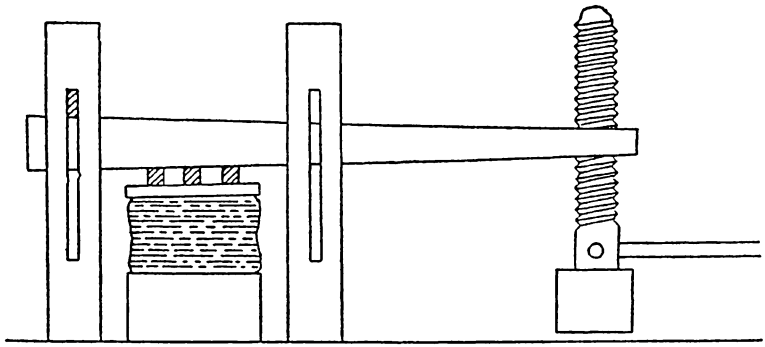


Figure 6.7 Lever-and-screw press according to Pliny the Elder (18.317)
Source: Drachmann 1967: 33

to this type of press: since there was no need for a long press-beam, this press needed very little space and could be easily transported.

This type of screw press appears relatively quickly in the urban context; it is remarkable that it was already used as a cloth press in Pompeii, that is before AD 79. The conditions of ancient technology clearly made it quite possible for equipment designed for agricultural use to be employed in craft production.[24]

Ancient presses proved to be so efficient that it was not possible to make fundamental improvements in them in the Middle Ages and in early modern times. In the Mediterranean lands, presses with press-beams and wooden screws were used until the early twentieth century; the screw press

[24] Moeller 1976: 25–7.

which put direct pressure on the material to be pressed was used in trade for other purposes, such as the book press for the printed book.

The development of the mill and the press is exemplary for technical change in antiquity: equipment that was important for production was improved; new mechanisms, such as the transmission of power through cog wheels or the generation of pressure through the turning of a screw, were introduced. Such technological progress is hardly to be rated as marginal.

(c) *Innovations in the production of ceramics and glass*

The commercial production of ceramics supplied many families and households in antiquity with vessels and dishes of high quality; production of one's own clay pots for domestic use seems to have continued to be of importance only in remote rural regions. In these conditions, the potters produced large quantities of ceramic vessels for local and inter-regional markets from archaic times onwards. Technical innovations in ceramic production thus involved a trade which was of some economic importance.[25]

Already in archaic and classical times, the production of black- and red-figure Attic vases was based on considerable technical and manual skills: the clay had to be prepared diligently before the shaping of the pots, and the firing process required exact regulation of the temperature in the kiln and the oxygen supply during the separate phases of firing. In traditional ceramic production, the potter's work was limited to the shaping of the pot on the potter's wheel, while a vase painter painted the pots before firing. In Roman times, this working process was fundamentally changed for the production of the relief-decorated *terra sigillata* vessels, with the employment of moulds. Smooth *terra sigillata* pots, shaped without a mould, were still in mass production at the time of the Principate but, in addition, relief-decorated vessels from the pottery centers of Southern Gaul were marketed in many parts of the Empire during the first century AD. The thick-walled shaping bowls used as moulds carried on their inner side decoration in relief, executed by pressure with an incising tool (*poicon*). The production of relief-decorated ceramics was thus separated into three stages of work: first, the burins were cut; then the shaping bowl was prepared, with the hollow relief on its inner side; lastly, the mould was fired and used to shape the relief-decorated vessels. The potter put the mould at the center of his wheel, pressed the clay into the inside of the shaping bowl with the wheel turning, and thus drew up the wall of the pot. While the pot was being shaped, the relief decoration was simultaneously created, and the individual vessel did not require separate and time-consuming decoration. Once the clay had dried (and simultaneously shrunk), the pot was taken from the

[25] Peacock 1982; Bémont and Jacob 1986; Noble 1988.

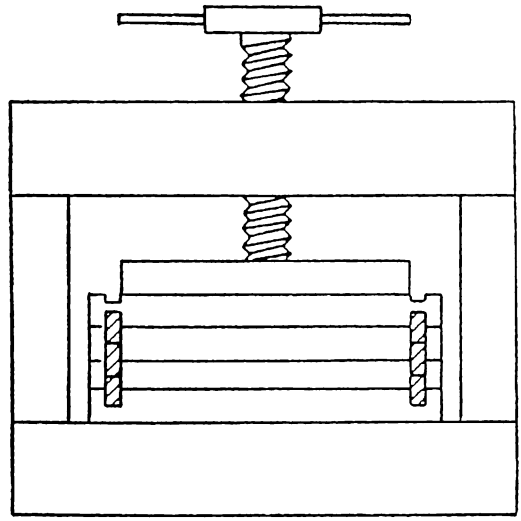


Figure 6.8 Screw-press according to Heron (3.20)
Source: Drachmann 1967: 36

shaping bowl, which then could be used again. In this way it was possible to produce identical pots in great numbers; relief-decorated ceramics became an article of mass production.

In the pottery centers of Gaul, big kilns were erected for the firing of ceramics, which can hardly be compared with the kilns in Greek potteries. At La Graufesenque, such kilns were 4 meters wide and 3 meters high, and had a capacity of approximately 30,000 pots; lists, preserved as graffiti on bowls and plates, show that several potters delivered their products for simultaneous firing.[26]

In certain pottery centers, the existence of big installations for clay preparation can be demonstrated: it seems to have been already then appreciated that productivity in ceramic production could be increased by wider cooperation at the stages of clay preparation and firing.

Glass production provides a further example of the way in which technological innovations could have far-reaching economic consequences. Glass is a material which does not occur in nature, but has to be produced from various natural components (quartz sand, soda, lime); it was used, before the first century AD, primarily for the production of small containers. This glass was colored and opaque; small bottles were shaped by the sand-core method, in which a solid sand core was immersed into the molten glass. Two technological innovations made it possible to open up completely new

[26] Marichal 1988.

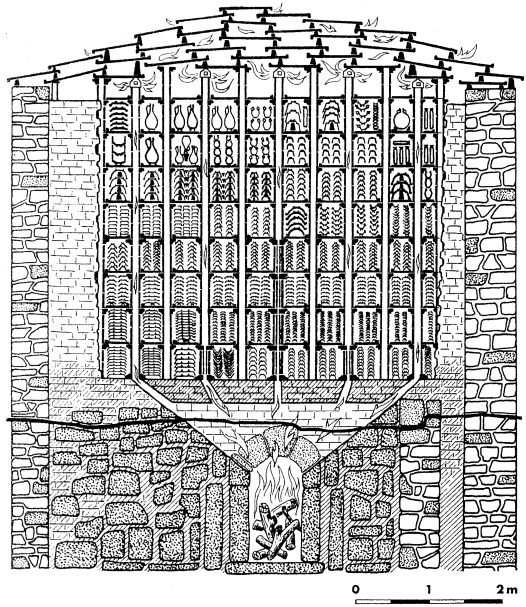


Figure 6.9 A large pottery-kiln at La Graufesenque
Reproduced from Vernhet 1981: 38

production possibilities for glass as a material: with the glass-blowing pipe, bigger vessels could be shaped through glass bubbles, and certain additional ingredients made it possible to produce colorless, transparent glass. Thus the glassmakers were able to produce bottles, glasses, little jugs, and bowls which displayed their content for all to see. An anecdote about a glassmaker in Rome at the time of Tiberius and the representations of glass vessels on murals in Pompeii show that this new material exercised widespread fascination. Glass objects were soon distributed widely, and glass production in the western Mediterranean and the north-western provinces was accordingly soon on the increase. The gravestone in Lyon of the glassmaker Julius Alexander, who was of African origin, is testimony to the fact that this craft offered the opportunity for a certain prosperity. New techniques were repeatedly developed in ancient glass production: at the time of the early Principate, two-colored and two-layered glasses were created, with the use of moulds making it possible to decorate bottles in relief or shape vessels in the form of fruits. In late antiquity *diatreta* glass, with the appearance of being enveloped in a net, was created by intricate cutting methods. Finally, even glass plates with applied figural images made of gold were produced. Besides the plain glassware for domestic use, the products of glassmakers included precious luxury items. The development of Roman

glass production proves the craftsmen's ability to innovate and to be in total command of new techniques. In addition, it is clear that technical innovations spread and put to economic use fairly rapidly.[27]

(d) *New building techniques: Arch construction and* opus caementicum

Ancient architecture underwent a complete change during the Hellenistic age and the early Principate, thanks to two technological changes; this transition was not limited to the aesthetic dimension, but opened up entirely new possibilities for creating large interior spaces, without the use of many supports, and for bridging large spans. Arch construction undoubtedly had an effect on the design of façades, in particular of Roman monumental architecture; but its wider use was in the construction of installations for the infrastructure, for instance in the building of the bridges so important for the network of Roman roads. Similarly, aqueducts were led across wide valleys on top of high arches, as for example in the Pont du Gard in the south of France. In order to bring water to Rome in an open channel at the highest possible level, arched stretches more than 9 km in length were in several cases constructed in the plains outside the city.

From the second century BC a new building material, *opus caementicium*, came into use. This was a kind of liquid concrete which could be poured into wooden boarding and which, when it dried, was of such firmness that it was also suitable for the building of vaults and domes. Examples of this new building technique are the Pantheon, constructed at the time of Hadrian, which has a dome bigger than that of St. Peter in Rome or the Duomo in Florence, and the Frigidarium of the Baths of Diocletian (today S. Maria degli Angeli). In particular, utilitarian buildings used for trade, such as the market halls at Ferentinum or in Trajan's Forum in Rome, had large vaults made of *opus caementicium*. During the early Principate, in particular after the fire in Rome at the time of Nero, fired brick came into wide use as a building material for walls; the walls of larger buildings were often furnished with a core of *opus caementicium*, with the brick walls having the function of a boarding. Since *opus caementicium* retained its firmness even under water, it could also be used for the building of harbors.[28]

The construction of building complexes for inner-city trade, as well as the intensified improvements in the infrastructure of transport and traffic, were without a doubt of considerable importance for the Roman economy. In the big inland spaces of the western and north-western provinces especially, the transport of goods was dependent on a network of good and passable

[27] Strong and Brown 1976: 111–25; Newby and Painter 1991; Schneider 1992: 108–19; Plin. *HN*. 36.189–99; Strabo 16.2.23; Petron. *Sat*. 51; Sen. *Ep*. 90.31; Dessau, *ILS* 7648.

[28] White 1984: 73–90; Adam 1984; Hodge 1992; O'Connor 1993; Vitr. *De arch*. 2.6.

roads; bridges made river crossings possible without passing through fords. Improvements in Mediterranean harbors, such as the construction of the mole at Puteoli or of the harbor basin at the mouth of the Tiber, supported long-distance trade and thus secured the supply of the big cities.

(e) *Shipping and land transport*

There were numerous innovations in shipping in antiquity, closely connected with the expansion and intensification of trade and the exchange of goods in the Mediterranean. Already in the archaic period, the long, slim galleys were no longer adequate for the demands of longer trading journeys. From the sixth century, therefore, ships were built with a thick-set body, high sides, high masts and a big square-rig sail. These ships were wind driven and therefore no longer needed rowers; because of their bigger loading capacity, they could be used for the transport of mass-produced goods such as grain, wine, and oil. In the time of the early Principate, grain for the city of Rome was transported from Egypt to central Italy by ships that could carry loads of over 450 tonnes in weight. One problem with such ships was that they often had only one sail; in order to increase the size, some Roman trading ships had two further masts installed at the bow and at the stern, besides the mainmast in the middle of the ship; and a triangular upper sail was fixed above the mainsail on the central mast. At the same time, the rigging and thus the maneuverability of the ships was improved. In figural representations, the lateen sail appears besides the square rig: its main use was probably for coastal shipping in the eastern Mediterranean. Ancient ships were perfectly capable of navigating the high seas: after the discovery of the monsoon winds, Roman ships traveling in convoy took the direct route to India by the Red Sea and across the Indian Ocean. The lighthouse of Brigantium (La Coruña) in north-western Spain proves the existence of Roman seafaring on the Atlantic.[29]

The construction of the boats used for the transport of goods on the rivers of the north-western provinces also underwent a series of technical changes. As is demonstrated by the finds of wrecks at Mainz, the Romans on the Rhine went over from the shell construction common in the Mediterranean, to skeleton construction, which made the building of the hull noticeably easier. Another characteristic of these boats is that the single rudder is firmly fixed to the stern post; this is clearly visible on several reliefs.

In the Mediterranean world until late antiquity, overland transport of heavy loads was mostly carried on in the traditional manner, that is, with pack animals or two-wheeled ox-carts; but at the same time, the fundamental change in overland transport in the north-western provinces, and

[29] Casson 1971; Landels 1978: 133–66; White 1984: 141–56.

also in northern Italy, should not be overlooked. Strabo already appreciated the close connection between improvements in traffic infrastructure and technological developments in transport; in comparing Roman and Greek building activities, he notes that Roman roads were constructed in such a way as to allow the transport of entire ship's cargoes by cart. As is documented by numerous reliefs and mosaics, new methods of harnessing were experimented with, especially in Gaul and northern Italy; at the same time, carts were constructed which were better suited to the long-distance transport of heavy loads than the usual ox-carts with their big disc-wheels. While in archaic and classical Greece two oxen – more rarely two mules – were normally harnessed to a yoke fixed to the cart's shaft, during the Principate horses began to be increasingly used for overland transport. The harness was now adapted to the horse's anatomy, so that the animals were not handicapped when pulling. In Roman Gaul, heavy carts with two axels and spoked wheels were used for the transport of goods. They were usually pulled by two horses: a relief from Langres even shows a team of horses harnessed in couples behind each other. It was also possible to harness a single horse to a two-wheeled cart; the horse then walked between two poles, which were connected to the harness around the horse's neck.[30]

From Augustan times, wooden barrels were used in Gaul and northern Italy as containers for wine; their decisive advantage over amphoras was the better ratio between the weight of the container and the weight of the fluid; moreover, since vats did not have to be carried like amphoras but could be rolled, the transport of fluids, for example when loading or unloading ships, was made considerably easier. While smaller barrels were used for river transport, bigger carts were sometimes loaded with a single barrel of considerable capacity.[31]

(f) *Water-lifting equipment*

In ancient Egypt as well as in archaic Greece, devices for the lifting of water already existed: the *shaduf*, a swing-beam to which a scooping container and a counterweight were fastened, was used in Egypt for the irrigation of fields and gardens; with the *shaduf*, water could be taken from a river or canal and led to a field higher up. In Greece, such swing-beams were fixed directly to the well, in order to make the lifting of the water-filled clay vessels easier.

Two new devices for the raising of water were the scoop-wheel and the Archimedean screw. The scoop-wheel was either fitted at its circumference with boxes to take up the water, or else had containers attached there, which

[30] Landels 1978: 170–85; White 1984: 127–40; Raepsaet 2002.
[31] Plin. *HN* 14.132; Strabo 5.1.8; 5.1.12; White 1984: 133; Zimmer 1982: 218–19; 229–30.

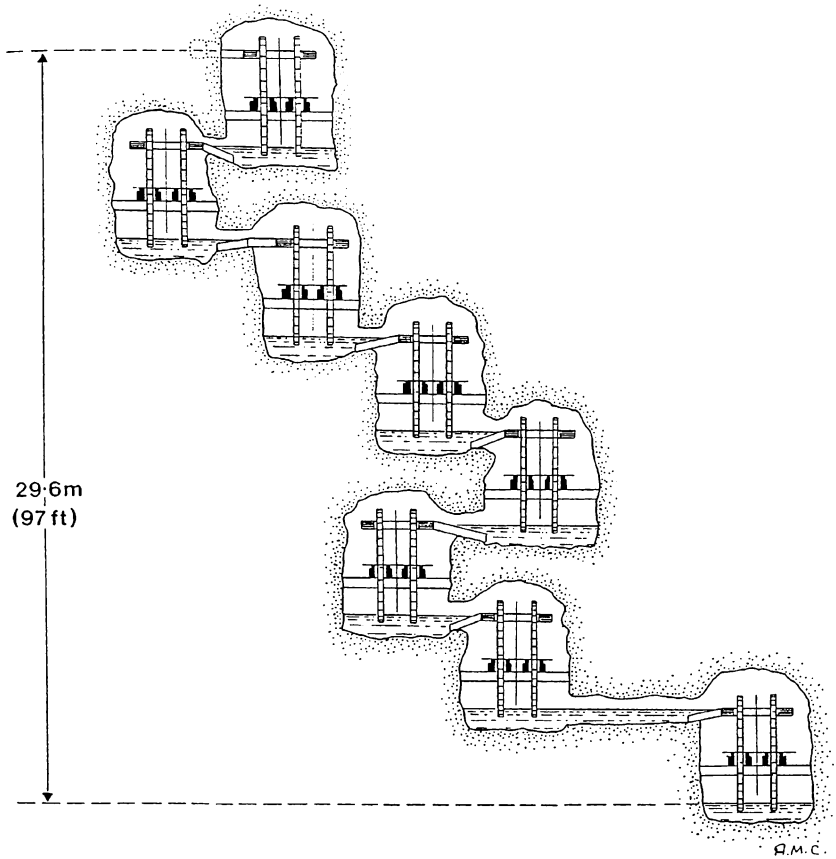


Figure 6.10 Water wheels used for drainage at Rio Tinto
Source: Wacher 1987: vol. II, 621

were then emptied at the highest point of the wheel. If the scoop-wheel was located on a river with strong enough currents, it could be driven by water power. The Archimedean screw, on the other hand, set up in a slanting position, had to be turned by human power; it could lift water only over a small vertical interval, but was an efficient device for the irrigation of agricultural land in Egypt.[32]

But the preeminent economic importance of water-lifting equipment lay in its use in Roman mines, much more than in its agricultural uses. When the Romans in Spain started to mine precious metals below ground-water level, they had to tackle the problems of drainage. For this, water-lifting

[32] Oleson 1984; Landels 1978: 58–83; Wikander 2000: 217–302; Vitruvius, *De arch.* 10.4–6.

equipment, long since used for the irrigation of fields, was installed in the mines. The contemporaries of the Romans were much impressed by their ability to pump whole streams of water out of mines with the help of the Archimedean screw: it was a precondition for the mining of gold and silver. Besides Archimedean screws, scoop-wheels were also set up in mines; since their size made it impossible to take them to their final position through the narrow shafts and galleries, they were put together from their components underground.

Only through the Roman solution of the technical problem of water containment in the silver and gold mines could sufficient quantities of precious metal be mined for the minting of coins under the late Republic and the early Principate.[33]

IV TECHNICAL KNOWLEDGE AND ECONOMIC DEVELOPMENT

At many levels in ancient societies, technical knowledge was passed on orally: experiences and knowledge were handed down from the older to the younger generation in the context of the rural family, without the need to record them. Similarly, in the field of craftsmanship, apprentices gained the necessary competence for the practice of their craft through direct contact with an older craftsman.[34] Apart from this knowledge gained through experience by farmers and craftsmen, a body of technological knowledge grew up in classical Greece, which was used to employ mechanical instruments with maximum efficiency, or to construct equipment designed for certain purposes. Architects in particular faced grave problems with the construction of monumental buildings, and needed a great deal of technological creativity to solve them. Examples are the lifting of heavy ashlar blocks, the transport of stone blocks from the quarry to the building site, or the laying of foundations in soft ground. Already in early classical times architects self-consciously recorded their achievements in their own writings. Later, Vitruvius systematically summarized the specialist knowledge of architecture, with technical aspects taking up a substantial part of his work.[35]

In the field of engineering, the aim of specialist knowledge was to understand exactly the causes behind the effectiveness of mechanical instruments; for example, much attention was paid to the lever and its effects. A specialist literature developed in the fourth century BC for this area of ancient technology, which was by no means confined to theoretical knowledge, but was quite attuned to practical application, for example, the *Mechanica* of Heron

[33] Diod. Sic. 5.37.3f.; Healy 1978: 93–100; Domergue 1990: 443–60.
[34] Meissner 1999. [35] Vitr. *De arch.* 10.2.11f.; cf. 7, *Praefatio* 12; Plin. *HN* 36.95–8.

of Alexandria. Heron was interested in the improvement of presses, and was able to expound exactly the advantages and disadvantages of the various types of press, taking also the safety of the workers into consideration. It was specifically in the field of engineering that considerable progress, of importance for general technology and consequently for the economy, was made. A precise description of the transmission of power by cog-wheel, or the use of a combination of rollers (block and tackle) for the lifting of heavy loads, was achieved; the screw and the advantages of the screw press are also the subject of longish explanations.[36]

An enlightened attitude towards technological innovation is clearly expressed in the Roman literature on agriculture, by Cato, Varro, and Columella; fairly long treatises are devoted to the devices for pressing olives, the equipment used for threshing, or the methods of fertilization. Pliny likewise mentions, in his *Natural History*, new devices such as the heavy plough pulled by four oxen, the mowing machine used in Gaul, or the screw press.[37] The work of Pliny undoubtedly contributed to the spread of technological knowledge. The recording of technological knowledge in writing did not, however, lead to a permanent process of technological innovation; technological change remained in many cases spasmodic and dependent on specific contexts.

V CONCLUSION

The recent debate on the ancient economy distinguishes clearly between two forms of economic growth in pre-industrial societies: on the one hand, with the level of productivity remaining stable, growth depends on the extension of the land available for agriculture, on the opening up of new mines, or on an increase in the number of workshops. A precondition for this type of growth (extensive or aggregate growth) is a numerical increase in the labor force. Per capita growth, on the other hand, is dependent on an increase in work productivity; its prerequisites are normally technological innovation and an increase in financial expenditure on technical provision at production sites.[38]

In the debates of economic history, two fundamental facts are perhaps beyond dispute: on the one hand, that in antiquity as in other pre-industrial societies, considerable extensive growth took place, visibly represented by urbanization, the growth of urban settlements and the foundation of new cities, the development of wider regions for intensive agricultural use and

[36] Arist. [*Mech.*]; Heron, *Mechanica*; Drachmann 1963; Gille 1980.

[37] Cato, *Agr.* 18–22; Varro, *Rust.* 1.29.1; 1.52; Columella, *Rust.* 12.52.6f.; Plin. *HN* 18.171–3; 18.296; 18.317.

[38] Saller 2002.

the extension of mining activities; on the other hand, that economic growth since the beginning of the Industrial Revolution has essentially been attributed to an increase in work productivity, which in turn is highly dependent on increasing division of labor, technological innovation and rising capital investment.

The question that faces ancient historians is whether, and if so to what degree, technological innovation in antiquity contributed to a growth in productivity, and thus generally to intensive economic or per capita growth. First, the way in which working processes in agriculture, craft, and building were changed through technological development must be clarified. In antiquity, there were various possibilities for increasing the productivity of work processes: the introduction of new tools, the improvement of known tools and equipment, or the construction of complex mechanical devices. An example of the introduction of a new tool is the use of handled shears for sheep shearing in Roman Italy.[39] The importance of improvements in the details of technical equipment is often underrated. This is true for the vertical loom, which in Roman times had an upper and a lower beam, while the Greek loom possessed only the upper cloth-beam, the warp-threads being held taut by weights. At first glance, this change seems insignificant, but it made it possible to push the weft-thread downwards on to the already woven fabric and to weave sitting down, while with older looms the women had to work standing, and with raised arms. In this case, technological improvement certainly led to a considerable reduction in physical exertion. As is demonstrated by the development of the grain mill, there was even the possibility of a partial mechanization of work processes, resulting in the use of animal muscle power and finally of water power as the driving force. Mill complexes such as those near Arles and on the Janiculan hill in Rome had a high capacity of output and could meet the demands of several thousand people. A targeted use of the laws of mechanics also characterizes the construction of oil- and wine-presses or water lifting equipment, and the use of block-and-tackle for lifting heavy loads in the construction of large buildings. The Romans were also capable of adapting traditional technology to new conditions: many technological innovations can be traced in Gaul, for instance the wheeled plough mentioned by Pliny, which was better suited to the heavy soil of the regions north of the Alps than the Mediterranean plough; or the mower specific to Gaul, which allowed the harvest to be brought in in the quickest possible way and with little expenditure of labor.[40] By comparison with the archaic epoch, such technological developments certainly increased the productivity of work processes in Hellenistic and Roman times.

[39] Varro, *Rust.* 2.11.9. [40] Pliny, *HN* 18.171–3; 18.296.

But at the same time the limitations of technological development in antiquity must be emphasized. In the area of craftsmanship, manual tools were never replaced by machines nor, by and large, was manual production ever pushed aside. Such a division of labor as is described by Adam Smith in the famous first chapter of *The Wealth of Nations* was therefore hardly possible in the ancient sites of production. In contrast with the factories of the Industrial Revolution, the introduction of larger workshops barely influenced working processes. Such workshops were therefore essentially no more productive than the small ones in which one craftsman worked with his assistants. Normally, the workshops were not elaborately fitted out and it was quite cheap to set up a workshop; a craftsman usually needed only a few tools for his craft and often practiced it in a shop connected with his living quarters. There were some crafts, however, which were dependent on bigger production sites with more expensive equipment: bakeries had their ovens and mills, smithies their forges for bringing iron to red heat, and fulling plants their big water basins for the working of cloth. Bakers and fullers in particular were sometimes quite well-off: the baker Eurysaces, for example, was able to have erected for himself a pretentious monument at the Porta Maggiore in Rome, and the fullers of Pompeii were able to donate money for a statue for Eumachia.

In such conditions as these, it hardly made sense for the members of the upper classes to invest part of their wealth in large-scale enterprises for commercial production: the chances of obtaining high returns from craft-based production were clearly lower than in agriculture or in money-lending. One of the few exceptions, from the time of the early Principate, was brick production: here, some big land-owners made economic use of the clay from their estates by setting up brickworks, which delivered building materials even to distant cities. The chances of a profitable return arose from the building boom in Rome and in other cities, such as Carthage, ensuring the sale of large amounts of brick.

The dominant feature of urban trade continued to be the small workshop, and even production centers that were of inter-regional importance comprised not large-scale concerns, but a multitude of small businesses.[41] In special cases a number of craftsmen, each working in their own small workshop, were able to use certain production facilities in common, for example at La Graufesenque, where many potters were able to fire their pots simultaneously in the big kilns. Ancient craftsmanship achieved its highest possible quality and productivity by the specialization of individual craftsmen or workshops in certain products; production and products were crucially governed by the experience and practice of the individual craftsman. Antiquity was characterized not by the large concern, where

[41] Manning 1987: 587.

the work process would be divided (vertical specialization) into a multitude of individual operations with a marked division of labor, but by a specialization, as far-reaching as was possible, of craftsmen and workshops (horizontal specialization). The degree of specialization was dependent on the size of particular markets: a small rural settlement undoubtedly offered fewer opportunities for craft specialization than a bigger town with an affluent group of consumers.[42] That specialization in individual trades and professions makes economic sense and leads to a better supply of goods for a *polis* was a claim already recognized, and extensively supported through theory, by Plato.[43]

In any analysis of the role which technological innovation played in economic growth, it must be borne in mind that productivity could be increased not only through technological progress, but also through improvement in the organization of labor. This is especially true for the big estates of Hellenistic and Roman times: the control over slaves, the exact listing of individual duties, the establishment of work norms, the motivation of the slaves through rewards, even the fixing of food rations aimed at securing the highest possible income for the owners of the big estates. Labor organization and technological advance complemented each other nicely in estate management: estate owners like Cato paid attention to both.

But technological progress should not only be seen from the point of view of increase in productivity: the new possibilities of arch construction and of *opus caementicium* were employed in architecture in order to create an efficient infrastructure for transport, trade and exchange, both in the cities and in rural regions; water supply for urban populations was secured by the building of aqueducts; in this way, technological change also has an effect on health and welfare. The effects of an efficient infrastructure on the economic growth of pre-industrial societies are difficult to evaluate, but it can safely be assumed that the infrastructure of the Roman empire contributed substantially to the standard of living and the prosperity of Roman society. Urbanization in the Mediterranean lands had been possible only on the condition that agriculture and craft were able to provide the growing urban populations with food and consumer goods, and that the erection of public buildings, which served the benefit of the population, was technically and financially possible.

Technological change in the ancient Mediterranean never changed production in agriculture and craft as fundamentally as did the Industrial Revolution, and never increased productivity to a degree that would have resulted in change to the economic or social structure. On the contrary,

[42] Xen. *Cyr*. 8.2.5.

[43] Pl. *Resp*. 369d–371e; 374a; 397e; Harris 2002; compare with Rome also Treggiari 1980.

technological progress in antiquity always took place within the framework of the agricultural society and never achieved the same dynamic as the innovatory processes of modern industrial societies. To point out the technological innovations of antiquity and their economic effects is by no means to express agreement with a modernist view of ancient technology and economics; rather, it is meant to contribute to an adequate recording of the importance of technological change for ancient agricultural societies.

PART II

EARLY MEDITERRANEAN ECONOMIES AND THE NEAR EAST

CHAPTER 7

THE AEGEAN BRONZE AGE

JOHN BENNET

1 INTRODUCTION

In this chapter, I explore economic activity in the Aegean Bronze Age (c. 3000–1000 BC). I focus on the "palatial" societies of Late Bronze Age Crete and mainland Greece, but offer an outline of prior developments, on which they were based. I emphasize what might be termed the "core" of the Mycenaean world (mainland Greece from southern Thessaly to the southern Peloponnese, the islands of the Aegean, including Crete, plus much of coastal southwest Anatolia). Such a definition is just as deficient for the Bronze Age as it is for the Early Iron Age and later, since it does not "bound" the world in which inhabitants of the Bronze Age Aegean moved or with which they were in contact, as will become apparent in the discussion of exchange.

It is a commonplace to emphasize the agricultural basis for all ancient societies and, for five millennia, this was true of the Aegean region. The standard western Old World cultigens (wheat, barley, and pulses) and domesticated animals (sheep, goats, pigs, and cattle) arrived by 7000 BC (with or without people), in eastern mainland Greece and on Crete, at least at Knossos.[1] For Crete, lack of evidence for prior human settlement strongly suggests deliberate colonization at that time, probably from southwest Anatolia.[2] The Bronze Age in the Aegean officially begins late in the fourth millennium BC,[3] although metalworking is quite common before this, and regular use of tin bronze relatively rare before the later third millennium. By 3000 BC permanent human populations practicing agriculture had reached all but the tiniest Aegean islands,[4] facilitating the formation of an interaction zone comprising the eastern Greek mainland, the northern Aegean, western Anatolia, and Crete. The Aegean is not rich in mineral resources, but obsidian (for chipped stone tools) was available on Melos (and had been exploited since the eleventh millennium BC), while copper ores were exploited on Cythnos and lead and silver on Siphnos in the

[1] Perlès 2001; Halstead 1996; Kotsakis 2001. [2] Broodbank and Strasser 1991.
[3] Manning 2001: 144–5, 217 (c. 3100 BC); Warren and Hankey 1989: 169 (c. 3500 BC).
[4] Cherry 1981; 1990; Broodbank 2000: 107–74.

third millennium. Naxos provided the abrasive emery and the island of Aegina provided andesite for millstones. To these, we can add the important sources of lead, silver, and probably copper[5] around Laurion in eastern Attica, exploited in the third and second millennium BC.

Reacting to broadly exogenous explanations of culture change current since the origins of Aegean archaeology, Renfrew suggested in his pioneering study of the emergence of social complexity in the Aegean[6] that the transformation of the Aegean in the third millennium was a primarily endogenous, economic phenomenon. Increased agricultural production, made possible by the exploitation of the "Mediterranean triad" (olives, vines, and grain), and the development of metallurgy fueled this process. To these we can add the exploitation of livestock for their "secondary products."[7] According to this interpretation, ox-driven plough[8] agriculture increased grain production and supported non-agricultural specialists producing metals and other exchangeable craft products, such as woolen textiles. Olive oil could be consumed in times of stress or transformed into an exchange commodity, while wine provided another exchange commodity and fueled ritual consumption among the elite. After a millennium of aggregate growth, Cretan "palatial" societies emerged, based on redistribution of surplus staple production, followed, half a millennium later, by those of mainland Greece.

More recent research has challenged this picture.[9] Geoarchaeological work, particularly in the southern Argolid,[10] suggests that overexploitation of slopes to take in additional land to feed growing Early Bronze Age populations may have triggered catastrophic erosion in parts of mainland Greece, ushering in a period of economic collapse in the Middle Bronze Age.[11] The extent of viticulture and oleoculture before the emergence of the Cretan palaces has also been questioned.[12] Some scholars traced the emergence of social complexity to long-standing practices of built-in overproduction, demanded by the ecology of southern Greece.[13] Practices of "social storage," when captured by elites, gave rise to the redistributive economies of the second-millennium BC palaces. Some have also stressed ecological differences between the northern and southern Aegean; the semi-arid, marginal environment of the southern Aegean stimulated social strategies

[5] Kassianidou and Knapp 2004: 220 point out that, although there are copper minerals at Laurion, there is no archaeological evidence for copper extraction in the second millennium BC; the evidence depends on lead isotope analysis of artifacts.

[6] Renfrew 1972. See Barrett and Halstead 2004 for assessments of the impact of Renfrew's publication thirty years on.

[7] Sherratt 1981. [8] Pullen 1992.

[9] Summarized in Halstead 2004. [10] Jameson et al. 1994.

[11] For the further possibility of climate change at this period see Dalfes et al. 1997.

[12] Hansen 1988; Runnels and Hansen 1986; Hamilakis 1996; 1999.

[13] Halstead 1981; Halstead and O'Shea 1989.

to minimize temporal and spatial shortfalls in food.[14] Furthermore, recent research on third-millennium Cretan society suggests greater complexity than was previously envisaged, notably in the production and circulation of ceramics.[15] Equally it is likely that some sites, especially that at Knossos (5 hectares, perhaps 1,000–1,200 people), had already achieved significant size and social complexity several centuries before the end of the third millennium.[16]

Current research tends to take a larger-scale view, emphasizing regional diversity.[17] Moving beyond Renfrew's endogenous and ecological explanations, scholars now emphasize "interactionist" models.[18] A recent study of the third-millennium societies of the Aegean islands, for example, stresses the interconnectedness that was fundamental to their success.[19] These models, broadly operating within world-systems analytical frameworks, reinstate cross-cultural interactions, not in their older diffusionist guise, but emphasizing active strategies and choices within Aegean societies and the fact that different regions show different historical trajectories.[20] In such models the later third millennium BC is crucial; in this period sailing ships from the east became regular visitors to the Aegean, and probably also came into use within the region.[21] The replacement of oar-driven longboats with sailing ships collapsed distance and drew the Aegean into regular and more-or-less direct interaction with the "great powers" of the eastern Mediterranean in the second millennium. This must have played a significant role in the establishment, by 1900 BC, of the first "palatial" societies on the island of Crete,[22] offering elites opportunities to acquire "symbolic capital" in the form of exotic materials, contacts, and knowledge, thereby differentiating themselves from commoners and supporting their authority.[23] This ability to acquire and display exotic materials and knowledge was central to Aegean elite self-representations throughout the second millennium BC.[24]

[14] E.g., Halstead 1994. [15] E.g., Day et al. 1997; Whitelaw et al. 1997; Wilson et al. 2004.

[16] E.g., Whitelaw 1983; 2004b; Day and Wilson 2002. See Whitelaw 2000: 225, Table 1, for the estimated size and population.

[17] E.g., Halstead 1994; Whitelaw 2004b.

[18] Cf. Horden and Purcell 2000. [19] Broodbank 2000.

[20] Undoubtedly part of the stimulus to re-examine the role of "eastern" connections arose from the critique of Bernal (1987; 1991; cf. discussion in *Journal of Mediterranean Archaeology* 3 (1990) 53–137; Lefkowitz and Rogers 1996). While far from accepting Bernal's arguments, the organization of conferences (e.g., Cline and Harris-Cline 1998; Karageorghis and Stampolidis 1998) illustrates the renewed interest in such connections. See now also Laffineur and Greco 2005.

[21] Broodbank 2000: 341–9; Sherratt 2000a: 18–20.

[22] Cf. Sherratt and Sherratt 1991. [23] Cf. Helms 1988.

[24] The dates given in the table, and used in the text, are based on Warren and Hankey 1989; Manning 2001; Wiener 2003; 2007, and, in relation to specific regions and periods, Rutter 2001; Shelmerdine 2001a (mainland); Watrous 2001; Rehak and Younger 2001 (Crete). Relative chronology has been defined in detail through the linkage of deposits of archaeological materials, especially ceramics. In the Early Minoan/Helladic phases, radiometric (^{14}C) dating has been valuable in establishing absolute dates, particularly early in the period. Absolute chronology in the later third and the second millennia has

Table 7.1 *Chronological Table for the Aegean Bronze Age. All absolute dates are approximate and liable to change*

Cultural Label		Crete (Minoan)		Mainland (Helladic)	
Crete	Mainland	Pottery phase	Date range (BC)	Date range (BC)	Pottery phase
Pre-Palatial		EMI	by 3100–2700		EHI
		EMII	2700–2200		EHII
		EMIII	2200–2100	2200–2000	EHIII
		MMIA	2100–1900		
		MMIB	1900–1800		
Proto-Palatial		MMII	1800–1700	2000–1600	MH
		MMIII	1700–1600		
		LMIA	1600–1480	1600–1500	LHI
Neo-Palatial		LMIB	1480–1425	1500–1440	LHIIA
Final-Palatial	Mycenaean	LMII	1425–1390	1440–1390	LHIIB
		LMIIIA1	1390–1370		LHIIIA1
Post–Palatial		LMIIIA2	1370–1300		LHIIIA2
		LMIIIB	1300–1190		LHIIIB
		LMIIIC	1190–1070		LHIIIC
		Subminoan	1070–1000	1070–1015	Submycenaean

II EVIDENCE

For much of the Aegean Bronze Age our primary evidence is archaeological. Systematic archaeological exploration began in 1870 with Schliemann's excavations at Hisarlık (ancient Troy), rapidly followed by excavations on

been determined through material culture links between the Aegean and the eastern Mediterranean, particularly the well-understood "historical" chronology of Egypt (e.g., Kitchen 2000). There are problems in the Late Bronze Age because the absolute chronology depends on dating the eruption of Thera/Santorini (e.g., Friedrich 2000). The "low" Aegean chronology assumes an eruption date for Thera c. 1550–1525 BC on the basis of synchronisms with Egypt. The "high" chronology advocated by some archaeologists (e.g., Manning 2001; Manning et al. 2001; 2002) assumes an eruption date c. 1650 BC based on ^{14}C determinations and on the recognition of annual phenomena affected by a major eruption (tree rings and Greenland ice cores: e.g., Manning 1999; Manning et al. 2001; 2002). These correlations have been challenged (e.g., Buckland et al. 1997), the issues particularly surrounding the inability conclusively to link the Thera/Santorini eruption specifically to indicators either in the dendrochronological or ice core sequences, and to difficulties in assessing radiocarbon determinations in the seventeenth and sixteenth centuries BC due to the shape of the calibration curve in those centuries. For a comprehensive and balanced overview of the *status quo*, see Wiener 2003; 2007. If accepted, the "high" chronology has the effect of raising the date for the beginning of the Late Bronze Age (LMIA/LHI) and the dates for LM/LHI–II by about a century. Dates prior to that are unaffected, compressing the Middle Bronze Age, while the two chronologies more or less come together in the fourteenth century BC. More significantly on a Mediterranean scale, it would correlate the Aegean Late Bronze Age with an earlier stage in Egyptian history (cf. Manning 1999; Kitchen 2000). Because of the general controversy surrounding absolute dates, archaeologists often use pottery phase names, allowing them to be sure that the phenomena under discussion belong within contemporary or earlier/later phases. This chart should assist readers wishing to consult the more specialist literature. The Egyptian 18th dynasty (Ahmose I) begins c. 1540 BC and ends c. 1296 BC.

the Greek mainland. Crete attracted increasing attention after its independence from the Ottoman empire in 1898.[25] The framework behind these first investigations owed much to contemporary classical archaeology, except that researchers like Schliemann sought to elucidate a legendary rather than a historical past.[26] A distinct discipline of prehistoric archaeology developed in the first half of the twentieth century, pioneered by investigators like Blegen and Wace; but Renfrew in the early 1970s turned Aegean archaeology's theoretical gaze towards prehistoric archaeology as practiced elsewhere, separating it from classical archaeology.[27]

In general, excavation in southern mainland Greece and Crete has been biased toward large (mostly "palatial") sites and tombs,[28] but since the 1970s regional studies projects, pioneered by the Minnesota Messenia Expedition and the Southern Argolid Exploration Project,[29] have drawn attention to the broader range of settlement types (and other activities within the landscape), stimulating fuller understanding of non-urban settlement and land-use, and appreciation of analysis at different scales.[30] The introduction of intensive survey techniques in the 1980s[31] improved the resolution of this picture. Data from these surveys are now becoming available, making comparison between regions feasible for this and other periods (Table 7.2).[32]

Aegean survey archaeologists have increasingly deployed scientific techniques, already well established in parallel disciplines, to determine past land use, climate, and geomorphological change.[33] Scientific techniques have also been employed since the 1970s to study archaeological materials, notably in determining the provenance of ceramics and metals.[34] These have become increasingly sophisticated, particularly since the 1990s,

[25] On Troy, see Allen 1998, rightly reinstating Frank Calvert's contributions to the Troy enterprise. More generally, Fitton 1996; McDonald and Thomas 1990. For an up-to-date summary of the state-of-play of prehistoric archaeology throughout Greece, see Cullen 2001, with extensive references. Brown 2001 offers insights into the practice of archaeology in late nineteenth-century Crete.

[26] Allen 1998; Morris 1994a.

[27] McDonald and Thomas 1990; Renfrew 1980; Snodgrass 1987. See also Barrett and Halstead 2004 on Renfrew's legacy in Aegean archaeology.

[28] For a still useful, but out-of-date summary of prehistoric sites in mainland Greece and the islands, see Hope Simpson and Dickinson 1979, and Hope Simpson 1981. Cavanagh and Mee 1998 offer an exhaustive survey of mainland and island burial evidence. For burial evidence on Crete, see Pini 1968; Löwe 1996.

[29] McDonald and Rapp 1972; Jameson, Runnels and van Andel 1994.

[30] Pioneering in this respect was the Melos project: Renfrew and Wagstaff 1982.

[31] See, e.g., Cherry 1983; 1994; 2003.

[32] See, e.g., Driessen 2001b; Cunningham and Driessen 2004 (for Crete); Cherry and Davis 2001; Wright 2004; Rutter 2001: 97–106, 148–9 (for southern mainland Greece); cf. Alcock 1994 (for similar comparison in the Hellenistic period), and Cherry 2003 (for a broader overview of the contribution of intensive survey to prehistoric Aegean archaeology). The papers in Alcock and Cherry 2004 offer a comparative perspective on survey in the broader Mediterranean.

[33] E.g., Zangger 1993; Zangger et al. 1997; Rackham and Moody 1996; Grove and Rackham 2001.

[34] E.g., Day 1988; 1997; Day et al. 1997; Jones 1986 (ceramics); Gale 1991a; Stos-Gale 2000; 2001 (metals).

Table 7.2 *Regions intensively surveyed in Greece and Crete, showing area covered, number and approximate density of Late Bronze Age sites**

Region	Area surveyed (km²)	No. LBA sites (minimum)	No. LBA sites(/10 km²)
Mainland			
Berbati	25	19	7.6
S. Argolid (SAEP)	44	27	6.1
Methana	10	5	5.0
Skourta plain	32	14	4.4
Boiotia	45	16	3.6
Pylos (PRAP)	40	14	3.5
Nemea Valley (NVAP)	50	10	2.0
Lakonia	70	10	1.4
Asea	33	4	1.2
Oropos	22	2	0.9
Crete			
Ziros	2	6	30.0
Mesara	22	44	20.0
Petras-Ay Fotia	4	6	15.0
Kommos	25	29	11.6
Vrokastro	50	46	9.2
W. Mesara	22	20	9.1
Itanos	30	20	6.7
Akrotiri	171	107	6.3
Kavousi	50	30	6.0
Gournia	24	13	5.4
Praisos	9	4	4.4
Ay Vasileios	38	11	2.9
Malia	40	9	2.3
Lasithi	85	13	1.5
Ayiofarango	20	1	0.5
Kythera	30	88	29.3
Messenia (UMME)	3800	168	0.4

* Data from Cherry and Davis 2001: 154, table 10.2; Driessen 2001b: 51–3, table 4.1; Rutter 2001: 98, table 1; Shelmerdine 2001a: 343, table 2, updated from Cavanagh et al. 1996; Cosmopoulos 2001; Forsén and Forsén 2003; Mee and Forbes 1997; Watrous et al. 2004.

and include residue analyses of ancient ceramics to determine their use.[35] Both the British and American Schools of archaeology in Athens now have archaeological laboratories. Regularly used techniques include the study of ancient plant remains, both macroscopically (archaeobotany) and through pollen analysis (palynology),[36] and of animal bones (zooarchaeology).[37] It is a matter of some embarrassment, however, that skeletal studies of human

[35] E.g., Tzedakis and Martlew 1999: 26–9.

[36] E.g., Hansen 1985; Jones 1987; Sarpaki 2001; Valamoti 2003; also Haldane 1993 for organic materials preserved in wreck contexts.

[37] E.g., Kotjabopoulou et al. 2003; Halstead 1998–9.

disease and demography remain underdeveloped, despite extensive excavation of burials. But this is changing, and stable-isotopic study of human bone is also shedding light on ancient diet.[38]

The "palatial" Bronze Age, beginning with the first palaces on Crete c. 1900 BC, brings the first written sources. Unfortunately the scripts used on administrative (and other) documents before c. 1400 BC, the so-called Cretan Hieroglyphic and Linear A, have not yet been deciphered, so the evidence they offer is limited.[39] Nevertheless, since numbers and many commodities are identifiable, progress has been made in quantifying products within these systems,[40] while detailed study of different types of documents (including tablets and various types of sealings) suggests a basic understanding of Linear A administrative practices[41] and possible administrative hierarchies among sites.[42] The use of Linear A on the islands of the Aegean (Thera, Melos, Keos, Kythera, and Samothrace) and at Miletus in southwest Anatolia is suggestive, and fits with Minoan Cretan cultural dominance there in the later Middle and early Late Bronze Age.[43]

From c. 1400 BC, we have documentary evidence (mostly clay tablets, also seal-impressed clay nodules) in the Linear B script, which Michael Ventris showed in 1952 recorded an early form of Greek.[44] The earliest surviving documents on clay, some 4,000 in number, come from two horizons in the palace at Knossos. One dates to the end of the fifteenth century BC, and the other, preserving more tablets, around the middle of the fourteenth.[45] Most other Linear B documents belong to the later thirteenth century BC, from the major mainland Greek "palatial" centers of Pylos (c. 1,100 documents), Thebes (c. 430), Mycenae (73), Tiryns (24), and Midea (3).[46] The discovery of three Linear B tablets dating to the mid-thirteenth century at Chania

[38] E.g., Tzedakis and Martlew 1999: 210–37; Vaughan and Coulson 2000 (paleodiet); Halstead 1977; McGeorge 1987; Hallager and McGeorge 1992; Triantaphyllou 2001 (skeletal analysis).

[39] Cretan Hieroglyphic: Karnava 2000; Olivier and Godart 1996; Schoep 1996; Younger 1996–7; Linear A: Godart and Olivier 1976–85; Hallager 1996; Schoep 2002.

[40] R. Palmer 1995; Schoep 2002. [41] Hallager 1996; Schoep 2002. [42] Schoep 1999.

[43] Palaima 1982, now updated by Karnava 2007 to include the discovery of administrative documents on Thera (Michailidou 1992–3; Boulotis 1998) and Samothrace (Matsas 1995), and a non-administrative inscription on Kythera (Sakellarakis 1996). For Miletus, see Niemeier 1996.

[44] Ventris and Chadwick 1973 is still the best basic introduction; on the decipherment, see Chadwick 1990; Robinson 2002. For a valuable and concise overview of the use of Linear B documents, see Palaima 2003a.

[45] Driessen (1990; 2000) gives evidence for the earliest Linear B at Knossos from the so-called "Room of the Chariot Tablets," and sketches the implications of the chronological separation of this group of tablets from the rest of the archive in Driessen 2001a. For the possibility of additional minor destructions at Knossos, see Driessen 1997; Firth 2000–1. For full publication of the Knossos texts, see Chadwick et al. 1987–98.

[46] Aravantinos et al. 2001 (recent Thebes tablets); Melena and Olivier 1991 (documents from Tiryns, Thebes, and Mycenae); Bennett and Olivier 1973; Bennett et al. forthcoming (Pylos texts). Midea: Demakopoulou and Divari-Valakou 1994–5. A single tablet recently discovered in a LHIIIA2 context at Mycenae has the distinction of being the earliest example from a securely dated context: Blackman 2001: 29–30; Shelton 2002–3.

in western Crete[47] is significant, showing that Linear B administration continued on Crete beyond the destruction of the palace at Knossos in the mid-fourteenth century. In addition to the more than 5,000 documents on clay, about 160 transport and storage vessels with inscriptions painted before firing (the so-called inscribed stirrup jars) are known, from all the above sites and a few more.[48] The exact relationship of these inscriptions to the archives is not yet fully understood. The vessels were mostly manufactured on Crete, but found in contexts throughout southern mainland Greece, strongly suggesting a link between the inscriptions and their distribution.[49]

Although deciphered, the Linear B documents are limited in scope.[50] Their content is primarily economic and exclusively administrative, not legal, literary, liturgical, or narrative. The administrative transactions recorded, however, include references to cult activity (offerings made by the palaces) and festivals. The information they contain would be more valuable if each site had a time-series of texts. However, at most sites (Knossos excepted[51]), the documents offer no time depth, because they owe their preservation to the fires that burned the buildings in which they were created and stored. Documents seem to refer to regular activities on varying cycles, while explicit references to "this year," "last year," or "next year" on a few tablets suggest an administrative "window" of a little over a year.[52] Possibly information was transferred onto larger, more easily stored media – parchment or papyrus – but such documents do not survive.

Although the Linear B documents offer much information,[53] it is axiomatic in the field that their value can be greatly enhanced by combining them with archaeological evidence.[54] Equally, within Linear B studies (usually called "Mycenaean studies" in the UK and "Mycenology" in the USA), the principle of contextual analysis of sign-groups, rather than etymological interpretation alone, has become standard practice.[55] In addition to internal Aegean textual evidence, Egypt provides some external textual evidence and representations of individuals from Keftiu;[56] some Hittite texts refer to men from Ahhiyawa active in Anatolia;[57] and documents from Ugarit and Mari refer to Aegean merchants.[58]

[47] Hallager, Vlasaki, and Hallager 1992.
[48] Catling et al. 1980; van Alfen 1996–7.
[49] Day and Haskell 1995; Catling et al. 1980.
[50] As noted by Finley 1957: 129.
[51] E.g., Driessen 1990; 1997; 2001a.
[52] See Bennet 2001: 30, fig. 1 for one way of representing the Linear B administrative cycle.
[53] For an exposition of the potential of Linear B for writing the history of the Aegean Late Bronze Age, see Chadwick 1976.
[54] E.g., Bennet 1988a; Driessen 1990; Palaima and Shelmerdine 1984; Shelmerdine and Palaima 1984.
[55] Ventris and Chadwick 1973; L. Palmer 1963: 27–36. An excellent Mycenaean dictionary presents differing interpretations of sign-groups with bibliography: Aura Jorro 1985–93.
[56] E.g., Vercoutter 1956; Helck 1995; Wachsmann 1987; Panagiotopoulos 2001.
[57] E.g., Beckman 1996; Cline 1994: 121–5; Hawkins 1998; Niemeier 1998.
[58] E.g., Heltzer 1988; 1989; Malamat 1971.

III PRE-MYCENAEAN AEGEAN (3000–1400 BC)

(a) *Growth and development*

As noted above, the southern Greek mainland, islands, and Crete diverged from northern Greece in the early third millennium BC. Using data from regional surveys, we can suggest that settlement numbers (and presumably population) increased in all areas in the first half of the third millennium.[59] In many regions settlement expanded into virgin territory as more land was taken in to support increasing populations. We also encounter the first representations of ploughs.[60] Modestly large villages appeared on the mainland, including Lerna (perhaps 1.6 ha.; population c. 300), Tiryns (perhaps 4 ha.; population c. 800), and Kolonna on Aegina (2.5 ha.; c. 500 population). The evidence of architectural differentiation within these settlements is also significant. Large structures known as "corridor houses" appeared, providing evidence of management of storage, possibly of valuable commodities, through clay sealings.[61]

Around 2200–2000 BC, however, a further divergence took place. During this phase settlement numbers fell sharply in most parts of the southern mainland, except Messenia, where they apparently increased. Catastrophic erosion induced by the expansion of agriculture onto unstabilized (i.e. non-terraced) slopes may have been at least a partial factor in the north-east Peloponnese, although it is unclear how far this can be generalized.[62] There is also evidence that settlement became increasingly nucleated, so simply counting site numbers defined by surveys might mask more stable population levels.[63] Some mainland areas, like the Nemea valley, were apparently abandoned in the first half of the second millennium BC.[64] In the Cyclades settlement patterns and organization were restructured; some see this as a gap in settlement.[65] Crete, on the other hand, saw opposite trends, with large increases of site numbers in most areas and, of course, the emergence of distinctive monumental structures conventionally called palaces.[66]

The Minoan "palaces" and their surrounding habitations represent the first settlements in the Aegean which can meaningfully be called "urban."

[59] See Rutter 2001: 97–102, table 1, and 148–9; Wright 2004; Driessen 2001b: 51, table 4.1, for figures.

[60] Pullen 1992; whether we should take this as evidence for its recent introduction (cf. Sherratt 1981) is open to debate.

[61] For sizes: Jameson et al. 1994: 543, table B.1; Pullen 2003: 30–1; Zangger 1994: 202, fig. 8. For the "corridor house" in general, see Shaw 1987. On EHII sealing: e.g., Weingarten 1997 (Lerna); 2000 (Yeraki).

[62] For a skeptical view, see Endfield 1997.

[63] Jameson et al. 1994: 366–8; although they estimate a decline in population in their survey region from c. 1,900 in EH II to 475 in MH (1994: 563, table B.7).

[64] Cherry and Davis 2001: 150–2; Wright 2004: 123–4.

[65] On this question see Broodbank 2000: 320–61; Sherratt 2000a: 20–2.

[66] Driessen 2001b; Cunningham and Driessen 2004.

It is difficult to estimate the size of settlements around the palaces, but Whitelaw estimates that Knossos town covered 33 hectares in the immediately pre-palatial phase (c. 2200–1900 BC), rising to 56 hectares in Protopalatial times (c. 1900–1700 BC). Equally striking is the fact that the site may only have extended to 5 hectares around 2200 BC, implying a tenfold increase in size over three centuries. Immigration, not internal growth, presumably accounts for much of this.[67] Population estimates for Protopalatial Knossos range from 11,200 to 14,000.[68] The other known Cretan palaces at Malia and Phaistos approach this size, but no other contemporary Aegean sites come anywhere near this scale.[69] Using estimates of household size and differential estimates of population density for sectors of the settlement radiating out from center to periphery, it seems that Knossos reached its largest size c. 1500 BC, covering 67 hectares, with a population around 13,400 – 16,750.[70] Only in Roman times, when Gortyn (covering 100 hectares, or 1 km^2) was the island's capital, did Cretan cities regain this scale. It is worth pointing out that these figures are comparable to sites in western Anatolia (e.g., Troy VI: 27 hectares) and Syria (e.g., Ugarit-Ras Shamra: perhaps 28 hectares; Alalakh: c. 22 hectares), since some scholars have argued that Aegean urbanism was on a radically different scale from that in western Asia.[71] In terms of the urban–rural division of population, it has been suggested that 40 to 50 percent of Neo-Palatial Minoans dwelt in cities or towns. Recent survey on the island of Kythera suggests a similar pattern, with much of the population congregated loosely around the major harbor town of Kastri.[72]

With the emergence of the "palaces," Minoan material culture dominated the Aegean. However, we should resist the temptation to regard this as a uniform phenomenon (it is likely, at least in the first half of the second millennium, that each Minoan palace was politically independent and may have formed its own alliances and trade partnerships), or as a "thalassocracy" in Thucydides' terms. Already in the third millennium, there is good evidence for Minoan colonization of Kythera, where settlement patterns strikingly mirror those of Crete into the Late Bronze Age, and an unequivocally Minoan-style peak top sanctuary dominates Kastri.[73] Other

[67] Whitelaw 2000: 225, table 1. [68] Whitelaw 2001a: 21–7.

[69] Whitelaw (2001a: 29, fig. 2.10) estimates Malia's extent in the Neopalatial period as c. 37 hectares, just over half the size of Knossos.

[70] Whitelaw 2000: 225, table 1; cf. 2004a: 153 (14,000–18,000).

[71] Renfrew 1972: 240–4; Whitelaw 2001a: 27–31. This is not to deny that the scale of urban settlement in Late Uruk Mesopotamia was an order of magnitude larger. Crete's palaces were probably in direct contact with eastern Mediterranean states rather than those in Mesopotamia.

[72] Branigan 2001a: 45–9 (Crete); Bevan 2002 (Kythera).

[73] On Kythera: Broodbank 1999b; Sakellarakis 1996; Bevan 2002. Broodbank 2004 is a thoughtful exploration of the issue of "Minoanization" in the Aegean in general; see also Wiener 1990.

islands show differing degrees of affiliation: Minoan styles with a more visible substrate of indigenous material culture, mostly from the mid-second millennium onwards. Kolonna on Aegina was a prominent site through much of the second millennium, with trade links over much of the eastern Greek mainland, and extensive use and imitation of Minoan pottery.[74]

Lead isotope analysis of bronze, silver, and lead artifacts on Crete suggests that the need for metals (copper, lead, and silver) available from Laurion in eastern Attica drove such interconnections.[75] Documentary evidence from Mari, however, suggests that tin came from the eastern Mediterranean, via long-distance exchange networks established in the late third millennium.[76]

Seventeenth-century Crete experienced destructions at the major palaces, probably caused by earthquakes, and immediate reconstruction and remodeling. Some archaeologists suggest that storage facilities in the new palaces were more restricted, implying a smaller palatial role in storing (and redistributing?) staples, balanced, perhaps, by devolution of staple production and storage to rural settlements of varied form, unhappily known by the general term "villas."[77] However, other archaeologists argue that this reduction in palatial storage only happened after c. 1425 BC.[78] Equally, the sixteenth-century emergence in some settlements of distinctive central buildings with architectural features reminiscent of the palaces (especially central courts, leading to a proposal to call such structures "court-centered buildings") has complicated our understanding of political organization in early Late Bronze Age Crete, reflecting either emulation or political fragmentation.[79]

In the LMIA pottery phase (Table 1) the volcano on the island of Thera (Santorini) erupted, preserving for posterity the site of Akrotiri. We can be certain that the eruption did not directly cause the destruction of many palatial and sub-palatial sites on Crete that happened at the end of the following phase, at least 50–100 years later (even on the most conservative of low chronologies). Nevertheless, the eruption surely affected agriculture and settlement (in the short term), trade routes between Crete and its primary metal sources in Attica (in the medium term), and (less tangibly) popular confidence, particularly in rulers and their divine sanction.[80] In any event, a horizon of burnt destructions occurred across Crete c. 1425 BC,

[74] Rutter 2001: 125–30; Kilian-Dirlmeier 1997; Walter 2001.

[75] Stos-Gale and Macdonald 1991; Stos-Gale 2001. [76] E.g., Malamat 1971; Heltzer 1989.

[77] For the idea of devolved storage, see Halstead 1981: 203; Moody 1987: 236–7. For a recent collection of papers on "villas," see Hägg 1997.

[78] Christakis 1999: 123–31; 2004: 307.

[79] Knappett 1999; Hamilakis 1997–8; papers in Driessen et al. 2002. See also Schoep 1999; 2002 on possible fragmentation suggested by different practices in Linear A administration in the LMIB period.

[80] Driessen and Macdonald 1997 discuss these factors. Peatfield 1994 is interesting on possible ideological repercussions.

with only the palace at Knossos escaping. For at least a few generations, it was apparently the sole functioning palace for much of the western three-quarters of the island.[81]

The first signs of the emergence of complex societies on mainland Greece come around 1600 BC, roughly the same period as the construction of the new palaces on Crete. Rather like the situation in Early Iron Age Greece, our primary evidence comes from burials, particularly the shaft graves at Mycenae and the earliest tholos ("beehive") tombs of Messenia.[82] Most regard the groups using these (and other) burials as ancestors of the rulers of the later "Mycenaean" palaces.[83] The quantities of objects with exotic provenances or styles deposited particularly in the Mycenae shaft graves have led to suggestions that the Mycenaeans "got rich quick" as mercenaries, or took the treasure as plunder. However, what we seem to have is a conscious choice by leading groups within these various societies to negotiate their status competitively, by disposing of objects that invoked their broad horizons, extending from the central Mediterranean to Crete, and, through Crete, to the eastern Mediterranean and Egypt. Amber (some Baltic, some Sicilian[84]) appears for the first time in a few tombs, highlighting contacts with (and probably beyond) the central Mediterranean. The occurrence of Late Helladic I pottery at Vivara in the bay of Naples, Filicudi, and the Lipari Islands is consistent with this.[85] Material of the same period is also attested at Toroni in coastal Macedonia.[86] These contacts probably mark the initial emergence of a Mycenaean "margin," a region affected but not transformed by Mycenaean contacts.[87]

Sites that began achieving prominence c. 1600 BC tended to keep growing, becoming the major players of the "heyday" of Mycenaean Greece (c. 1400–1250 BC). This is clear in Messenia, where the growth of Pylos, at the expense of near neighbors and potential competitors, can be demonstrated.[88] Equally, settlement numbers rose throughout mainland Greece in this phase, often reaching or surpassing the levels that had prevailed

[81] For the extent, see Bennet 1985; Driessen 2001a. The existence of the Knossos palace has led to proposals to rename the phase between these destructions and Knossos' destruction (previously referred to as the "Postpalatial") as the "Third Palace" (Dickinson 1994: 13, fig. 1.2) or the "Final Palace" period (Rehak and Younger 2001: 384, 391, table 1).

[82] Cavanagh and Mee 1998: 41–60; Dickinson 1977.

[83] E.g., Kilian 1988; Wright 1995; Palaima 1995.

[84] Beck 1966; Beck et al. 1968; Harding and Hughes-Brock 1974. Most recently Maran 2004.

[85] Vagnetti 1993; 1998; 1999a; 1999b; Graziadio 1998.

[86] Wardle 1993; Cambitoglou and Papadopoulos 1993.

[87] Sherratt and Sherratt 1991; cf. A. Sherratt 1987 on the ideal placement of Mycenae to monitor overland trans-shipment of commodities from the Corinthian to the Argolic Gulfs. See A. Sherratt 1993, with Schneider 1977, for a world-systems view of relations between temperate Europe and the Mediterranean and the concept of the "margin" in addition to "core" and "periphery." For the question of why, with broadly similar ecology, palatial societies did not emerge in the central Mediterranean in the second millennium BC, see Lewthwaite 1983.

[88] Bennet 1999b; Bennet and Shelmerdine 2001; Shelmerdine 2001b.

before the early second-millennium decline. Settlement numbers throughout much of southern Greece probably reached their highest levels in the fourteenth and thirteenth centuries BC.[89] The spread of settlement in the vicinity of Mycenae (the Nemea and Berbati regions[90]) is an interesting feature of this expansion. At least in the case of Nemea, this was probably a deliberate recolonization to expand cultivated land, perhaps involving some drainage of the Nemea valley.[91]

Mycenae was the largest urban center in mainland Greece c. 1400–1250 BC. Its continuously inhabited "core" extended over 32 hectares and its population perhaps reached 6,400, if we assume a density of 200 people per hectare.[92] The Argolid housed a particularly dense concentration of prominent sites, including not only the fortified sites of Mycenae, Tiryns, and Midea, but also Argos, Lerna, Nauplion, and Asine. Although there has been no systematic intensive survey on the Argive plain itself, it is clear that life here centered on urban settlements. The "presence" of the Argive centers probably affected settlement and economic activity in neighboring regions, such as Berbati and the Nemea valley, even extending into Corinthia.[93]

In Boeotia, Thebes, whose urban topography is difficult to reconstruct because of the substantial modern town that overlies it,[94] might have been almost as extensive as Mycenae, perhaps 28 hectares.[95] Finds of Linear B documents, Linear B inscribed stirrup jars, ivories, and lapis lazuli cylinder seals remind us of Thebes's likely importance, even without recourse to its prominence in later Greek tradition, as reflected in its popularity in fifth-century Athenian tragedy. In Messenia, recent urban survey[96] at Bronze Age Pylos suggests its lower town (beyond the palatial structures themselves) extended over 12–13 hectares at the site's peak in LH IIIB, while the palatial structures themselves occupied about 2 hectares, giving a total of 14–15 hectares, for which a reasonable population estimate is about 3,000.[97] At Pylos, Linear B texts imply that at least 377 (perhaps 460, if restored) dependant female workers – over 10 percent of the archaeologically estimated population – were resident at the center itself.[98]

Extrapolating from these figures for Pylos to the whole region surveyed by the Minnesota Messenia Expedition (multiplied by the Pylos Regional Archaeological Project's "success rate" with prehistoric sites), Whitelaw

[89] E.g., Wright 2004; Davis et al. 1997; Shelmerdine 2001a: 342–6, 379.
[90] Cherry and Davis 2001; Wells and Runnels 1996; Wright 2004. [91] Cherry and Davis 2001.
[92] French 2002: 64, who suggests, however, that the proposed population density of 200/ha. is perhaps too high. Also Iakovides and French 2003: 22.
[93] Cherry and Davis 2001; Morgan 1999; Wright 2004: 123–8.
[94] Dakouri-Hild 2001; Symeonoglou 1985. [95] Whitelaw 2001a: 29, fig. 2.10.
[96] Cf. Alcock 1991; Snodgrass and Bintliff 1991.
[97] Bennet and Shelmerdine 2001, 136; Bennet 1999b; Whitelaw 2001c: 63 (population estimate).
[98] Chadwick 1988: 76.

estimates a total population for the Pylian polity of 50,000.[99] Whitelaw's figures would mean that as many as 16,800 (34 percent) of the population lived in the twenty or so largest settlements (2 hectares in extent or larger). These include Pylos itself, a possible second "capital" at Leuktron, and seventeen second-order centers suggested by the Linear B texts.[100]

We should be wary of generalizing a uniform way of life across all the Mycenaean polities of the fourteenth–thirteenth century BC southern Aegean. Nevertheless, Mycenaean material culture apparently included central Greece as far as modern Volos and Dimini (perhaps to be identified as legendary Iolkos) in southern Thessaly.[101] Beyond this area, there are indications that Macedonia and Epiros lay on the "margin" of this world.

(b) *Institutions*

The major economic organization in Middle and Late Minoan Crete and Late Helladic mainland Greece was something we customarily call the "palace." The presence of large-scale storage facilities for staples and craft products, together with spaces for rituals, evidence of bureaucratic control, and the Minoan palaces' sheer size suggest strongly that they could extract what they wished and manage economic activity over quite large areas (perhaps up to 3,000–4,000 km^2).[102] The palaces were not a short-lived phenomenon, even if we ignore developments prior to the appearance of the specific architectural form. We should not assume that they functioned in the same way from c. 1900 BC to the end of the Bronze Age. Without being able to understand the documentary evidence fully, however, it is difficult to assess the extent to which Minoan "palaces" dominated the economies of their regions, let alone how the balance shifted through time.[103]

[99] Whitelaw 2001c: 63–4, based on McDonald and Rapp 1972: 141; Bennet 1995; 1999a. Chadwick (McDonald and Rapp 1972: 111–13), using Linear B documentary evidence, suggested a total population almost twice as large: 80,000–100,000, close to the population estimate of the region for classical times (112,500) suggested by Roebuck (McDonald and Rapp 1972: 113).

[100] Bennet 1995, with references, on the largest settlements. The figure is based on size estimates given by McDonald and Rapp 1972, superseded by estimates from PRAP (e.g., Bennet 1999b). Since in most instances PRAP's detailed investigation has suggested larger site sizes than those estimated by McDonald and Rapp (1972), it is likely that the figures for the total area and therefore population of the larger sites are underestimates. However, it is harder to ascertain whether further increases would change the *proportion* of urban to rural, or simply increase the overall population estimate. On Leuktron, see Bennet 1998–9.

[101] Hope Simpson and Dickinson 1979: 272–98. On a Mycenaean palace at Dimini, see Adrymi-Sismani 2000. Feuer (1983) explicitly examined the Mycenaean northern boundary, but his publication needs updating.

[102] Bennet 1990.

[103] See Knappett 1999 for a perceptive discussion of problems in understanding the polities just of the Protopalatial period. He particularly notes that economic, political, and cultural spheres need not be coterminous. Driessen and Macdonald 1997 discuss possible changes within the Late Bronze Age on Crete; see Knappett and Schoep 2000; Schoep 1999, for the Middle and Late Bronze Ages.

We can say more about the Mycenaean "palaces," since we can read the Linear B documents (see below). Authority in the earliest mainland polities may have been kin-based, only becoming institutionalized after a period of intense competitive display and negotiation.[104] We may associate this development with the construction of the first true "palaces" (in the sense of building complexes embodying administrative, economic, and ritual functions with regional significance), a phenomenon that belongs only in the late fifteenth to early fourteenth centuries BC. It is possible that the bureaucratic techniques familiar from Linear B were first developed at Knossos in the second half of the fifteenth century BC and only then introduced on the mainland.[105]

It is worth noting the differences between palatial organization on Crete and the mainland in the Late Bronze Age. On Crete, the system attested at Knossos was apparently an adaptation of earlier power structures and administration. The evidence of place-names mentioned in the Knossos archive – only about one hundred for an area of perhaps 3,000–4,000 km^2 – suggests that Knossos dealt primarily with relatively high-level places. By contrast, over 200 place-names appear in the archive from Pylos, which probably dealt with sites much lower in any hierarchy of settlements, suggesting a more centralized system. Further a combination of archaeological and textual evidence suggests that the Pylos system expanded from west to east by incorporating competing early Mycenaean centers.[106]

The presence of deciphered texts on the mainland creates a danger of overestimating the role played by "palaces" in regional economies and underestimating differences between practices at different "palaces" or through time at individual "palaces."[107] Within their final century, for example, the physical structures at Bronze Age Pylos were remodeled considerably, restricting and modifying access to the central buildings.[108] Although the different histories of excavation may have affected the finds, it is worth noting that almost all administrative documents discovered at Pylos were within the palatial structures, whereas at Mycenae most were recovered from structures outside the fortifications. But we do not know whether this was a result of different practice in the two sites or of diachronic changes between

[104] E.g., Wright 1995; cf. Voutsaki 1995; 2001.

[105] Implied by Driessen 2000; see also Palaima 1988b. It is also possible that Linear B was developed on the mainland and then taken to Crete, but this reconstruction depends partly on assuming an essentialist identity – Greek script can only have been devised in Greece – and the idea that intrusive Mycenaeans introduced the script to Crete in the wake of the c. 1425 BC destructions (for a more complex view, see, e.g., Preston 1999). For others, the fact that proper "palaces" were barely known on the mainland before c. 1400 BC militates against the bureaucratic system being developed there.

[106] Bennet 1995; 1999a; 1999b.

[107] For a summary account of differences in administrative practice, for example, see Shelmerdine 1999; for differences across time at Knossos, see Driessen 2001a.

[108] Shelmerdine 1987; 2001a: 337–9 (recent work at Pylos suggests several phases within the final palace: Nelson 2001); Wright 1984.

mid-thirteenth-century Mycenae and late thirteenth-century Pylos. In any event, we should remember that the picture afforded by the Knossos documents is probably 150 years earlier than that suggested by the Pylos tablets.

In general, the type of palatial institutions we envisage in the Mycenaean polities is broadly similar to those of contemporary Mesopotamia. Finley proposed just such a comparison in an early review of *Documents in Mycenaean Greek*, rejecting analogies with later (especially "Homeric") Greece. He described the palatial economy as "a massive redistributive operation."[109] He drew here on Polanyi's characterization of redistribution in early economies as "appropriational movements towards a center and out of it again."[110] But while the Mycenaean economy clearly fits into this broad model, it covers a range of types of economic organization. Killen, in an authoritative overview, reinforces Finley's point about the similarity with Near Eastern economies, but suggests that the nature of Mycenaean "redistribution" needs to be made more precise.[111] A better term is "mobilization," he argues, citing Earle's definition: "the recruitment of goods and services for the benefit of a group not coterminous with the contributing members."[112] This better captures the way we now understand the selective nature of palatial interest – seeking to acquire commodities essential to the support and maintenance of the ruling elite – while reinforcing the essential point: the ability of the palatial economy to centralize control of those aspects of the economy it chose to manage.

More recently, archaeologists and textual scholars alike have emphasized forces operating alongside the palatial sector – the "para-palatial" economy, as I will call it, to reflect its coexistence with the palatial system. However we understand the institution of the "palace" in the LHIII Aegean, we should not think of it as controlling all economic activity within its region, despite its ability to exercise central control over some aspects; nor, necessarily, as existing within a distinct, clearly bounded territory.

IV MYCENAEAN AEGEAN (1400–1200 BC)

The workings of Aegean economies and their intersection with those of other regions are clearest in the fourteenth and thirteenth centuries BC. By this time, the entire southern Aegean was linked to long-distance exchange routes extending from southern Europe to Mesopotamia and Egypt. The "palatial" societies of first Crete and then southern mainland Greece transformed themselves into producers and consumers of materials (particularly

[109] Finley 1957: 135. [110] Polanyi 1957: 250.

[111] Killen 1985: 241–3 (updated as Killen 2007). For a systematic examination of parallels with Near Eastern systems, see de Fidio 1992.

[112] Earle 2002: 83. In his chapter "A reappraisal of redistribution," Earle distinguishes four types – leveling mechanisms; householding; share-out; and mobilization (Earle 2002: 81–96).

metals) and goods whose value was broadly shared and understood throughout the eastern Mediterranean.[113] The political economy operated by those in charge of "palaces" was articulated toward acquiring exotic raw materials and products and creating value-added products (most obviously cloth and perfumed oil) for exchange in the eastern Mediterranean circuit.

Exchange with the central Mediterranean most likely involved transferring manufactured goods from the Aegean *across* boundaries of shared value in exchange for raw materials (and perhaps people) for local Aegean consumption and trans-shipment into the east Mediterranean. There is evidence that Mycenaean material objects and associated behaviors (especially consumption of intoxicating beverages) were exploited by elites in Sicily and Macedonia.[114]

The rise to prominence of Late Bronze Age copper-producing centers on Cyprus reveals a re-articulation of exchange routes. Their products were shipped throughout the Mediterranean, from Sardinia to the Levant, in the trade-mark ox-hide shaped ingot,[115] despite the continued use of copper sources at Laurion in Attica, in Sardinia, and elsewhere.[116] The "palaces" probably monopolized such exchange, as the only organizations with sufficient capital and political authority to acquire and move high-value commodities and raw materials in the eastern Mediterranean.[117] However, shipwrecks spanning the late fourteenth through early twelfth centuries BC and the increasingly directional pattern of the distribution in Cyprus and the Levant of pottery manufactured in the Argolid region, both suggest that palatial monopolies were breaking down toward the late thirteenth century.[118]

The fall of the Hittite empire, retraction of Egyptian presence in Syria-Palestine, destruction of Ugarit, and rise of the Middle Assyrian empire in the early twelfth century had important repercussions for Aegean palatial elites, much of whose legitimacy lay in connections with the east Mediterranean. The development (centered on Cyprus) of ironworking, which did not depend on acquiring ores through long-distance exchange meant that, within the Aegean at least, such exchange monopolies and large political units would not return until Hellenistic times, close to a millennium later.[119]

[113] Sherratt and Sherratt 1991, with an elegant diagram, 385, fig. 1.

[114] D'Agata 2000 (Sicily); Andreou 2001; Kiriatzi 2000; Kiriatzi et al. 1997 (Macedonia).

[115] Steel 2004: 149–86; more generally, Knapp 1997. [116] Stos-Gale 2000.

[117] The Amarna letters (Moran 1992) give a flavor of the types of transactions involved, admittedly between Egypt and other major eastern Mediterranean "states," not the Aegean polities. The existence of an Aegean entity (or entities) recognized as such is perhaps implied by the references (collected in Cline 1994: 121–5; see also Beckman 1996) in fourteenth- and thirteenth-century Hittite sources to Ahhiyawa: see, e.g., Hawkins 1998; Niemeier 1998; and Finkelberg 1988, for the possible relation between Achaea (home of Homer's Akhaioi [Achaeans]) and Ahhiyawa as a term for fourteenth–thirteenth century Greece.

[118] E.g., Sherratt 1999; 2000b; 2001. [119] Sherratt 1994; 2000b.

(a) *Production*

In order to understand palatial production, we must take into account the institutions involved.[120] The Linear B tablets reveal that the leading figure ("king") bore the title *wanax* (Myc. *wa-na-ka*; later Greek *anax*, "lord," often applied to deities).[121] This word, lacking a plausible Indo-European etymology, may have originated in Minoan Crete. It, and some of the institutions of rulership that went with it, may have been part of the early Mycenaean elite's appropriation of exotic materials and knowledge.[122] The adjective derived from *wanax*, *wanaktero-* (presumably "royal"), is applied to some examples of various products (e.g., cloth, javelin shafts, oil or wine contained in stirrup jars) and to certain craftspeople at Pylos (the "royal" fuller and potter are attested, for example, among those holding land). The term probably refers to the "king" in his official capacity, since at Pylos there are a few references by name to an individual who can possibly be identified with the *wanax*: the name *e-ke-ra*$_2$*-wo*[123] appears in the same position in Er 880 as the *wa-na-ka-te-ro, te-me-no* does on the parallel document Er 312. These could be references to the ruler's private wealth as a member of the elite. In effect, therefore, the terms *wanax* and *wanaktero-* can be regarded as synonymous with "palace" or "palatial."

Contrasted with the *wanax* is the *lawage(r)tas*, a more transparently Greek term, with the sense "leader" (*lawagetas*) or "assembler (*lawagertas*) of the host." We have a smaller number of attestations of the adjective derived from this term (*lawage(r)sio-*), but the contrast is clear in Pylos Er 312, in which the "estate" (*temenos*) of the *wanax* is three times larger than that of the *lawage(r)tas*. As well as this land, some individuals are described by the same adjective. In thirteenth-century BC Pylos, at least, a reasonable case can be made for the *lawage(r)tas* being the polity's "second-in-command," possibly based in the complex surrounding the palace's secondary megaron (Room 65), or Southwest Building.[124]

A group termed the *hek*^{w}*etai* (Myc. *e-qe-ta*) was probably also affiliated with the center. Their function is unclear, although the term's etymology ("followers," perhaps of the *wanax*) suggests that it might have been military.[125] Among other contexts, *hek*^{w}*etai* appear on documents (the *o-ka* tablets: Pylos An 657, 654, 656, 519, and 661) listing contingents

[120] On the question of this terminology and its relationship to later Greek, see, e.g., Morpurgo Davies 1979.

[121] Carlier 1984; 1998. For Linear B terms used throughout, see Aura Jorro 1985–93, s.vv., with bibliographic references.

[122] Palaima 1995; Wright 1995; see Kilian 1988 for the idea that the origins of *wanax*-style rulership can be traced back to the Shaft Grave period.

[123] Palaima 1998–9: 215–21, who realizes the name as *Hekhellawon*; see also Aura Jorro 1985–93: vol. 1, s.v., for other possibilities.

[124] Hiller 1987; also Davis and Bennet 1999. [125] Deger Jalkotzy 1978.

watching the Pylian coast. They accompany some of the contingents and their names – unusually for the Linear B corpus – include a patronymic, hinting at elite status. In other contexts, cloth (Knossos Ld[1] series) and chariot wheels (Pylos Sa series) are called *e-qe-si-jo* ("of or pertaining to *hek^{w}etai*"). It is possible (Pylos Wa 917) that a prominent individual (and administrative official) at Pylos – Alxoitas – was a *hek^{w}etas*.

Local communities within the Pylos polity seem to have been termed *da-mo* (*damoi*; esp. Pylos Cn 608). At the level of these communities, we have evidence for officials, particularly the *ko-re-te* and *po-ro-ko-re-te* (attested on Pylos Jn 829 at each district within the polity). Although we cannot interpret the main term, the *po-ro-* prefix seems to have the function of "sub-" or "vice-*ko-re-te*." At least one of their roles was insuring that communities met their obligations to the center (such as providing bronze, as on Pylos Jn 829).

The *g^{w}asileus* (Myc. *qa-si-re-u*, equivalent to later Greek *basileús*) was a titled official more deeply connected with local affairs.[126] Their exact role is unclear, but it may have involved supervising craft production at the local level, at least in the Pylos bronze industry.[127]

In societies of this type, ownership and control of land are crucial, and the Mycenaean documents offer tantalizing glimpses.[128] Once again, Pylos provides most evidence, although there are documents relating to land from Knossos, Thebes, and even among the small number of texts from Tiryns. These documents do not explicitly say that the state owned all land in the polities. The pair of documents Pylos Er 312 and 880 show that the *wanax*, *lawage(r)tas*, and other members of the elite at Pylos held land – described as a *temenos* (Myc. *te-me-no*) – at a place called *sa-ra-pe-da*; that this fact required recording might mean that the state (i.e., the *wanax*) did not own all land in the polity.

We have some detailed documentation of land-holding at Pylos: this land, its area measured in "seed" (Myc. *pe-mo*) grain, was at five locations, arguably all quite close to the center.[129] Two paired sets of documents (Pylos Eb and Eo; En and Ep) list those enjoying the use – the term "lease" is often used for want of a more precise translation of the Mycenaean *o-na-to* – of land at *pa-ki-ja-ne*, probably near the palace itself, some of which may ultimately belong to the state, some of which is definitely said to belong to the "community" (Myc. *da-mo*).[130] A similar series (Pylos Ea), perhaps in

[126] E.g., Carlier 1995; Lenz 1993.

[127] Smith 1992–3: 182. There are numerous other titled officials; for a discussion of those in the Pylos archive, see Lindgren 1973.

[128] For a summary, see Killen 1985: 243–50, with some changes of view reflected in Killen 1998b; also Duhoux 1976: 7–65; R. Palmer 1998–9.

[129] Killen 1985: 243–50; Lejeune 1974.

[130] Killen has recently argued that much of the land was in fact owned by the *damos* (Killen 1998b).

progress at the time of the destruction, records landholding at an unknown location.

Individuals probably held land in return for services rendered to the center, to judge from references to the royal potter and fuller and to other producers, such as the unguent boiler Eumedes, or "slaves of the deity," presumably servants in a shrine.[131] There are also links between groups with land under flax recorded in the Pylos Na series and service in the An (*o-ka*) tablets.[132]

A final document (Pylos Eq 213) appears to record a palace official's tour of inspection of land at a number of locations, including *a-ke-re-wa*, a district capital probably not far from Pylos itself. Pylos An 830 lists land at locations in the Pylian further province, suggesting the palace could document control over parcels at some distance, perhaps again in return for services provided locally. Although less clear than those at Pylos, references to landholding in the Knossos documents mention a number of locations, although most may be close to the center.

We can therefore see some of the polity's productive capacity (and presumably the benefits from it) apportioned to distinct sectors among the ruling elite and to service-providers. In most cases, however, production records do not explicitly indicate "ownership" or "benefit accrued." In these cases, we assume that the palace is the owner or beneficiary.

However, there are two cases in which "ownership" or "benefit" is assigned to another entity or individuals. First, some productive areas are said to belong to a deity, in particular the female deity Potnia (*po-ti-ni-ja*). Some of the sheep flocks at Knossos and "bronze smiths" (Myc. *ka-ke-we khalkewes*) at Pylos are described in this way, as well as a perfumer.[133] The documents do not explain exactly how this arrangement worked, but we can imagine that the benefits accrued supported religious personnel and/or establishments associated with the goddess. It is worth noting, however, that the overall productive capacity in commodities assigned to Potnia in the Linear B documents in this way is quite small, about 4–7 percent.[134]

Second, more productive capacity seems to have been allocated to specific, named members of the elite. In the Knossian Linear B records dealing with the production of woolen textiles, while the majority (around 70 percent) deals with flocks directly responsible to the palatial authority, we have references in the remaining 30 percent to a few individuals (around fifteen) who appear to have enjoyed the benefit from these flocks. A parallel situation perhaps existed at Pylos, where four individuals are involved in a similar way with flock management. Their occurrence elsewhere in the

[131] It is worth distinguishing between this arrangement and compensation for labor, normally provided by the palace as food rations: e.g., R. Palmer 1989.

[132] Killen 1985: 248–9. [133] E.g., Killen 1976: 123; Smith 1992–3: 183–4; Shelmerdine 1985: 42–3.

[134] Bendall 2001a; 2001b: 449.

archive suggests high status. At Pylos, the names are associated with the term *agora* (*a-ko-ra*), probably meaning "collection" and, in one instance (Pylos Cc 660), with the verb *ageirei* (*a-ke-re*), "[he] collects." This has led to this group of individuals at Knossos and Pylos being called "collectors."[135]

A fundamental point about this system of allocating productive capacity is the fact that it was recorded on central documents. This strongly suggests that those enjoying the benefits were not independent economic or political entities, but parts of the ruling elite at each Mycenaean polity where they are attested. It has therefore been argued that these individuals were members of the royal elite to whom elements of the polity's productive capacity were allocated, and so the term "beneficiary," possibly "owner," might be appropriate. The fact that some of the names occur in records from more than one Mycenaean center may be consistent with them belonging to an elite with common naming traditions, or possibly to an inter-polity ruling class.[136] Another view, perhaps most plausible for the Knossos polity, is that they represent members of local elites, distributed throughout the polity, more common at some distance from the center at Knossos.[137]

More significantly, these individuals have been identified at other stages of textile production, notably as workshop owners, and in other areas of the palatial economy. In particular, perfumed oil production at Knossos shows a 70:30 percent division between "palatial" and "collector" manufacture, just like wool production; and the individual named Kyprios (*ku-pi-ri-jo*) may have been a prominent "collector" of perfumed oil. "Collectors" were possibly also involved in acquiring and distributing exchange commodities.[138]

These observations demonstrate the potential for Linear B texts to reveal complexity within what might otherwise seem a monolithic "palatial" economy. Nevertheless, we should remember that the texts take the perspective of a central authority, however internally diversified that authority might have been. It is more difficult for us to assess the palatial center's "reach" into the overall economy.

Linear B scholars have recognized for some time that the palaces did not control the entire economy, even allowing for the incomplete preservation of the documents from any one center.[139] For example, palaces apparently took no direct interest in the *process* of ceramic production, although they consumed ceramics in large quantities, as attested by documents (Knossos

[135] For extensive discussion of "collectors," with references to earlier literature, see Bennet 1992; Carlier 1992; Driessen 1992; Godart 1992.

[136] Killen 1979, vigorously restated by Olivier 2001.

[137] An observation first made by Hart (1965), followed by L. Palmer (e.g., 1972: 34), and later developed by Bennet (e.g., 1992).

[138] Both suggestions in Killen 1995.

[139] H. Morris (1986) carried out pioneering research; Galaty and Parkinson (1999) provide papers and discussion along these lines. Killen's cautionary comments should be noted (Killen 1999b).

K 700; 778) and by excavations (the pottery stores at Pylos contained thousands of consumption vessels).[140] So too agricultural production: although botanical remains are rarely systematically conserved and studied, they represent a broader range of cereals than the two types attested in the documents. The apparent absence of pulses in the texts is particularly noticeable.[141] Further, although there are references in the documents to large amounts of agricultural produce (notably the 10,000 + units of grain, around 775 tons, attested on Knossos F(2) 852, apparently glossed with the term "harvest" [*a-ma*]),[142] these fall well short of the likely total production of the territories surrounding the centers. It seems unlikely that the "palaces" controlled all agriculture in their regions.

In general, the economy outside palatial control is, almost by definition, difficult to observe, since it is "textually invisible." Archaeology fills in some of the gaps in the records, but it is perhaps the tensions between the texts and archaeological finds that shed most light on palatial – para-palatial economic relationships.[143]

As an example of palatial production, we can take the system by which the palace at Knossos produced elaborate woolen textiles, at least partly for export. By chance, the various stages of this "industry" are well documented, but we owe our understanding largely to Killen's research.[144] Our documents begin with about 600 censuses of individual flocks (the Knossos Da-Dg and Dv series). Each of these elongated or palm-leaf shaped records, all written by the same scribe, comprises a personal name in majuscule at the left, followed by one of about thirty place-names in smaller signs, usually in the lower half of the tablet. Roughly 30 percent of documents have a second personal name in smaller signs, drawn from the limited repertoire of so-called "collector" names. There then follow quantities of male and female sheep, typically totaling to a round number (often 100, 150, or 200), and predominantly male. This apparently unwise imbalance can be explained if the males were castrated males (wethers), who would provide more wool than females. In each series the round number totals are made up in slightly different ways: male and female variants of the sheep logogram (presumably mature animals), plus sheep differentiated by various abbreviations, such as "old" (*pa* = *palaio-*), as "yearlings" (*pe* = *perusinwo-*, "last year's"), or as simply "missing/owed" (*o* = *ophelos*, "[a thing] owing"). Around 66,000

[140] Whitelaw 2001c attempts to quantify the palace's annual consumption of ceramic vessels. See Blegen and Rawson 1966: pls. 94–101, for ceramics stored in the palace at its destruction.

[141] E.g., Halstead 1995a. Conventionally Linear B logogram **120* denotes wheat, and **121* barley, but R. Palmer 1992 proposes the opposite identification; see Halstead 1995b; Killen 2004.

[142] E.g., Killen 1998b.

[143] For an extensive treatment of this topic in relation to osteological versus textual evidence for animal exploitation, see Halstead 1998–9.

[144] Killen 1963; 1964; 1966; 1979. Killen 1984a is a concise summary contrasting the processes of textile production at Pylos and Knossos.

sheep are recorded in this way, possibly representing a total "flock" of up to 100,000.[145] There are also totaling documents (Dn series) that gave totals by place-name and by "collector."[146]

The flocks thus inventoried were clipped or plucked (Dk series), with each male sheep expected to produce about 750 grams of wool. A few of these documents, by another group of hands, are preserved, but some clearly refer to the same flocks as the Da-Dg records. There are also some records of breeding flocks (Dl), but interestingly, these are insufficient to make up the shortages attested among the Da-Dg and Dv inventories. The shortfalls among the Da-Dg records are greater than we would expect from natural wastage and are also unevenly distributed among flocks, although "collector" flocks tend to display greater "losses." This pattern may imply the removal of animals, probably for local consumption.[147]

This argument seems convincing, and has an important implication for the status of the animals recorded on the documents. Rather than being animals directly owned by the palace and managed by local shepherds, in fact the animals were locally owned and managed, and the palace merely claimed the wool on round numbers ("flocks") of animals. A further implication is that the palatial authorities at Knossos had taken over a pre-existing system of flock management, in order to acquire raw material (wool) for transformation into value-added finished products for redistribution and exchange.[148]

Another scribal hand recorded the distribution of wool to female textile manufacturing groups, the targets for these groups (apparently one piece of cloth per member), and their provisioning with rations. As noted above, some of these groups were under the control or ownership of a "collector," while others were spread throughout the area of Knossos' control, mostly central and west-central Crete, with a few in the west, around modern Chania.

Only in the final stages of production did finished pieces of cloth converge on Knossos itself. We have records of cloth arriving there, some being subjected to further processing ("finishing"[149]), and finally cloth in storage (Ld(1)) in bales of 25 to 35 pieces. The records of stored cloth describe its appearance ("red," "with white fringes," etc.) and, occasionally its destination: *e-qe-si-ja* (for *hek^{w}etai*) or *ke-se-nu-wi-ja* (*xenwia*, "for *xenoi*, foreigners," i.e. presumably "for export").[150]

Textile production had a long history prior to its manifestation under palatial control in fourteenth-century Knossos, and Linear A texts include

[145] See Olivier 1988 for a detailed presentation of the figures.
[146] Olivier 1967b; 1972. [147] Halstead 2001, summarizing and amplifying earlier work.
[148] On the adoption of pre-existing structures by the Knossos administration more generally, see, for example, Bennet 1985.
[149] The Mycenaean term seems to have been *o-pa* (*hopa*): Killen 1999b. [150] Killen 1985: 263–4.

the cloth logogram.[151] However, its capture by the palaces and the application of palatial labor redirected it, probably in pre-Linear B times, toward production for exchange.

In mid-fourteenth-century Knossos, therefore, we see one way in which palatial production was organized. Acquisition and initial processing of raw materials were carried out at the local level, across the polity. Still at the local level, but perhaps at fewer locations, raw materials were transformed into a basic product, cloth. Targets, it seems, were controlled by weighing out, a system called *talasia* (Myc. *ta-ra-si-ja*) in Linear B, apparently similar to the Latin term *pensum*, whereby a weighed amount of a raw material was distributed in the expectation that the same weight would be returned with value added, as a finished product. Late thirteenth-century Pylos used this same system for bronze working; (bronze) smiths are described as "having a *talasia*" (Myc. *ta-ra-si-ja e-ko-te*) or "*talasia*-less" (Myc. *a-ta-ra-si-jo*).[152] Mycenaean Greek leaves unclear whether they produced bronze from copper, since the word *khalkos* (Myc. *ka-ko*) is used for both metals, although it seems more likely that they were allocated bronze for working, not copper for bronze production.

By contrast, palatial authorities seem not to have captured the equally ancient craft of pottery production in the same way. At least partly, this is due to the abundant resource – clay – and relative simplicity of labor and know-how involved. The primarily archaeological evidence from late thirteenth-century Pylos offers us a picture of ceramic production and how it related to the palatial system.[153]

Direct references to ceramics in Linear B are rare. Two Knossos tablets (K 700; K 778) list 1,800 and 180 stirrup jars respectively, while a Pylos document (Fr 1184) lists 38 stirrup jars (Myc. *ka-ra-re-we*) either containing or to be filled with just over 500 liters of (perfumed) oil. Finally, seven sealings (Wt 501–507) from the House of the Sphinxes at Mycenae bear names of vessels, some of which also appear on tablet Ue 611, fallen from an upper storey of the same structure, and some of which are attested *in corpore* in the same basement storage room. In addition, the term "potter" (*ke-ra-me-u*) appears several times in Pylian landholding documents, once with the adjective *wa-na-ka-te-ro* ("royal"),[154] but none of these references is in the context of ceramic production.

The reference to a "royal" potter suggests that the palace could call upon a particular individual's products. More striking is the number of

[151] In general, Barber 1991: 311–57.

[152] On the Pylos bronze records, see Smith 1992–3. Killen 2001 offers a concise exploration of the *talasia* system, also noting that (at least some aspects of) chariot-production might have been organized in this way. See also Duhoux 1976: 67–115; Nosch 2001; Ventris and Chadwick 1973, Glossary s.v.: "An amount [of a raw material] weighed out and issued for processing."

[153] This section draws on the analysis of Whitelaw 2001c.

[154] Palaima 1997; Lindgren 1973: 77–8.

standardized vessels in storage in the palace at Pylos. Whitelaw has calculated that 8,540 vessels, 95 percent of those found in the final palace, were stored in four room complexes (Rooms 9; 18–22; 60; and 67–8). Rooms 18–22 alone contained over 6,500 vessels (predominantly *kylikes*, the Mycenaean drinking vessel *par excellence*).

Using these figures, plus an additional requirement of vessels for transporting perfumed oil, Whitelaw suggests that the palace consumed around 12,000 vessels per annum. Drawing on ethnographic parallels, he suggests that this represents the annual production of one or two full-time or two to four part-time potters. This is not inconsistent with the fabric and shapes of the vessels, which show limited variation. Extrapolating these consumption figures to the entire polity, a total consumption of around 75,000 vessels per annum is plausible, which could be produced by 100–200 full- or up to 500 part-time potters.

The implications of this study are that a relatively small workforce could produce seemingly huge quantities of ceramics, and that the palatial center's share of Messenian production might represent 2 percent at most. Moreover, the palace might have been self-sufficient in ceramics through "dedicated" or "attached" potters, but could acquire an abundant product without investing heavily in production. Indeed, it may be significant that the potter described as "royal" appears in a landholding document, suggesting that he enjoyed this benefit in return for services to the palace.

We cannot necessarily extend this picture to other parts of the Mycenaean world. Messenian ceramics were regionally distinctive, and most vessels at late thirteenth-century Pylos were plain or simply decorated. The Argolid, by contrast, was home to the production of high-quality, highly decorated ceramics, some of which seem targeted at "eastern" consumers, in Cyprus or east Mediterranean cities like Ugarit.[155] We cannot verify whether palatial authorities monitored such production more closely, but the Mycenae documents cited above (Ue 611; Wt 501–7) might hint at this.

Palatial production of textiles and bronze probably captured pre-existing practices and personnel, since both crafts had deep histories in the Aegean, long pre-dating the first Cretan palaces at the beginning of the second millennium BC.[156] The centers perhaps controlled other systems, such as the transformation of olive oil into perfumed oil through the addition by maceration of various fragrances,[157] more closely. Despite recent reassessments

[155] Vermeule and Karageorghis 1982 (on pictorial pottery); Sherratt 1999, with bibliography; on the kiln at Berbati near Mycenae: Schallin 1997; on ceramics at Ugarit: Yon et al. 2000; van Wijngaarden 1999a; on consumption and value more generally in Mediterranean: van Wijngaarden 1999b; 2002; on consumption at other Levantine sites: e.g., Leonard 1994; Steel 2002.

[156] We might classify bronze as an exotic good (see below), since tin had to be brought long distances, but the Pylos texts suggest otherwise, since they probably refer to bronze, not copper allocations. This, again, may be a function of the date of the Pylos texts.

[157] Shelmerdine 1985 is the most comprehensive treatment for Pylos; for Knossos, see Foster 1977.

of the probable extent of Bronze Age olive cultivation, the raw material was probably fairly widespread within palatial territories, but its processing seems to have been quite closely controlled by the centers. This is particularly clear at late thirteenth-century Pylos, where one of the four "collectors" (*a-ko-so-ta*; perhaps *Alxoitas*) was involved in distributing ingredients for maceration (Pylos Un 267).[158]

In fourteenth-century Knossos, at least a century before the Pylos documents, a more devolved system may have operated, especially if stirrup jars from west Crete and marked in Linear B before firing were in fact part of a distribution system centered on Knossos.[159]

Killen distinguishes between the mode of production of perfumed oil – where it would be difficult to verify the issue and return of weighed amounts of a commodity – and the *talasia* system used for producing textiles, bronze, and perhaps chariot components.[160] He suggests perfumed oil production was more narrowly confined to the immediate vicinity of the palace at Pylos and probably managed through trusted individuals, perhaps of high status, like Alxoitas mentioned above.

A more extreme version of this system seems to have been used for palace-sponsored production of items from more exotic materials, such as ivory[161] (Myc. *e-re-pa*, *elephas*) or blue glass (Myc. *ku-wa-no*, *kuwanos*).[162] These raw materials were not locally available, but were acquired, perhaps through palatial monopoly, in long-distance exchange. No texts detail the stages of production of such elite objects as inlaid furniture from these materials; we merely have inventories of them (notably the Pylos Ta series[163]) and occasional references to their producers' receipt of foodstuffs (e.g., "gold workers," *khrusoworgoi*; "*kuwanos*-workers," *kuwanoworgoi*; etc.).

The composite nature of these products, often combining exotic materials (gold, blue glass, ivory, for example) on the same object, is striking; they were *tours de force* of "conspicuous production," only possible for the palatial elite. The archaeological distribution of such materials and objects, distinctly focused on the palatial centers, bears out this picture of restricted access. Blue glass required a new process, only developed in Mesopotamia (and possibly Egypt) in the sixteenth century. The basic material was probably never produced in the Aegean, but acquired effectively as a raw material in the form of bun ingots, like those recovered from the late fourteenth-century BC Uluburun shipwreck.[164]

[158] The same individual is clearly a major administrative functionary, receiving commodities on behalf of the palace (Pylos Pa 30) and carrying out a tour of inspection of land (Pylos Eq 213). It is possible that he is one of the major administrators of the palace, writing documents attributed to scribal hand 1 (Palaima 1988a), as suggested by Bennet 2001 and Kyriakidis 1996–7.

[159] Van Alfen 1996–7. [160] Killen 2001. [161] E.g., Burns 2000.

[162] Assuming the Mycenaean word *ku-wa-no* refers to blue glass: Aura Jorro 1985, s.v.

[163] E.g., Killen 1998a.

[164] See Pulak 1998: 202–3, for c. 175 glass bun ingots, presumably destined for the Aegean. On glass and vitreous products in general: Panagiotaki et al. 2004.

Some products in materials like glass are distributed outside the palatial elite, but in a very limited range of forms. Mould-made blue-glass relief beads, for example, are common in sub-elite tombs, but only within the Aegean,[165] and may have functioned as "materialized relationships" with the palatial elite. The material and the technology, both unavailable outside the sphere of the palatial elite, would mark off such products, as would their replication in identical form through manufacture in moulds, emphasizing their "palatial" nature.[166]

(b) *Distribution*

The core problem with understanding past exchange patterns is that objects tend to be recovered archaeologically in contexts where they were consumed, not in the process of distribution, or even at their point of arrival. Moving from archaeological patterns to understanding distribution in action and its organization is difficult.[167] The fourteenth- /thirteenth-century BC Aegean is no exception. Elite self-definition through exotic materials and knowledge is characteristic of Mycenaean civilization from the Shaft Grave period onward. Therefore appreciating the movement of commodities, both within and beyond the Aegean, is important to understanding how the palaces functioned.

The Linear B documents virtually never explicitly mention exchange,[168] while archaeological evidence is distorted not only by selective deposition by users in the past, but also by taphonomic processes that remove some materials, particularly organic ones, skewing patterns toward durable residues, especially ceramics.[169]

Taking the texts first, our only direct evidence of a commodity being moved from one center to another is Mycenae text X 508. It records a type of cloth destined for Thebes (Myc. *te-qa-de*; "*Theg*^{w}*ansde*"), presumably that in Boeotia,[170] indicating intra-Aegean exchange. Parallel to this, but without explicit references to movement, might be those texts that list stirrup jars (Knossos K 700; K 778). Two Pylos texts (An 35.5–6; Un 443.1) appear to represent commodities given to individuals as payment (Myc. *o-no*) for alum (Myc. *tu-ru-pte-ri-ja*; *strupteria*).[171] Finally, there are the

[165] Hughes-Brock 1998: 264–6; 1999.

[166] On the restriction of access to valuable materials in the LHIIIA–B period, see Voutsaki 2001: 199–207.

[167] E.g., Knapp and Cherry 1994: 123–55; Gale 1991a. On ceramic evidence in general, see Zerner 1993.

[168] Killen 1985: 262–70.

[169] On ceramics in historical times, see also Osborne, this volume.

[170] The presence of the same sign-group, in various forms, on texts found at Thebes makes it likely that this refers to Boeotian Thebes: see Aravantinos et al. 2002. The construction of roads for wheeled transport facilitated overland shipping: Jansen 2002; Lavery 1990; 1995; McDonald 1964.

[171] It is worth noting here that there is no indication of an equivalent akin to currency in such transactions. The ability to "translate" commodities into similar values within the east Mediterranean metrological systems is attested by weights attested archaeologically and the units used in Linear B: see, e.g., de Fidio 1998–9 for a thorough overview.

references, on just four documents in the Knossos Ld(1) series, to *xenwia* cloth, probably cloth "for export."

The obvious archaeological evidence of non-local materials and products in the Aegean means there must be some reason for the paucity of explicit references in the texts.[172] Survival of over 5,000 documents, spread over at least seven sites, suggests that it is not simply due to accidents of preservation. One possibility is that such activities (and therefore records) were seasonal, or irregular, occurrences. Alternatively, such arrangements may have taken place at a higher administrative level than the clay documents preserved.[173] They might have been recorded on other media, like parchment or papyrus, or not at all, if concluded personally at the highest level. The Pylos *o-no* texts, probably "contingent" documents written when needed and with only a short "shelf life" because they were not archived,[174] may mean that we are not missing many more documents of this type than would have existed at any one time.

This paucity of Linear B evidence elevates the importance of archaeological data in understanding distribution. Fortunately, we can "directly" observe distribution *in process* from three Late Bronze Age shipwrecks. Two lie off the southern coast of modern Turkey, quite close to each other: one at Uluburun, also referred to as Kaş in the earlier literature (probably shortly before 1300 BC), the other off Cape Gelidonya (c. 1200 BC). A third ship (also c. 1200 BC), least well preserved, sank off Point Iria in the southern Argolid.[175] The Uluburun ship was the largest, perhaps 16–17 meters long. Its cargo included 10 tons of copper in the form of 354 ox-hide and 121 bun ingots, plus about a ton of tin in ingot form; 175 blue glass ingots; over 150 Canaanite jars, some containing resin; ivory, both hippopotamus and elephant; and 10 large ceramic containers (pithoi), containing over 100 pieces of Cypriot fine-ware pottery.

Lead isotope analysis indicates that the copper ingots came from Cyprus. This and the Cypriot fineware pottery suggest that the ship was traveling west from Cyprus toward the Aegean when it sank, and the ivory and blue glass may mean that it had previously docked in Syria and probably Egypt. The large amount of high-value cargo, particularly the glass, copper, and tin, mirror references to inter-polity exchange mentioned in the near-contemporary Amarna letters.[176] In these letters, such exchange is presented as gift-exchange between fictive kin, a "fiction" that reminds us

[172] Discussed by Killen 1985: 265–70.

[173] On the status of our clay records, see, e.g., Driessen 1994–5; Palaima 2003a; cf. Bennet 2001. It is less likely that exchange was funneled through a single center, such as Mycenae, where documents would have existed, but have not survived.

[174] Halstead 1999b: 37–8.

[175] Pulak 1998 (Uluburun); Bass 1967 (Gelidonya); Phelps et al. 1999 (Iria). Bass (1991) summarizes the earlier two wrecks and their implications.

[176] Moran 1992.

of the Mycenaean term *xenwios/-ia* applied to cloth.[177] These objects, plus a broken gold scarab of Nefertiti (probably valuable scrap) and a wooden diptych writing tablet strongly suggest that this vessel represents materials moving at the highest level, probably under state sponsorship. We can imagine it taking on Aegean products (such as cloth and perfumed oil, plus Aegean fine-ware pottery) at a port like Kommos in Crete, before returning across open sea to North Africa west of the Nile Delta.[178] Finds on land of the same materials as in the wreck, in similar proportions (after episodes of consumption), suggest that the Aegean was one of its destinations.[179] We cannot determine the crew's "ethnicity." Mycenaean, Syrian, and Canaanite have all been suggested on the basis of weapons or tools deemed to have formed part of the ship's equipment, not cargo, reflecting the international nature of east Mediterranean interaction at the time.

Although shipwrecks offer rare insights into the *process* of distribution, we should be cautious in reconstructing large narratives from single, highly productive sites that represent only a tiny sample of the journeys made in the Late Bronze Age eastern Mediterranean. However, it is worth noting the contrasts between Uluburun and the Gelidonya and Iria wrecks of a century later. The Gelidonya ship was perhaps only 9–10 meters long (Iria probably smaller still) and contained at least 34 ox-hide copper ingots (c. 1 ton), plus 20 bun and 19 slab ingots of bronze, and over 250 pieces of bronze scrap. There were possibly three ingots of tin on board. This gives the impression of a crew trading independently, without state sponsorship, offering not only raw materials – copper and tin – but also bronze in ingots and as scrap. The Iria wreck site only preserves non-local ceramics from Crete, mainland Greece, and Cyprus, probably moving for their contents. It may represent intra-Aegean exchange.

It has been argued convincingly that late-thirteenth- and twelfth-century east Mediterranean exchange networks were largely free of state monopoly, and increasingly centered on Cyprus, which avoided the worst disruptions of the years around 1200 BC.[180] Cypriot manufacturers and traders introduced the first known manufactured iron objects into the Aegean, particularly daggers with bronze rivets. Reliable iron production was probably a

[177] See Sherratt and Sherratt 1991 generally, and Panagiotopoulos 1999; 2001, more specifically, on the nature of such high-level exchange.

[178] On Kommos and its international connections in the fourteenth and early-thirteenth centuries BC, see, e.g., Rutter 1999. Sherratt (2001) thinks that vessels this size did not make it into the Aegean proper, but offloaded their cargoes on islands like Rhodes or Crete.

[179] Cline 1994: 100–5.

[180] Sherratt 1994; 1998. For a parallel argument from consumption patterns for the breakdown of elite monopolies on exchange in the late-thirteenth and twelfth centuries BC, see Voutsaki 2001: 208–13. The evidence for Cypriot predominance comes from increased amounts of Cypriot pottery in the Aegean (and central Mediterranean) in this period, and the presence of Aegean pottery in Cyprus and the Levant (e.g. Ugarit), some of it marked after firing with signs like those of the Cypro-Minoan script: Sherratt 1999; Hirschfeld 1992; 1993; 1996; van Wijngaarden 1999b; Yon et al. 2000.

side-effect of smelting iron-rich copper ores on Cyprus. For a century or so, these circulated as prestige objects among the more diverse, small-scale, and unstable elites of the eastern Mediterranean.[181]

The presence of Mycenaean pottery in Sicily, southern Italy, and Sardinia marks the other end of Aegean involvement in exchange that brought objects and materials from temperate Europe into the Mediterranean.[182] Again, patterns seem to shift in the late-thirteenth and twelfth centuries, with more European metalwork forms attested in the Mediterranean, and local manufacture of Aegean-style pottery in the central Mediterranean, plus increasing Cypriot finds there.[183] Routes through the Aegean may also have shifted in this period, bypassing the western Peloponnese either by sailing straight from Crete to the central Mediterranean or trans-shipping between the Saronic and Corinthian gulfs.[184]

Within the Aegean, we might suggest that inter-polity exchange took the form of similar commodities, if Mycenae tablet X 508 (mentioned above) is typical in documenting the exchange of cloth between Mycenae and Thebes. Archaeological evidence, combined with chemical and petrographic analyses, confirms the widespread distribution of coarse-ware stirrup jars of c. 14 liters capacity, particularly between western Crete and mainland centers like Thebes, Mycenae, and Tiryns. Some were painted before firing with Linear B inscriptions. They probably contained perfumed oil, but some may have contained wine.[185]

(c) *Consumption*

The previous sections emphasized the importance for the Aegean elite's authority of acquiring exotic materials and producing manufactured objects to exchange within this framework. In early Mycenaean times these commodities were apparently used prominently in mortuary contexts, being displayed and removed from circulation, for example, in the Mycenae Shaft Graves. The palatial elites' conspicuous consumption in mortuary contexts seems to have lessened in the fourteenth and thirteenth centuries BC, although they seem to have controlled deposition.[186] By the fourteenth and thirteenth centuries, Mycenaean palatial elites seem to have invested more heavily in elaborating palatial authority through architectural complexes with figured wall-paintings, often behind monumental walls, most visible to us now at Mycenae, Tiryns, and Gla.

[181] Sherratt 1994. [182] Vagnetti 1993; 1998; 1999a.
[183] Sherratt 1994; 2000b; Vagnetti 1999b. [184] Sherratt 2001.
[185] Catling et al. 1980; Day and Haskell 1995; van Alfen 1996–7. Capacity: Shelmerdine 1985: 146–7. Some analyses of contents have been carried out, indicating wine: e.g., Tzedakis and Martlew 1999: 152. See R. Palmer 1994 for an overview of wine in the Mycenaean economy.
[186] E.g., Voutsaki 1995; 2001: 195–207.

Such displays were not confined to the palatial centers themselves; larger projects inscribed palatial power on the landscape. Around Mycenae, for example, the latest tholos tombs ("Atreus" and "Clytemnestra") share materials with its main entrance complex, while the Lion Gate itself has a "relieving triangle" above it, like the tholos tombs.[187]

There were also "public works" projects, like the drainage of the Kopaïs basin and a fortified storage facility at Gla; an extensive network of roads for wheeled vehicles, well attested around Mycenae; a dam to divert a stream that caused flood damage to the east of Tiryns in the late-thirteenth century; and probably a port basin on the coast west of Pylos.[188] Such projects probably used corvée labor of the type attested in Linear B documents, either in return for rations or as a condition of landholding.[189]

Within these architectural contexts, the palaces sponsored large feasts, perhaps simultaneously promoting social cohesion and reinforcing ranking. At Pylos the combination of Linear B evidence, archaeological evidence from large numbers of consumption vessels (see above), iconography, and zooarchaeological data on the actual animals consumed, suggests feasts for over 1,000 people. Diners may have been ranked by location, the highest level within the main megaron, others within courts 63–88 (still within the palace, but outside the main complex), and still others outside the main entrance to the palace.[190] Feasts might have been occasions when palatial products – *e-qe-si-jo* cloth and glass beads, for example – were redistributed.

Some aspects of Mycenaean palatial feasting closely resemble sacrifice. Indeed, a recently excavated sanctuary in Methana has evidence of sacrifice very like the Pylos data.[191] The consumption of agricultural products (e.g., oil, grain, and honey) as offerings to deities is closely related to feasting. These are attested in Linear B documents, especially at Knossos, Pylos, and Thebes.[192] The presence of month names on some of these records implies a sacred calendar of offerings. Between the two areas of feasting and sacrifice lie the grain apparently offered by members of the Pylian elite to various figures, including Poseidon, based on their landholdings.[193] However, we

[187] Wright 1987; Santillo-Frizell 1998.

[188] On fortifications in general: Iakovides 1983; on the Kopaïs drainage: Knauss 1990; Iakovides 2001: 148, 154–7; on roads: Lavery 1990; 1995; Jansen 2002; McDonald 1964; on the Tiryns dam: Zangger 1994; on the Pylos port basin: Zangger et al. 1997: 613–23.

[189] Pylos An 35, for example, appears to list construction workers (Myc. *to-ko-do-mo*) at several places, admittedly in small numbers, so perhaps supervisors rather than laborers. Bendall 2003 suggests that one function for the Northeastern Building at Pylos was to organize labor of this type.

[190] On feasting in general, see Wright 2004; Halstead and Barrett 2004; Killen 1994; Piteros et al. 1990. On Pylos, see Davis and Bennet 1999; Shelmerdine 1998 (general); Isaakidou et al. 2002 (zooarchaeological); Bendall 2004 (hierarchical feasting).

[191] Hamilakis and Konsolaki 2004; cf. Isaakidou et al. 2002.

[192] On the new evidence from Thebes, see Aravantinos et al. 2001, with reviews by Palaima: 2000–01; 2003b.

[193] de Fidio 1977.

should bear in mind that the amounts attested in these religious or quasi-religious areas are small relative to the overall quantities attested in palatial records, certainly less than 10 percent.[194]

A final example of consumption by the palatial authorities – although it is difficult to disassociate it from production and distribution – is the direct acquisition of commodities through a process normally termed "taxation."[195] As we have seen, the palaces mobilized certain resources (wool, grain, oil, flax, etc.) for use in palatial production. The regions' staples were acquired from varied, depending on ease of transportation for bulky commodities (e.g., grain), or environmental factors (e.g., flax).

A limited set of texts, however, documents polity wide mobilization of products. The Pylos Ma texts offer the clearest example. They record, for each district within the Pylos polity, assessments of six commodities in a fixed ratio to each other. Three basic types of texts are attested, but only one document per district: assessments, actual contributions (with shortfall), and assessments with an indication of missing quantities from the previous year (Myc. *pe-ru-si-nu-wa*). Unfortunately only two commodities are plausibly identifiable: logogram **146*, a type of plain cloth, produced outside the palatial system and contributed as a finished item (possibly a tunic of some sort); and **152*, an animal hide.[196] A key point here is that all districts are asked to contribute all six commodities, suggesting that neither ecology nor transport restricted availability.

The widespread availability of these products places emphasis on compliance with the demand for, not so much on the acquisition of, the material. This implies that the process was as much symbolic – of palatial authority and ability to insure compliance – as practical. Equally, the fact that these products were present in local, possibly domestic, economies indicates an attempt to claim rights to production within individual communities. Two texts (Pylos Mn 162; 456) that break down contributions of **146*-cloth for specific communities within two of the polity's districts (*ro-u-so* and *a-si-ja-ti-ja*) support this notion.[197]

Our overall picture of the Aegean economy in the fourteenth and thirteenth centuries BC presents the institutions we term "palaces" as predominant in their ability to direct economic activity. Their dominance and the paucity of texts indicating equivalence transactions indicate that the term "command economy" applies to them. Although the nature of the palace-centered economy is broadly "redistributive," the form this takes suggests a

[194] Bendall 1998–9; 2001a; 2001b.

[195] For overviews, see Duhoux 1976: 151–94; Killen 1985: 270–2, and Perna 2004, who summarizes and discusses the important earlier research of de Fidio 1982; 1987; Shelmerdine 1973; 1989; Killen 1984b; 1996 and others.

[196] For suggested identifications of the other four commodities, see Perna 2004: 15–61.

[197] Killen 1996.

high degree of selection of interests geared primarily to supporting palatial activities. "Mobilization" therefore best describes the specific nature.

At the beginning of this chapter, I referred to agriculture as underpinning ancient economies in general. It is clear that the Aegean Late Bronze Age saw high settlement and population levels, no doubt facilitated by successful agricultural regimes that are largely invisible in the Linear B documents. We can, however, overestimate the role of subsistence in seeking to situate ancient societies at a lower level in an evolutionary trajectory than those of the modern world. However, in terms of economic life as a whole in the Aegean Late Bronze Age, it seems that palatial activities were significant. Indeed we see palatial involvement in agriculture, for example, in the provision of plough cattle (Knossos Ch series) or the massive procurement of wool. Given this, perturbations in the palatial economy may have had repercussions throughout their regions.

One final point bears repeating. Pylos has figured prominently in this discussion because there we can combine texts and archaeology. We need to remember, though, that Knossos shows some differences from Pylos, no doubt due to the historical contingencies surrounding its operation on Crete, after the apparent collapse of multiple palatial polities of the fifteenth century BC, some 150–200 years earlier than Pylos. Closer to home, however, the economic situation we would reconstruct if we had more texts from mid-thirteenth-century Mycenae or Thebes might also differ, even if only in degree or emphasis. Ceramic production (see above) might be a case in point.

V EPILOGUE: TRANSITION TO THE EARLY IRON AGE (1200–1000 BC)

Archaeological evidence attests the destruction and abandonment of Mycenaean sites between 1250 and 1150 BC.[198] Around 1250, the citadel at Tiryns and the "houses" outside the citadel wall at Mycenae show evidence of destruction. This has been attributed to earthquake, particularly at Tiryns. In the period immediately following, fortifications at both sites were extended, and facilities to access water from within added toward the end of the century. New walls were built at Midea and Athens. There is some evidence of destruction within the complex site of Thebes in the mid-thirteenth century.

At the end of the century, the major centers in the Argolid (Mycenae, Tiryns, Midea) were destroyed, along with those in Laconia (Menelaion), Messenia (Pylos), Achaea (Teichos Dymaion), and Boeotia (Thebes, Orchomenos). Other sites were abandoned in the same archaeological phase

[198] Helpfully summarized in Shelmerdine 2001a: 371–6, 381.

in the Argolid and Corinthia (Berbati, Prosymna, Zygouries, and Tzoungiza), Laconia (Ayios Stefanos), Messenia (Nichoria), Attica (Brauron), and Boeotia (Eutresis).

However, not all these sites were abandoned after destructions. Continuing habitation after 1200 is attested at Mycenae, Tiryns, Midea, and Argos in the Argolid and at Athens. A few sites were more prominent in the twelfth century: the settlements of Teichos Dymaion (Achaea); Asine (Argolid); Panakton (Boeotia); Elateia (Locris); and the cemeteries at Perati in Attica and Palaiokastro in Arcadia.

Survey data present a similar pattern. Site numbers in the twelfth through ninth centuries BC tend to be very low. However, not all areas show the same pattern: Messenia shows a particularly sharp decline, losing perhaps 75 percent of its settlements, while Achaea, although not intensively surveyed, shows stability, and there is some continuity in the Argolid. While part of this decline might be due to the relative "invisibility" (to archaeologists) of the non-palatial settlements that continue to be occupied, it seems inescapable that the mainland and Crete experienced considerable population decline in the twelfth century.

If we examine the twelfth-century situation closely, however, we see continuity at some sites. Athens, Knossos, and Argos, for example, seem to remain nuclei of settlement down into the eighth century, even if this is largely attested by cemeteries, perhaps retaining populations in the hundreds.[199] At Tiryns a smaller "megaron" was built in the twelfth century within the remains of the main thirteenth-century "megaron."[200] At this period the citadel had gone out of use, but there was an extensive settlement, perhaps as large as 25 hectares, in and around the lower town. This structure implies that the relationship between those who continued to occupy Tiryns (and to maintain exchange connections with Cyprus) and the "palatial" organization of the thirteenth century had changed. They rejected monumental architecture, figured wall-paintings, and writing, yet retained a certain reverence for the home of ancestral authority.[201]

The importance of long-distance exchange to the Aegean palatial elites' self-definition, discussed above, must have played an important role in the re-alignment of authority around 1200 BC. Cyprus' increasing prominence in exchange in the later thirteenth and twelfth centuries at least partly reflects the collapse of major eastern Mediterranean powers. The Hittite empire fell apart early in the twelfth century, fragmenting into neo-Hittite successor kingdoms. The city state of Ugarit was apparently destroyed

[199] E.g., Morris 1991.

[200] Maran 2000. On the possibility of a similar date for a structure built over the court in front of the main "megaron" at Mycenae, see French 2002: 136–8.

[201] On the notion of rejecting Mycenaean culture, including a different response at nearby Asine, where burials take place within the settlement, see, e.g., Morris 2000: 195–207.

c. 1182 BC, and Egyptian influence in Syria and Palestine waned across the twelfth century. Cypriot exchange, undermining palatial monopolies, combined with a compromised ability to bring in exotic materials, must have affected the authority of palatial elites in the Aegean.

Whether natural forces affected Aegean polities in this period is difficult to determine, since such factors can rarely be dated so closely. Earthquakes, at least at Tiryns and Mycenae, may have been a factor in the late thirteenth century. Interannual variations in rainfall can produce poor, even catastrophic agricultural yields in the southern Aegean on an unpredictable basis. Some inkling of this might be seen in the draining of the Kopaïs basin to increase agricultural land (if the goal was not production for export), possibly also in the early Mycenaean colonization of the Nemea valley close to Mycenae. Given the relatively densely packed landscape – in most areas of the mainland, as densely packed as it had ever been – a run of poor years might have caused food shortages quite quickly. These, too, might have destabilized palace-dominated societies.

There is no conclusive evidence, at the right time (around 1200 BC), for invasions bringing in new populations, despite the later Greek tradition of the Dorian invasion. We need, therefore, to understand the destruction and abandonment as primarily local phenomena directed against the palatial centers, either precipitated by local shortages, combined with earthquakes and perhaps concomitant disease, or by the ruling elite's inability to maintain their authority staked on external connections. More likely, both sets of factors operated, and determining cause and effect, is impossible given the poor chronological resolution of the data. Given the selective nature of palatial involvement outlined above, the impact on the bulk of the rural population may have been less catastrophic than has been imagined.

It is clear that by the end of the twelfth century, when Cyprus too dropped out of the picture, political and economic authority in the Aegean was no longer organized around monopolistic, centralizing palaces. Authority resided, perhaps on a shifting basis, at the local level, the top level having disappeared with the buildings we refer to as "palaces."[202] Rural landscapes, particularly in areas like Messenia, were much less densely settled for several centuries. But the loss of authority would not have been universal, since certain sites remained relatively large, notably Athens.

There are two ways of conceiving the relationship between the Aegean Bronze Age and later periods of Greek history. The first suggests a radical discontinuity: with the palaces went a way of life and economic behavior entirely unconnected with those of later periods. The second imagines a seamless continuity, with much prefigured in the "Bronze Age" poetry of

[202] For this "decapitation" model of the loss of palatial authority, see, Lenz 1993; on the transformation of terminology, Morpurgo Davies 1979; Carlier 1984.

Homer.[203] Neither polar extreme is likely to be accurate, but it is certainly incorrect to isolate the Bronze Age with artificial barriers between the modern disciplines of history and prehistory. Life continued, however much it had changed, in most areas of the Aegean from the Late Bronze to the Early Iron Age. Those living at the time, at whatever level of society, would have been aware of their past and had views of their future.[204] In a sense, the Homeric and Hesiodic corpora represent versions of such "world views" appropriate to the eighth century BC (or thereabouts); they are privileged because they are the only versions now accessible to us. That there were others of the eighth century, no longer preserved, and that there were earlier examples, seems likely beyond reasonable doubt, since the epic tradition itself extended back into the Late Bronze Age.[205]

These observations suggest that, whatever changes took place over the period 1200 to 800 BC and whatever new factors came into play, they represented a transformation of prevailing practices of the Late Bronze Age.

[203] For an extreme recent statement of this view, see Mylonas Shear 2004.
[204] Morris 2000. [205] Sherratt 1990; Bennet 1997.

CHAPTER 8

EARLY IRON AGE GREECE

IAN MORRIS

1 INTRODUCTION

In this chapter I review the economic history of Early Iron Age Greece. Following Douglass North, I assume that "the task of economic history [is] to explain the structure and performance of economies through time," by performance meaning "total output, output per capita, and the distribution of income of the society," and by structure "those characteristics of a society which we believe to be the basic determinants of performance . . . political and economic institutions, technology, demography, and ideology."[1] There is currently little agreement over Early Iron Age economic structures, and no quantitative estimates of performance.

Archaeologists used to call the period 1200–700 BC the Dark Age; most now prefer the less judgmental Early Iron Age (EIA). The dominant narrative tells of the transition from palace to *polis*. Iron became common between 1100 and 900 BC, but by convention EIA archaeology begins around 1200, with the destruction of the Late Bronze Age (LBA) palaces. The period has existed as a scholarly construct since Schliemann's excavations in the 1870s. Petrie's 1890 synchronism between Mycenaean pottery and Egypt's Nineteenth Dynasty fixed the fall of the palaces around 1200, defining a 500-year interval between Mycenae and the archaic age. Some historians end the EIA in 776, with the first Olympic Games, but most see a longer eighth-century transition, marked by population growth, state formation, colonization, and the return of literacy, representational art, and monumental architecture.[2]

Geographically, most studies include the modern Greek nation state, plus the west coast of Turkey and (in the eighth century) southern Italy and Sicily, but often break down the material into four or more archaeological cultures, focused on Crete, around the shores of the Aegean, in northern Greece, and in the western mainland.[3] Some combine the palace-to-*polis* narrative

[1] North 1981: 3; see above, Chapter 1. [2] On the historiography, see Morris 2000: 77–106.
[3] Snodgrass 1971: 228–68, 374–6; Whitley 1991a; 2001: 77–101; Morris 1998b.

with another story, about Greek ethnogenesis,[4] and many archaeologists treat the Aegean (and sometimes Crete) as the most "Greek" area in EIA.

Everything about this period is controversial, but in the most influential discussion, Snodgrass characterized the period as a "Dark Age," for the following reasons:

> first, a fall in population that is certainly detectable and may have been devastating; secondly, a decline in or loss of certain purely material skills; thirdly, a similar decline or loss in respect of some of the more elevated arts, of which the apparent loss of the art of writing is the most striking to us, although to contemporaries this need by no means have been so; fourthly, a fall in living-standards and perhaps in the sum of wealth; fifthly, a general severance of contacts, commercial and otherwise, with most peoples beyond the Aegean area and even with some of those within it. To these features, some would add a growth of acute insecurity.[5]

Snodgrass suggested that this situation ended with a structural revolution in the eighth century. Population exploded, stimulating agricultural advances, more competition, war, colonization, and state-formation. To make sense of this, the Greeks developed new cultural forms that lasted for a millennium, including sacrificial ritual, hero cult, citizenship, the alphabet, and figured art.[6]

In the 1990s some archaeologists suggested that the collapse and recovery were less abrupt, that there was more continuity from LBA into archaic times, and that EIA Greece was always linked to the Near East. Susan Langdon sums this up: "Although the romantic appeal of the notion will linger for some time to come, the Dark Age of Greece now appears to have been a less blighted, impoverished, and isolated time – that is, less 'dark' an age – than previously believed."[7] But the economic data make most sense within the traditional model. After summarizing the evidence in part II, I quantify some aspects of EIA economic performance in part III. I suggest that 1200–1000 BC saw economic collapse in Aegean Greece; 1000–800 saw stagnation; and that recovery began in the eighth century. However, I also argue that the most important economic take-off only came later, around 550–500. I discuss economic structures in part IV, and in part V offer conclusions.

II THE EVIDENCE

The main peculiarity of EIA studies is the relationship between Homer and archaeology. Homer's *Iliad* and *Odyssey* probably date around 750–700 BC, and describe the heroes of the Trojan War, set in the distant past. These warlike aristocrats owned broad acres, large flocks, and dependent

[4] See Hall 1997; 2002.
[5] Snodgrass 1971: 2. See also Snodgrass 1987: 170–210; 1993; 2000.
[6] Snodgrass 1977; 1980.
[7] E.g., S. Morris 1992a; 1992b; de Polignac 1995; Langdon 1997: 2.

Table 8.1 *Excavation and publication of EIA settlements, 1870–1990*

Period	Number of sites published	Number of settlement publications per year
1870–1945	16	0.2
1946–1970	42	1.2
1971–1990	118	5.9

Source: Alexandra Coucouzeli, cited in Snodgrass 1993: 30.

labor. They aimed for self-sufficiency on their estates in a world of weak markets. Goods (including women) circulated through gift exchange, which defined social relationships and embedded transfers within them.[8] Finley believed this was an eighth-century memory of a real society existing around 900 BC.[9]

Some 10,000 published graves dominate the archaeological record. Much work has focused on classifying the pottery in them.[10] Snodgrass pioneered a sociological approach, and his students made quantitative studies.[11] Good pre-750 sanctuary evidence only became available in the 1980s, through more careful excavation, and work in settlements, which provide fewer museum-quality finds, has steadily increased (Table 8.1). In the 1990s good survey data appeared. The evidence is still so thin that individual projects, like Lefkandi (Map 8.1), can revolutionize our picture; but Snodgrass estimates that the EIA evidence base has grown five- to ten-fold since 1970.[12] The main weakness now is faunal and floral analyses.

Through the 1960s and 1970s Homerists and archaeologists largely ignored each other's models of the EIA. In the 1980s a new synthesis formed, seeing the archaeological Dark Age model as valid before 800, but making Homer and Hesiod crucial to the eighth century.[13] For the period 1200–750 we must rely almost entirely on archaeology; after 750, we must combine texts and artifacts.

III ECONOMIC PERFORMANCE

Economic historians commonly distinguish between extensive/aggregate growth and intensive/per capita growth. Many societies have expanded their territory, improved technology, or benefited from better climate,

[8] Finley 1979b; Donlan 1985; 1997; Ulf 1990; Raaflaub 1991; van Wees 1992. [9] Finley 1979b.
[10] Particularly Schweitzer 1917; Desborough 1952; Coldstream 1968, and overview in Lemos 2002.
[11] Morris 1987; Whitley 1991b. [12] Snodgrass 2000: xxiv.
[13] See note 9 above, plus Crielaard 1995; Raaflaub 1997; Tandy 1997; Morris 2001.

Map 8.1 Sites mentioned in this chapter. (a) The Aegean Sea

and have converted the consequent growth in total output into more human beings. There are fewer examples of societies experiencing sustained growth in per capita consumption.[14] In this section I present evidence for both types of economic growth. I begin with demography, then look at standards of living.

(a) *Demography*

Thirty-five years ago, Snodgrass noted that the number of known sites fell from 320 in the thirteenth century to 130 in the twelfth and 40 in the eleventh. He later suggested that the size of the largest sites fell by a similar

[14] See E. L. Jones 1988.

Map 8.1 (b) The western Greeks

factor. At face value, these figures imply a 95 percent population decline between 1200 and 1000 BC. Snodgrass did not go this far, but concluded that "the population of Greek lands in the eleventh century BC was lower than it had been for a thousand years . . . [and] it was probably never so low at any later time in antiquity."[15] He argued from numbers of graves that there was a population explosion in the eighth century, with growth reaching 3–4 percent per annum at Athens and Argos, causing numbers to increase seven-fold between 780 and 720 BC.[16]

These figures are implausible. The best documented cases of decline like the twelfth-/eleventh-century figures come from epidemics striking virgin populations, like the bubonic plague in fourteenth-century Europe or smallpox in sixteenth-century Mexico. In parts of Italy the plague killed half the population between 1348 and 1350, and canceled out natural increases for another fifty years. In Mexico, population fell 94 percent between 1532 and 1608, then slowly recovered.[17] If the archaeological data directly mirror population trends, there was a catastrophic change in mortality rates, presumably driven by epidemic disease in the twelfth century, followed by recurrences through the eleventh and tenth centuries.[18] Earthquakes, droughts, uprisings, wars, and invasions – the forces usually adduced for the LBA collapse – could have multiplied its effects, but even assuming all these factors, the severity and length of the subsequent depression is striking.

The eighth-century boom is equally problematic. Snodgrass assumed female life expectancy at birth (e_0) of roughly 30 years.[19] 3 percent growth would require women to average more than 11 live births, with very early unions and minimal birth spacing. There are parallels, such as French Canadians before 1660, but these come from unusual circumstances, and few populations achieve total fertility rates above 8. And in fact, skeletal data suggest that e_0 was just 20–22 years (see below), making an average of 11 live births impossible. In the well documented cases, high growth rates are linked to declining mortality, with women surviving through more of their potentially fecund period (R_{pot}). Sustaining 4 percent growth at 8 births per woman would require female $e_0 = 50$, which was clearly not the case.[20]

I see three possible conclusions. First, EIA Greece experienced unparalleled demographic swings. We should demand strong evidence before accepting this. Second, there was massive emigration from the Aegean c.1200–1000 and immigration into it after 800 BC. There certainly was twelfth-century emigration: finds on Cyprus and around Gaza are so like

[15] Snodgrass 1971: 364–7; 1980: 18–20. Quotation from 1971: 367.
[16] Snodgrass 1977; 1980: 21–4. [17] Data from Livi-Bacci 2000: 80–4; 2001: 42–8.
[18] See Chapter 3; cf. Walloe 1999. [19] Snodgrass 1980: 18. [20] See Livi-Bacci 2001: 9–19.

Mycenaean material that no other explanation is possible. However, these sites account for only a tiny percentage of the Aegean population decline; there are few signs of continuing emigration through the eleventh to ninth centuries; and there are some signs of population movements from the Balkans *into* Greece in the same years.[21] In the late eighth century, on the other hand, there is no good evidence for immigration, and clear evidence for emigration of thousands of Greeks to Italy and Sicily.[22]

Third, the archaeological data do not reflect demography in straightforward ways. The general pattern, of decline between 1200 and 1000 BC, followed by depression lasting a quarter of a millennium then rapid recovery after 750, is beyond dispute. But raw counts of settlements and graves may exaggerate the scale of swings.

(a.1) Decline and stagnation, 1200–800 BC

There were many population movements after 1200. Some were short, as when the occupants of Tiryns moved from the upper to the lower acropolis. Others were medium distance (e.g., from the plains of central Crete to the mountains in the east); and a few were longer, from the Argolid and Messenia to Arcadia, Chalcidice, and the Cycladic and Ionian islands. So many refuge sites are known on Crete that we should perhaps speak of demographic relocation as much as decline,[23] but that is not true elsewhere. Further, around 1100 another wave of disasters hit Arcadia and the Cyclades, and by 1000 most of the new settlements failed. We may have misunderstood the ceramic chronology, and possibly Late Helladic IIIC wares continued in use through the eleventh and even into the tenth century; but the stratigraphy at Mycenae and Tiryns provides no support for this.[24]

Settlement sizes also fell. Large thirteenth-century sites like Tiryns, Pylos, Thebes, and Gla probably had populations of 5,000–10,000.[25] In the eleventh and tenth centuries, the largest sites – Athens, Knossos, Argos, probably Lefkandi and Karphi – had populations below 1,500.[26] The settlement hierarchy was steep. In the Argive plain, for example, Argos probably never fell below 1,000 inhabitants, and Asine and Tiryns below a few hundred; but most people probably lived in shifting hamlets of a few dozen people. This pattern seems to recur in a cellular arrangement around the Aegean, with each area that later constituted a city state (Attica, Corinthia, etc.) having the same basic structure in EIA. In western Greece we know of no substantial settlements, and the population may have been very mobile.[27] In northern Greece, beyond the areas characterized by Mycenaean

[21] Rutter 1990; Vanschoonwinkel 1991; Gitin et al. 1998.
[22] See Scheidel 2003b. [23] Nowicki 2000. [24] Mountjoy 1986.
[25] Dickinson 1994: 78; Davis et al. 1997: 428–30; Jablonka 1996; Whitelaw 2001a.
[26] Morris 1991: 29–34. [27] See Morgan 2003.

culture before 1200, there was greater settlement continuity, and more sites running to hundreds of people.

Intensive surveys have produced remarkably little EIA evidence. There are several possible explanations.[28] First, some areas were perhaps abandoned. Second, since surveys count diagnostic sherds, perhaps EIA ceramics had low visibility relative to earlier and later wares. In western Greece the Aegean Protogeometric–Geometric sequence has little relevance, and local "Dark Age" wares may be difficult to identify among surface finds.[29] However, the fill of the Lefkandi Toumba apsidal building shows that even the worst-represented Aegean period, Middle Protogeometric, had highly diagnostic types.[30] Third, surveys measure discard of diagnostic sherds, not the number of people using them. Typical EIA houses had less in them than typical classical houses (see below); and after two to three millennia of erosion, redeposition, and ploughing, EIA activity may be less visible than that of richer periods.

Another possibility is that gradual degradation affects EIA material more than classical artifacts. Bintliff and others argue that this causes prehistoric ceramics in Boeotia to be swamped by later activity.[31] If so, we would need a multiplier to compare EIA with later settlement numbers (but not with Bronze Age finds). However, the independent evidence of pollen from Messenia (where the EIA decline seems particularly acute), dated by radiocarbon not ceramics, suggests that "During the Early Iron Age [1100–800] the landscape experienced the least intensive human impact of the last 4,000 years."[32]

Each strand of evidence has problems, but one conclusion is unavoidable: there was a catastrophic population collapse between 1200 and 1000. My impression is that across Greece as a whole, by 1000 BC the population was no more than half what it was two centuries earlier, and probably more like a quarter. Crete and Macedonia were least affected, but in the old Mycenaean heartland settlement often contracted to just a few towns.

(a.2) Recovery, 800–700 BC

As with the post-1200 decline, a straightforward reading of eighth-century finds probably exaggerates the scale of change. Snodgrass' count of graves from Attica and the Argolid masked a shift in the ratio of adult: child graves from roughly 9: 1 before 750 to 1: 1 after. No known premodern population had child mortality rates as low as pre-750 BC cemeteries; the only possible conclusion is that many EIA sub-adults received low-visibility disposal.

[28] Sbonias 1999a discusses the general problems.
[29] Coulson 1983; 1986. [30] Catling and Lemos 1990.
[31] Bintliff et al. 1999, with discussions in *Journal of Mediterranean Archaeology* 13 (2000).
[32] Zangger et al. 1997: 593.

There is also evidence that some adult status groups are under-represented before 750.[33]

But settlement evidence nevertheless indicates major expansion. Athens probably had 5,000–10,000 residents by 700, and large new sites like Corinth and Eretria appear. Many villages, like Zagora on Andros and Asine, probably had 500 or more people. Van Wees suggests that Homer imagined about 600 inhabitants in Odysseus' Ithaca, and 4,000 in major towns like Troy, Pylos, and the fictional Phaeacia. If he is right, estimates drawn from texts and archaeology roughly coincide.[34]

Most surveys report increases in site numbers around 700. This was most pronounced around the Aegean. In Crete people moved down from refuge sites to the plains, and their towns regularly attained populations of 1,000. Knossos, which probably had at least 5,000 people by 700 BC, remained the largest site. In the western mainland growth only came in archaic times, and in northern Greece the pace of change was generally slower.

As well as larger and more numerous settlements in the old Greek world, Greeks moved to Italy and Sicily. The first colony, at Pithekoussai, probably had 4,000–5,000 people by 700.[35] Megara Hyblaea perhaps had just 240–320 settlers in 728, but its numbers grew ten-fold in less than a century.[36] Scheidel estimates that 20,000–40,000 adult male Greeks emigrated between 750 and 600 BC – i.e., 2–3 percent of the adult male population, and a far higher proportion from active cities like Corinth, Miletus, Eretria, and Chalcis.[37]

Population did not increase seven-fold in the eighth century, but across Greece as a whole it surely doubled (a growth rate of >0.7 percent per annum). The consequences must have been dramatic, involving some combination of aggregate economic performance improving, living standards declining, new resources being discovered, technology improving, and redistribution of resources. Social stresses must have been strong.

(b) *Standards of living*

Most archaeologists interpret EIA material remains as reflecting poverty, but cannot quantify this. Snodgrass listed Protogeometric "intimations of poverty," while Starr believed that "During the Dark Ages . . . men struggled to survive and to hold together the tissue of society."[38] Finley, on the other hand, argued that "In the sense . . . that *we* grope in the dark, and in that sense only, is it legitimate to employ the convention of calling the long period in Greek history from 1200 to 800 a 'dark age'."[39]

[33] Morris 1987; 1992: 78–81; 1998c. [34] Van Wees 1992: 269–71.
[35] Morris 1987: 166. [36] De Angelis 2003: 41–5. [37] Scheidel 2003b: 134–5.
[38] Snodgrass 1971: 380–6; Starr 1977: 47. [39] Finley 1970: 93.

It is hard to evaluate such vaguely expressed views. Economic performance requires measurement, and archaeologists have not developed appropriate methods. However, recent work on the English Industrial Revolution provides a starting point. Debates have focused on standards of living: it is the economy's ability to make people's lives better that gives economic history its point. In the 1980s some historians moved beyond arguments about real wages to the basic elements bundled together in the concept of the "standard of living" – mortality, morbidity, nutrition, housing, clothing, leisure, etc.[40] Archaeology gives access to some of these indices. The technical problems are, of course, immense. Most things used in antiquity do not survive; abandonment processes are hard to understand; and the original processes of deposition were governed by culture-specific norms that we cannot observe. But we can control for most of these factors, and establish parameters for changes in standards of living and underlying shifts in economic performance.[41] Despite all the uncertainties, a general picture emerges.[42] Average EIA per capita consumption was lower than in LBA (perhaps by as much as one-third). In classical times, per capita consumption may have been twice as high as EIA. On the whole, EIA life was more wretched than at any time between the rise of the Minoan palaces and the death of Justinian. Greeks died younger, lived in more squalid surroundings, and had fewer goods. There are contrary indications too, of course: some kinds of sickness declined, and some Greeks ate quite well. But there can be no doubt that the EIA economy performed poorly, even by ancient standards.

Because of space limits I concentrate on two basic indices, the experience of the body and housing, and add summary remarks on material goods, public buildings, and other communal spending.

(c) *The body*

(c.1) Mortality

The only empirical way to approach EIA mortality is through physical anthropology. Lawrence Angel studied nearly 2,000 ancient skeletons between the 1930s and 1970s. Techniques have advanced, but little new work was done until the 1990s. The number of skeletons analyzed with modern techniques is small, but we can expect rapid advances in the next decade.

The simplest measure of mortality is e_0. But because infants' bones survive less well than adults' and we cannot establish differential survival rates in specific cases, we can rarely calculate e_0 directly. Further, EIA subadults were often disposed of in ways that are hard to detect. As noted above,

[40] Fogel 1993; Floud 1994; Steckel 1995. [41] Morris 2005. [42] Morris 2004.

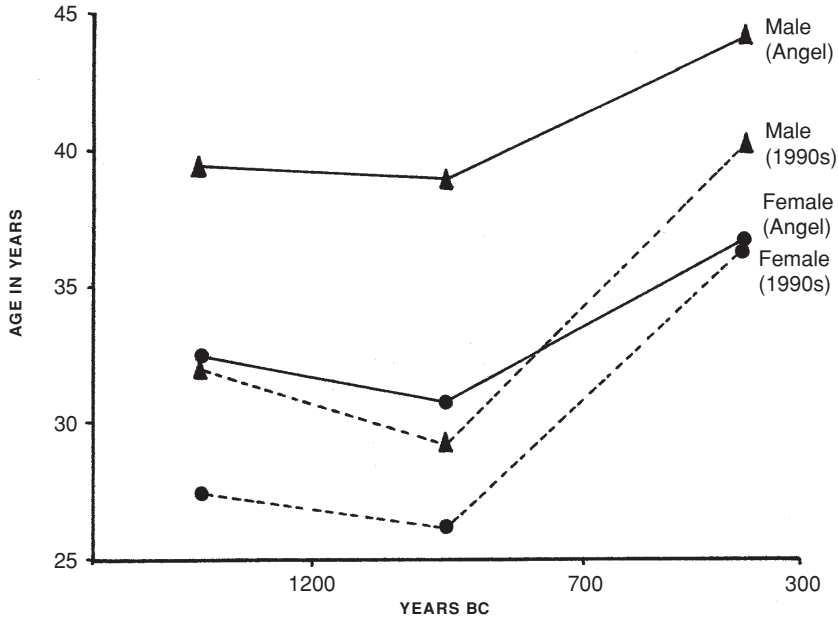


Figure 8.1 Average adult ages at death, 1600–300 BC. The solid lines represent data collected by Lawrence Angel between the 1930s and 1970s (Bisel and Angel 1985; $n = 433$ males, 294 females), and the broken lines represent data collected with new techniques in the 1990s ($n = 357$ males, 416 females)

overall fewer than 10 percent of published burials are infants or children, which seems demographically implausible for pre-modern populations.[43] At Kavousi water-sieving increased this proportion to 31 percent,[44] but this is still low. We must therefore focus on average adult ages at death.

Figure 8.1 shows Angel's estimated adult ages at death. Most palaeodemographers now age skeletons only within ten-year bands, and produce younger ages at death. Some doubt our ability to age adult skeletons at all, but these are a minority.[45] Angel's ages could be as much as five years too high, but because a single scientist produced them, using consistent methods, relative changes between periods within the data set remain meaningful. Angel found that adult male ages at death fell 0.6 years between LBA and EIA, then increased 5.1 years between EIA and classical times. For women the changes were 1.7 years and 5.9 years respectively. Angel documented an upward trend for some 2,500 years, from Early Bronze Age to classical. As Figure 8.1 shows, only EIA diverges from this. If we assume 40 percent mortality before age 5, e_0 fell by 3.5 percent between LBA and

[43] Morris 1987. [44] Liston 1993: 132–40.
[45] See discussions in Paine 1997; Meindl and Russell 1998; Aykroyd et al. 1999; Jackes 2000.

EIA (23.1 to 22.3 years), improving by 17 percent to 26.1 years in classical. If anything, these figures underestimate the EIA decline, since in periods when those people who reached adulthood were dying at younger ages, pre-adult mortality was probably higher too.

The few skeletons studied in the 1990s with more advanced methods mostly confirm Angel's picture of declining e_0 in EIA, but with lower average ages. Kavousi may be an exception, but here Liston grouped the adults into very broad bands: 10 of the 12 confirmed women died before age 40, while among the 20 men only 4 died in the 20–39 year range, 12 between 40 and 59 years, and 6 lived more than 60 years.[46] Given the broad ranges, the typical adult age at death could have been in the low 40s, just slightly higher than Angel's result. But with such small samples inter-observer and inter-site variations pose severe problems, and we must await further studies.

(c.2) Morbidity

Steckel and Rose use skeletons to calculate a "wellness index" for 5,000 years of New World history.[47] We cannot yet do this for EIA Greece, but we can get a sense of some health trends. A few skeletons have striking pathologies, like an eleventh-century Athenian child with Klippel-Feil syndrome, causing severe deformities and respiratory difficulties, and an eighth-century child from Tiryns with spina bifida.[48] The care these children received should dispel apocalyptic visions of EIA, but real understanding requires large samples.

We cannot always distinguish the causes of skeletal pathologies. Angel studied porotic hyperostosis, strainer-like lesions on the skull caused by low intake or poor absorption of iron, and identified malaria as the cause, but it now seems that other infestations and childhood malnutrition are involved.[49] As Fig. 8.2 shows, porotic hyperostosis fell in Angel's sample from 9 percent in LBA to 6 percent in classical. In classical Metapontum in southern Italy, the figure was just 4 percent.[50] Whether because children's diets improved or infestations declined (or both), anaemias were less common between 1600 and 300 BC than before or after.

Angel's quantification of vertebral arthritis also suggests improving health in EIA (Fig. 8.3). 52 percent of the skeletons were arthritic, compared to 63 percent in the LBA and 76 percent in classical. 78 percent of the classical skeletons at Metapontum had vertebral arthritis. At Makriyialos in Macedonia vertebral arthritis was common in both the upper and lower back in LBA and EIA, suggesting a combination of routine tasks and heavy agricultural labor. EIA men did heavier work than women, but women had

[46] Liston 1993: 130–1. [47] Steckel and Rose 2002.
[48] Lagia and Ruppinstein, forthcoming; Bräuer and Fricke 1980.
[49] Angel 1977; 1978; Stuart-Macadam and Kent 1992. [50] Henneberg and Henneberg 1998.

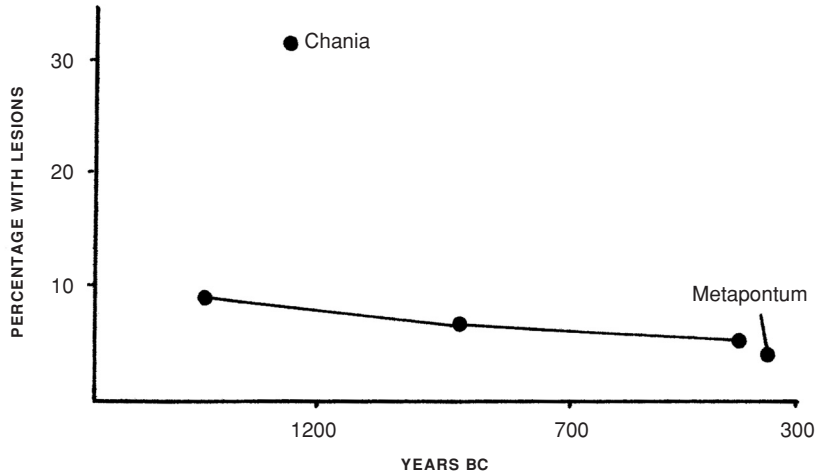


Figure 8.2 The frequency of porotic hyperostosis, 1600–300 BC. The solid line represents Angel's results (Bisel and Angel 1985; $n = 480$). The isolated points represent 1990s analyses (Chania [McGeorge 1992], $n = 22$; Metapontum [Henneberg and Henneberg 1998], $n = 272$)

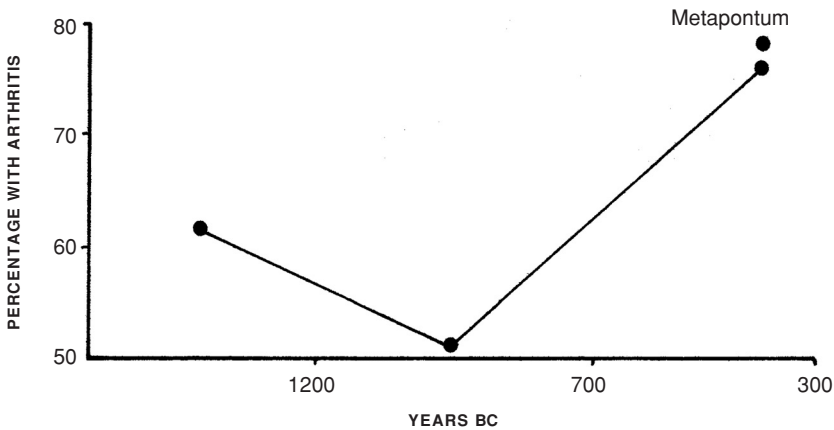


Figure 8.3 Percentage of skeletons with vertebral arthritis, 1600–300 BC. The solid line represents Angel's results (Bisel and Angel 1985; $n = 229$). The isolated point represents Metapontum (Henneberg and Henneberg 1998; $n = 272$)

more repetitive injuries, particularly in the forearms. Gender differences in labor may have increased in LBA and EIA.[51]

On the other hand, Angel found that oral health declined slightly between LBA and EIA, before improving sharply in classical times. At

[51] Triantaphyllou 2001.

classical Metapontum, though, carious teeth were twice as common as in Aegean Greece. Caries are normally linked to sugars from carbohydrate-based foods such as fruit and nuts, or starches.

While EIA Greeks died younger than those of LBA or classical times, their health, while they lived, was not noticeably worse. However, the evidence is meager, and intersite variability is often stronger than diachronic trends.

(c.3) Nutrition

Snodgrass suggested that EIA saw a shift toward less intensive subsistence systems, including nomadic pastoralism.[52] Nomadism is notoriously hard to identify archaeologically. Few archaeologists have collected faunal and floral data. At Nichoria there may have been a shift from rearing cattle for milk and power in LBA toward rearing them for meat in EIA, but the published study is based on just eighteen teeth out of thousands of bones collected, and a larger sample from Tiryns revealed no such trend.[53] Seeds from Nichoria indicate that cereal agriculture continued across EIA, but the sample is again small, and says nothing about the relative nutritional importance of meat and bread. New pollen analyses suggest that in EIA oak forests covered as much as half of Messenia. Perhaps 10 percent of the land was under olives in LBA, but this fell to 5 percent in EIA, before climbing to a peak of 25 percent in the third century BC.[54]

At Kavousi, the bones also suggest a shift toward meat eating. Breakage patterns show that joints (predominantly sheep and goat) were chopped into small pieces for boiling, to release marrow to make "pot liquor." People got a lot from their animals, but did not crush the bones to make "bone grease," normally a sign of subsistence stress. Overall, animal use was stable at Kavousi between 1200 and 700.[55] At eleventh-century Tiryns, by contrast, cattle bones were commoner than sheep/goat (41 vs. 26 percent).[56]

Enamel hypoplasia (defects in human tooth enamel, probably caused by nutritional stress) is stable and high in Angel's sample (Figure 8.4). More recent analyses identify still higher frequencies – 78 percent of teeth at classical Metapontum were affected, and all adult teeth at LBA Chania.[57]

In recent times age-specific stature correlates tightly with nutrition.[58] Stature can be estimated from skeletons, though the samples are still too small to inspire confidence. We have 320 LBA skeletons, but only 16 EIA (15 from the mountain village of Pydna) and 67 classical (60 from Metapontum, which scores badly on most health indicators). Figure 8.5 shows the results: an EIA peak for men and an EIA trough for women. By way of calibration,

[52] Snodgrass 1971: 378–80; 1987: 193–209. [53] Legouilloux 2000: 73–4; Sloan and Duncan 1978.
[54] Shay and Shay 1978; Zangger et al. 1997: 589–94.
[55] Klippel and Snyder 1991; Snyder and Klippel 2000. [56] Legouilloux 2000: 71.
[57] Henneberg and Henneberg (1998: 532, interpreted as congenital treponematosis); McGeorge 1992.
[58] See Floud et al. 1990; Komlos 1996.

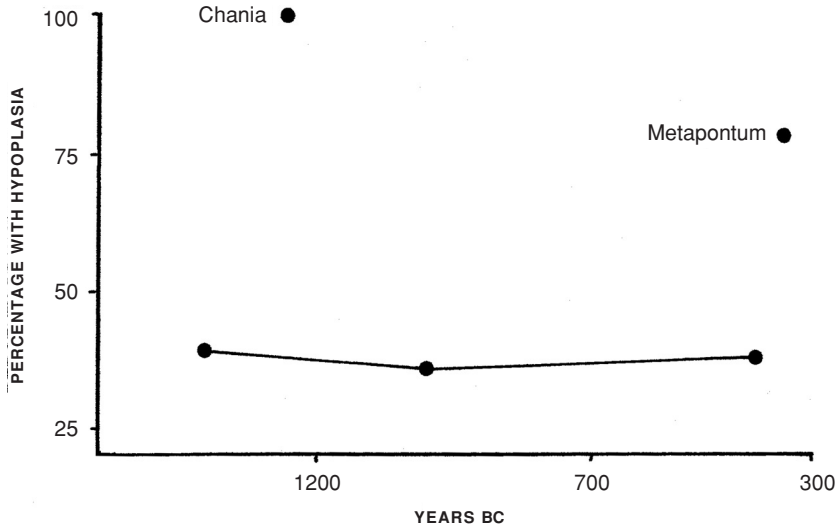


Figure 8.4 Percentage of mouths with enamel hypoplasia, 1600–300 BC. The solid line represents Angel's results (Bisel and Angel 1985; $n = 257$). The isolated points represent 1990s analyses (Chania [McGeorge 1992], $n = 12$; Metapontum [Henneberg and Henneberg 1998], $n = 272$)

we should note that the EIA male score, 168.8 cm., is only just above the 168 cm. cut-off that Fogel suggested as marking stunted populations.[59] In such populations, many people would be so poorly nourished that they were unable to work systematically.

(c.4) Conclusion

First, let me emphasize again that we have few good data. Interobserver and intersite variability account for more of the patterns than diachronic trends. New findings will change the picture radically. But the available evidence suggests that relative to LBA or classical times, adults of both sexes died younger in EIA, and had slightly more caries. Women's diet was worse. On the other hand, anaemias declined from LBA through classical times, vertebral arthritis and enamel hypoplasia dipped slightly in EIA, and men's diet improved. The EIA diet may have included more meat, fruit, and nuts than these other periods, with beef dominant at Tiryns, but pollen diagrams from Messenia suggest a low point in olive cultivation.

In some ways people were apparently physically better off than in LBA or classical times; in some ways, worse. Henneberg and Henneberg suggest that in classical Metapontum "premature mortality was high, they were riddled by numerous diseases, and they were not always given medical help . . . in a

[59] Fogel 1993: 14.

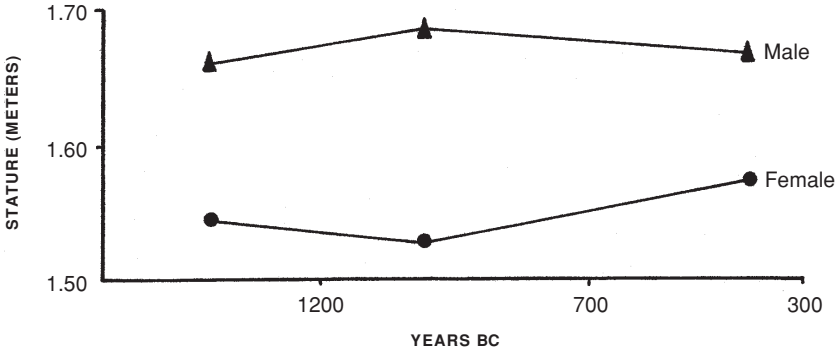


Figure 8.5 The stature of adult skeletons, 1600–300 BC. The diagram shows only those skeletons for which scores have been calculated using Trotter and Gleser's regression formulae (1958) ($n = 403$, but note the small size of the Early Iron Age sample [$n = 16$])

rather unhealthy populace, pain must have been a commonplace experience for most individuals."[60] In different ways, this applies to EIA Greece as a whole. The "wellness index" changed little between 1600 and 300 BC. Life was shorter in EIA, but not always nastier.

(d) *Housing*

The size and quality of housing are fundamental to assessments of living standards, and modern historians pay great attention to both.[61] More than 400 complete houses have been published for 800–300 BC.[62] They present many empirical challenges, but there are strong patterns.

(d.1) Size

Crete and the central Aegean followed different trajectories. There is a spike in house size in Neopalatial Crete (Middle Minoan III–Late Minoan IB; c. 1800–1600 BC), with a median size of 130 m^2. Further, we know from pictorial evidence[63] and the houses themselves (particularly at Akrotiri)[64] that many had two or even three floors. McEnroe suggests that single-storey houses were "comparatively rare," and that "in most cases there were some, probably quite important, rooms on the upper storey." Hallager, on the other hand, argues that the second floor was mostly open to the sky.[65] There are also sampling problems: most excavations concentrate on areas

[60] Henneberg and Henneberg 1998: 537. [61] E.g., Burnett 1986.
[62] Summaries in Lang 1996; Mazarakis Ainian 1997; Nevett 1999; and for the Bronze Age, Darcque and Treuil 1990; McEnroe 1979; 1982.
[63] Hallager 1985; Boulotis 1990. [64] Michailidou 1990; Palyvou 1999.
[65] McEnroe 1979: 106–7; Hallager 1990.

Table 8.2 *Median house sizes, mainland Greece and Aegean islands, c. 1600–300 BC*

Period (years BC)	Sample size	Median area (m^2)
1600–1400	11	40
1400–1300	14	41
1300–1200	50	76
1200–1075	19	52
1075–1025	2	71
1025–900	7	70
900–800	12	43
800–700	75	51
700–600	80	49
600–500	23	70
500–400	30	149
400–300	82	230

around palaces,[66] while small houses (McEnroe's Type III) are best known from the smaller sites (e.g., Gournia, Kommos, Pseira). However, even Type III houses are substantial, averaging 80–100 m^2, and regularly have stairs to upper floors. McEnroe suggests that "by American standards, [a Type III building] would have been a comfortably large house for a family of perhaps 6–10 people."[67]

After 1600 Minoan house sizes declined sharply. A few large Neopalatial-type houses were built in Late Minoan IIIA–B and many pre-1600 houses were reoccupied, but most new houses were smaller and of new designs.[68] Few have evidence for second floors. House sizes and forms then remained quite stable until the seventh century, despite the rupture in settlement patterns after 1200. Indeed, at Kavousi some houses remained in use, on and off, from the twelfth century through the early seventh.[69] Median house size was 60–70 m^2 across EIA, and many settlements (e.g., Phaistos, Karphi, Smari, Vrokastro, Kavousi Kastro) had one or more large houses (125–200 m^2).

The Aegean followed a different pattern (Table 8.2). Median house size jumped in the thirteenth century, falling back in the twelfth then recovering to close to pre-1200 levels in the eleventh and tenth centuries.

Two interpretations suggest themselves. The first is that the chaos of the twelfth century depressed living standards, but after this temporary setback, Greeks inhabited relatively commodious houses until a long decline set in

[66] Palaces are not included in Table 8.2. [67] McEnroe 1979: 113.
[68] McEnroe 1979: 131–72; Hayden 1987; 1990. [69] Gesell et al. 1995.

around 900. The second is that the tiny size of our eleventh- and tenth-century samples has inflated the medians.

Only two fully excavated eleventh-century houses have been published, both from Macedonia. One of them, the Kastanas Zentralhaus (105 m²), is clearly a special building, and almost certainly inflates the score. Fragments of much smaller apsidal houses are known from Asine, Argos, and Tiryns, and these suggest that the second fully excavated house (Assiros House 5, covering 36 m²) is fairly typical. In the tenth century, just seven fully excavated houses are known. They include the enormous Lefkandi "heroon" (445 m²), but the main reason for the high median is three apsidal houses (Asine 74L-M, Nichoria IV-1, Koukounaries A;[70] an unpublished example from Lamia is not included in Table 8.2) covering 70–80 m². Only further publications can decide between these two hypotheses, but I suspect that the tiny eleventh- and tenth-century samples have produced exaggerated scores.

Apsidal houses in the 70–80 m² range continued in the eighth and seventh centuries, and Mazarakis Ainian shows that at Oropos, Eretria, and nearby sites, small curvilinear houses were built in pairs in walled compounds, with one for living and the other for crafts.[71] But most ninth- and eighth-century houses were smaller. Alongside several dozen houses in the 40–60 m² range, the late eighth century also saw the first really large houses. At Zagora, the "Great House" (H19/22/23/28/29) covered 256 m². It may have had a second floor, but the general flimsiness of EIA foundations and (from the eighth century) house/temple models suggest this was rare.[72] Only one very small house, the Smyrna trench H oval house (14 m²), is known from EIA sites, but houses under 20 m² proliferate around 700 BC. Most come from the new Sicilian colonies (Naxos, Syracuse, Megara Hyblaea), and average just 4 × 4 m., but there are also very small houses at Smyrna and Zagora area J.

House types were more varied in the seventh century than in EIA. The first rectilinear, multi-room courtyard houses appeared around 700, and by 600 nearly all new houses took this form.[73] But in the seventh century they coexisted with various kinds of small houses, which were particularly common in villages like Emborio, Lathouriza, and Vroulia. By the sixth century, very small houses had disappeared; the smallest known examples, from Thasos, are 40–42 m². Second floors were also becoming common. But the real take-off began after 550. For the first time, new houses surpassed eighteenth–seventeenth century Cretan dwellings. Few fifth-century houses measure below 100 m², and in the fourth century few were less than 150–200 m².

[70] Following Mazarakis Ainian's (1997) letter sequence.
[71] Mazarakis Ainian, forthcoming. The paired houses cover 58–84 m².
[72] Schattner 1990. [73] Morris 1998b: 22–3.

The house size data are complicated, but general trends are visible. On Crete, there was a sharp fall in size after the Neopalatial florescence, and median size stabilized around 65–70 m^2 from the fourteenth century through the seventh. In the Aegean, there was a decline after 1200. Typical houses were around 45–55 m^2 in the ninth, eighth, and seventh centuries, though the situation at the beginning of EIA is less clear. Diversity increased in the late eighth and seventh century, and poorer people may have had slightly worse housing conditions than earlier in EIA. But a general improvement began in the sixth century, and a veritable revolution in living standards in classical times.

(d.2) Construction

Basic construction changed little across the second and first millennia BC: stone foundations, earth floors, and stone or mudbrick walls (depending on local resources). However, there were important changes in techniques. Minoan Neopalatial houses were sophisticated, with varied foundation styles, well made windows, and excellent craftsmanship.[74] Drains, light wells, paved and plastered floors, and plastered and even painted walls are common. Although some Late Minoan III houses maintained these traditions, construction generally declined. The Cretan EIA record is dominated by Karphi, Kavousi, Vrokastro, and other mountain refuge sites. Proper trenched foundations were rare, drains unknown, and rooms usually small.

Mycenaean domestic architecture was less sophisticated than Minoan, although Kilian documented substantial and well trenched foundation types at Tiryns, and Iakovidis has shown that pitched and even tiled roofs were common.[75] In the twelfth century new houses generally followed Mycenaean patterns, and some Late Helladic IIIB houses were renovated, but after 1100 construction quality declined drastically. Nichoria Unit IV-1 had a rough fieldstone socle laid on the ground, probably wattle-and-daub walls, a simple "pole building" structure, and a pitched thatched roof.[76]

The Lefkandi Toumba "heroon" was built similarly, but on a larger scale. It too lacked foundation trenches, and had a pitched thatched roof. The weight of this roof may have caused problems: Coulton suggests that "if some structural damage is needed to explain the rapid burial of the building, then difficulties with the roof are perhaps the most likely."[77] The walls were mudbrick, and at least some interior faces were plastered, which is rare in EIA. The use of interior posts to support the walls and roof was typical, but the quantity and size of the Lefkandi timbers is striking. The central posts were 18–25 cm. thick, sunk 1.45 m. into bedrock, and probably 10–11 m.

[74] Zoïs 1990; Palyvou 1990; 1999.
[75] Kilian 1990; Iakovidis 1990.
[76] McDonald et al. 1983: 19–33.
[77] Coulton 1993: 48.

long. No iron nails were found; overall the craftsmanship was similar to, but better than, other EIA buildings.

On Crete and the Cyclades, abundant schist made all-stone walls practical. These houses again had little or no foundation trench, but normally had flat roofs of thin stone slabs on wooden rafters, sealed with clay. At Zagora, a house wall of c. 700 BC fell almost intact, preserving a single small, inverted-triangle shaped window. Stone hearths and benches were common, and by 700 drains were coming into use. A bathtub built into the archaic fortifications at Miletus probably also dates around 700.

Thatched roofs were rare after 700 and almost unheard of after 600, and foundations were more substantial, better dressed, and trenched in the sixth century. Shady internal courtyards became normal. There were advances in handling water, with better drainage, and cisterns for rainfall, and communal facilities in the sixth century. In general terms, archaic houses were built like those of the EIA, but better.[78] As with house sizes, the real take-off, surpassing Neopalatial Minoan standards, began in the late sixth century. The earliest known clay tile roof is on the Temple of Apollo at Corinth, c. 680 BC. By 600 most temples had tiled roofs, but they only became normal on houses after 500. The fifth century also saw larger rooms and more frequent use of plastered walls, paved floors, cisterns, and drains.[79]

(d.3) Conclusion

Overall, EIA houses were less pleasant places than LBA and archaic structures, and much less pleasant than classical houses. In quantitative terms, I have suggested that a typical fourth-century house represents between five and ten times the level of consumption involved in a typical eighth-century house.[80] Standards of housing fell sharply in Crete after 1600 BC, then stabilized. They also fell in the Mycenaean world after 1200. We have almost no evidence for the eleventh century, and hardly more for the tenth, but most houses were certainly small and simple between 900 and 600 BC. During the eighth and seventh century standards of housing probably varied more than during the EIA. Standards improved rapidly from the end of the sixth century.

(e) *EIA economic performance*

EIA Greece (as I defined it above) supported fewer people, living shorter lives, in more squalid conditions than it did in LBA or archaic/classical times. Regional variations were pronounced, with Cretan and northern

[78] Lang 1996: 108–25. [79] Trevor-Hodge 1960; Müller-Wiener 1988.
[80] Morris 2004: 722–3; 2005: 108–23.

experiences less catastrophic than Aegean and western. Overall, after varying experiences of economic decline in the twelfth and eleventh centuries, there was general depression in the tenth and ninth, and recovery in the eighth. Despite rapid population growth, there is no sign that bodily status deteriorated (though our data are still coarse-grained). Variations in housing increased in the eighth century, but median levels remained much the same. Maintaining average consumption in a period of rapid population growth implies major social changes – extensification, intensification, technological progress, and/or socioeconomic restructuring.

There are other indices that we might examine. No two tell exactly the same story, but the general pattern is unmistakable. For instance, although differences in abandonment processes make household goods hard to compare, if we take three sites destroyed by fire – Nichoria Unit IV-1 (burned around 800), Himera (burned 409), and Olynthos (burned 348)[81] – the EIA assemblage is smaller, more limited, and of poorer quality than the classical cases. Alternatively, if we look at wealth diverted to public monuments, the Lefkandi Toumba apsidal building and Thermon Megaron B are the only large EIA buildings, but by 700 there were hundreds of temples. By 675 some were all stone, a hundred feet long, with tiled roofs. Religious architecture became still more impressive and expensive in the sixth century, and the bones from sacrifices suggest that new festivals increased the amount of meat eaten.[82]

After 400 years of decline and stagnation, the eighth and seventh centuries saw extensive (aggregate) economic growth, and very modest intensive (per capita) growth. Both types of growth accelerated in the sixth century, and even more in classical times. The major economic accomplishment of the EIA seems to have been creating new structures that sustained what was, by ancient standards, major archaic–classical economic growth.[83]

IV ECONOMIC STRUCTURES

(a) *1200–800*

The LBA redistributive states[84] collapsed after the destruction of most palaces around 1200. Similar practices may have continued on a smaller scale at twelfth-century sites like Tiryns and Koukounaries, where new Mycenaean-style elite residences were built, but no twelfth-century Linear B documents are known. By 1100, these buildings were also destroyed. Large

[81] Coulson 1983; Catling et al. 1983; Adriani et al. 1970; Allegro et al. 1976; Robinson 1931–52; Robinson and Clement 1938.
[82] Hägg 1998. [83] See Morris 2004: 728–33. On scales of growth, Saller 2002.
[84] See Chapter 7.

buildings survive further into the EIA in Crete and northern and perhaps western Greece, but nothing about them suggests redistributive systems.

Any detailed account of economic structures must combine archaeology with arguments from Homer and Hesiod.[85] If, as I suggested above, Homer drew on common assumptions about eighth-century life, these should allow us to reconstruct some of the institutions of earlier periods too. However, this is necessarily subjective.

Homer describes communities led by groups of nobles called *basileis*, normally with one of them recognized as leader. Each *basileus* was head of a large household (*oikos*) of kin and dependants. Sometimes Homer describes councils of *basileis* making decisions about public issues affecting all *oikoi*; other times, he describes assemblies of larger groups of free men, though the *basileis* still seem in control. As always, the question is what to make of the evidence. In this case, it may well be an idealization of EIA practices. In Linear B each palace is ruled by a *wanax*, but among the lesser officials is the *pasireu*, perhaps a village headman. By 1100 the *wanax* no longer had a recognizable function, and most philologists guess that this left the *pasireu* as the highest meaningful office. By Homer's time, *anax* survived as a word to describe the dominant *basileus*, but the *basileis* controlled the community.

Aegean burials suggest that by 1000 BC communities were dominated by groups of men who saw themselves as relative equals, drawing a line between themselves and the lower orders.[86] Large sites like Athens and Argos had dozens of these men, while the more typical small villages probably had just one. The "Great Houses" at sites like Smari, Karphi, and Kastanas may mean that hierarchy was more pronounced outside the Aegean. The only evidence in the Aegean for a single EIA leader standing above all others is the Lefkandi Toumba apsidal building. I have suggested that this had a more complicated function: as the excavators originally suggested, it was part of the creation of a new form of identity, the semi-divine *heros*. "Heroization" was a method through which EIA *basileis* protected the homogeneity of the elite by promoting outstanding (and threatening) men to heroic status at death.[87]

Judging from Homer and Hesiod, the *basileis*' main tasks were providing security, plunder, justice, and divine favor. Whitley suggests that small settlements were tightly organized around their *basileus*; when his line failed or another man displaced him, the hamlet was abandoned.[88] Homeric *basileis* led the community's young men in war bands, rewarding them with plunder and honor in drinking parties and feasts. Military prowess was vital, and any of the *laoi*, the "people" following a *basileus*, could win

[85] See also Chapter 10.
[86] Morris 1987; 2000.
[87] Morris 2000: 208–38.
[88] Whitley 1991a.

glory (e.g., *Od.* 14.199–234). A *basileus* constantly had to justify his position. So long as he did so, the people honored him (*Il.* 12.310–21). This honor included a *temenos*, "cut-out land" for the *basileus*. Homer is clear that a *temenos* contained arable, orchards, and vineyards. On Ithaca, Laertes and Odysseus owned *temene* with valuable fruit trees, vines, sheep, and cattle (e.g., *Od.* 14.96–104). Poorer men had their own plots, called *kleroi*, owned through partible inheritance (*Od.* 14.208–10; Hes. *Op.* 37). Some men were called *polukleroi*, "of many plots," and others *akleroi*, "landless," so it must have been possible to alienate land; and in one story Odysseus says that because of his martial prowess he married a "woman from a family with many *kleroi*" (*Od.* 14.211–12).

If Homer's assumptions bear any resemblance to the EIA reality of empty landscapes, then control of labor was crucial. Some laborers, like Odysseus' shepherd Eumaios, were chattel slaves bought or captured from overseas. Others – probably the majority – were landless or poor local residents. Some, called *thetes*, sold their labor casually, while others entered longer-term relationships with powerful men. Homer represents the *thes* with no patron as the most wretched man alive (*Il.* 11.489–91), but says little about non-slave members of great families. Debt may have been an important tool, and some people may have entered servitude semi-voluntarily to gain security. In a dangerous, under-populated world with limited markets, contractual relations with the poor providing labor for the rich make a great deal of sense.[89] Homer stresses that *thetes* without patrons could not enforce agreements (*Il.* 21.441–52; *Od.* 18.356–75). There would not be much advantage to the rich in demanding a share of their dependants' produce as rent if institutions for exchanging bulk products for finished ones were underdeveloped; and there is no good evidence for centralized agricultural storage. The distinction between people who received formal, archaeologically visible burials and those disposed of less formally may have coincided with that between the *basileis* and poorer but free and independent *oikoi* on the one hand, and the larger class of dependants on the other.[90]

In classical Olynthos, some houses have concentrations of loomweights, storage, and metal slag, suggesting small-scale specialization.[91] In Karphi, the only pre-750 site excavated on a large enough scale to identify inter-house differences, there is remarkable homogeneity; and most isolated houses from other sites contain traces of storage, weaving, eating, and metalworking.[92] Hesiod's account of Ascra sets up domestic self-sufficiency as a goal, and the archaeological finds suggest that EIA households achieved this in many respects. Homer and Hesiod have words for potters (*kerameis*),

[89] Cf. North and Thomas 1973: 29–32. [90] Morris 1987: 93–6, 173–83.
[91] Cahill 2002: 169–79. [92] Morris 1991: 31–2.

metalworkers (*chalkeis*), and carpenters (*tektones*), but we should imagine a range of levels. Families would take care of simple needs themselves (e.g., Hes. *Op*. 423–36 on cart-building); would go to a village specialist for others (e.g., *Op*. 493–5, on the smithy); and would rely on traveling experts, or perhaps specialists based in the few large towns, for major tasks. The high quality of some EIA artifacts is probably a testament to these *demiourgoi*, "workers for the people."

Iron must have made many productive tasks easier, but iron tools are very rare in the archaeological record. The earliest substantial cache is c.700, at Oropos.[93] Stone tools are also rare (although not unknown), so we should assume that bronze and iron tools were used for most tasks, but that they were expensive and carefully conserved. Compared to LBA and classical sites, EIA productive technology seems primitive.

Basileis provided two linked services in addition to security. The first was dispute resolution: *basileis* were *dikaspoloi*, "judges" or "realizers of the law" (*Il*. 1.258; *Od*. 11.186). A scene on Achilles' shield (*Il*. 18.497–508) depicts this. The leaders' credibility depended on the assumption that they had special access to the gods, who gave them greater wisdom and eloquence than others (*Od*. 8.166–77; Hes. *Theog*. 79–93). When the *basileis* appeared to act selfishly, support could be withdrawn (Hes. *Op*. 38–9, 202–12, 263–4).

Great *oikoi* like Odysseus' on Ithaca or Nestor's at Pylos produced most things that they needed, forming relatively closed economic systems. But even they desired goods from outside, especially women and metals. We can identify three main mechanisms for inter-*oikos* and inter-community circulation of goods. First is what Tandy calls "peripheral markets":[94] when someone had a surplus of some good, and knew where to find people who desired that good, he simply went there and worked out a deal. The Achaean army at Troy was a perfect place for such markets (e.g., *Il*. 7.467–75).

The second mechanism involved outsiders, chiefly Phoenicians. Homer's heroes combine desire for their goods with anxiety over inability to control them. Homer regularly represents Phoenicians as cheats, thieves, and kidnappers (e.g., *Il*. 23.741–4; *Od*. 14.288–9; 15.415–84). Polanyi suggested that one of the commonest institutions of dealing with such encounters is the "port of trade," a controlled space where two cultures can meet.[95] Exchange rates could be negotiated and established as common knowledge, and reliable go-betweens found, lowering transaction costs. Al Mina on the Syrian coast may have been one such location; Kommos on Crete, which had a Phoenician-style temple by 850, another. There is evidence that Phoenician craftsmen settled in enclaves on Crete by 850. Crete had unusual levels of Near Eastern imports in the late tenth and ninth century, as did Lefkandi.[96]

[93] Mazarakis Ainian 1998. [94] Tandy 1997: 117–19. [95] Polanyi 1963.
[96] Al Mina, Boardman 1990; Kearsley 1995. Kommos, Shaw 1989. Imports, Hoffmann 1997; D. Jones 2000.

The third mechanism, most prominent in the poems, was ritualized gift exchange. When one *basileus* visited another, he received gifts; feasting and gift-giving established frameworks within which more substantial transfers could take place (e.g., *Od.* 1.180–4). Mistaking a *basileus* for a trader (*prekter*) was a major breach of etiquette (e.g., *Od.* 8.158–64). Gift-exchange cemented alliances and defined hierarchy, but we should not exoticize and romanticize it into non-profit-seeking reciprocity. In a world where trust between members of different communities was an expensive commodity, gift exchange lowered transaction costs, creating at least some sanctions for unscrupulous behavior. In theory, Zeus would punish men who betrayed guest-friends (*xeinoi*). As van Wees notes, Odysseus was extremely self-interested in his pursuit of gifts; and when Glaukos gave Diomedes gold armor in exchange for bronze, Homer said he had lost his wits (*Il.* 6.119–236).[97] Odysseus' skill lay in his ability to extract the maximum gifts without actually breaking expectations about *xeinia*.

By 1000 BC, Greece had settled into a new economic equilibrium, at a lower level of performance than the LBA equilibrium. Population was small, political leadership weak, external contacts minimal, and many advanced skills had been lost. It made sense for poor families to attach themselves to larger *oikoi*, and for wealthy families to have dependent laborers work their lands. New belief systems formed, explaining and justifying contemporary poverty relative to the lost heroic age.[98] When trust and knowledge were scarce, it also made sense even for those rich enough to take risks to embed exchange in other social relationships. Gift-giving made it difficult to respond to changes in supply and demand or to exploit advantages in knowledge. But information and transaction costs were so high that the potential of guest-friendship to control exploitation counted for more than its rigidities. Few of the conditions that development economists identify as favorable to growth were present.[99]

(b) *The eighth century*

This equilibrium persisted through the tenth century, but by 900 conditions were changing. Developments in the Levant gave the Phoenicians richer trading partners and incentives to seek materials around the Mediterranean. Hiram I of Tyre reportedly undertook voyages for Solomon around 950, and in Shalmaneser III of Assyria's time (858–824) Tyrian traders were active on the Euphrates. Around 830 Kilamuwa of Zinjirli put up a major inscription in Phoenician rather than Aramaic, presumably because of the level of Phoenician involvement in Syria.[100] By now Near Eastern goods were more common in Greek graves, and (as noted above) Phoenician/Syrian

[97] Van Wees 1992; Donlan 1989. [98] Morris 2000: 217–18, 228–38.
[99] E.g., Ray 1998. [100] Aubet 1993: 35–45.

craftsmen probably lived in Crete. In Homer, Near Eastern artifacts are highly prized status symbols, and their use in burials suggests the same was true in ninth-century Crete and the Aegean. We might suspect (though we can do no more than that) that trading profits drew more Phoenicians into the Aegean, and that the increasing supply of oriental goods drove down their cost for Greeks; and that as costs fell, more Greeks got access to them, triggering a kind of symbolic inflation, and perhaps greater efforts to generate products to trade with the Phoenicians. The use of exotic grave goods peaked at Lefkandi, Knossos, and Athens around 850–825. Small amounts of Greek pottery from 925 onward have turned up in the Levant, but we have to assume that Greece supplied mainly basic commodities such as grain, wine, oil, and humans.[101]

Around 800 Near Eastern grave goods become rarer in Greece, but they return in force after 750. Again, supply-side changes were important. Ashurnasirpal II of Assyria had extracted tribute from Phoenicia as early as the 870s, but around 740 Tiglath-Pileser III reorganized the Assyrian state and annexed all of Phoenicia except Tyre. He hugely increased tribute, extracting 150 talents of gold from Mattan II of Tyre around 730. In these years Phoenicians established bases in Spain, Sicily, Sardinia, and North Africa, and probably intensified activity in the Aegean.[102]

These developments were important, but rapid population growth all across the Mediterranean basin surely did more to shock the EIA economic system out of its low-level equilibrium. From Iberia to Iran, everyone faced increasing competition for resources. The general population growth may be connected to a major climatic shift from the warm, dry, Sub-Boreal phase to the cooler, wetter, Sub-Atlantic. Bradley notes that "If such a disruption of the climate system were to occur today, the social, economic, and political consequences would be nothing short of catastrophic."[103] The Sub-Atlantic regime may have eased problems of interannual variability in winter rainfall and moderated the disease pool, stimulating population growth.

In eighth-century Greece, we see two main responses: first, increasing competition within elite groups, as some individuals tried to capture the new resources and become rulers; and second, increasing competition between rich and poor. The two trends interacted, and led to a third outcome: a compromise between some members of the elite and the rest of the community, through which "middling" aristocrats formed oligarchies with enough popular support to stop any of their rivals establishing themselves as sole rulers. We might say that they preserved the internal egalitarianism of the EIA aristocracies against challenges from would-be kings by generalizing

[101] Morris 2000: 238–56.
[102] Aubet 1993: 45–76, 303–10; Bondì 1991; Frankenstein 1997.
[103] Bradley 1999: 15.

equality to all adult males in the community. Already in Homer, heroes seem more answerable to the common people than the elites of Egypt or the Near East. So successful were these cross-class alliances in the Aegean that in archaic times would-be kings were stigmatized as *tyrannoi*, tyrants beyond the pale of civilized society. Tyrants did rule some archaic Aegean cities, but they rarely lasted more than a generation or two. By 500 they had been completely defeated (though they remained a major force in classical Sicily and Italy). Oligarchy was the normal government until c. 500, when democracy gained ground.[104] I suggest that these structural changes had profound economic consequences. Jones argues that in pre-modern economies "growth can occur only within an 'optimality band' where factor and commodity markets are freed and the government is neither too grasping nor too weak."[105] This, I believe, is precisely what happened in the late eighth and seventh century: loose EIA communities coalesced into city states with governmental structures strong enough to guarantee property, but not strong enough to act as predators. This framework, different from most ancient Mediterranean social structures, made room for rising living standards in archaic and classical Greece.

Around the Aegean and in Crete, elite spending on burial skyrocketed after 750, and new high-status goods (most famously, the giant "Dipylon" vases in Athens) were created. The "Great House" at Zagora reveals a new level of luxurious living, and there are indications of more lavish feasts than previously.[106] The very act of recording the *Iliad* and *Odyssey* in the new technology of writing may have been an attempt to foreground aristocratic claims to divine descent, and there was an explosion of "heroic" burials of recently deceased men between 725 and 700.

We see increasingly wealthy aristocrats marking themselves off from rivals and from EIA traditions of homogeneous, understated rituals. But there are also signs that these ideological claims were resisted.[107] Homer praises the rule of virtuous *basileis*, but also highlights the disruptive effects of elite greed and feuds.[108] Heroizing burials were also disputed. Successfully promoting a relative to semi-divine status presumably generated great *kudos* for a family, but the community as a whole also made claims on heroic tombs as sources of general protection. This tug-of-war was perhaps most complex in new colonies. The founder was regularly heroized, and his descendants normally claimed special standing from this; but his tomb was also a place of communal solidarity.[109] Compared to Near Eastern and Egyptian elites, archaic Greek aristocrats had remarkably little religious authority. Mazarakis

[104] I set out my argument in more detail in Morris 1998b; 2000: 155–91.
[105] E. L. Jones 1988: 187.
[106] Mazarakis Ainian 1997: 171–4; Tandy 1997: 142–9; Morris 2000: 287–306.
[107] Cf. Osborne 1996a: 84–5 on "cultural schizophrenia" in Athens.
[108] Balot 2001: 59–70. [109] Malkin 1987.

Ainian has suggested that EIA worship of the gods went on largely in chiefs' houses, with religion being a major source of social power (as it had been in LBA). In the eighth century, however, secular and religious authority were separated, and spatially distinct sanctuaries with temples created.[110]

I have argued that a narrow group of wealthy men and women developed an "elitist" ideology, claiming special power through privileged links to the gods, the past, and the rulers of the East. "Middling" aristocrats who grounded authority in the local community resisted them at all points, representing elitists as would-be tyrants. By 700, middling attitudes gained the upper hand in most of the Aegean: lavish burials and houses disappeared, and the major focus of spending was communal sanctuaries. Athens was an exception, however, only rejoining the general Aegean pattern in the later sixth century.[111]

A major outcome of the eighth-/seventh-century turmoil was the creation of aristocratic colleges, or oligarchies, governing small city states. These groups submitted to common rules, setting up offices and taking turns to exercise different dimensions of leadership. Much early Greek law is procedural, regulating who may hold which office, for how long, and establishing penalties for infringements.[112] These formative state offices held little real power. So far as we can tell, they could not impose land, poll, or income taxes. Archaic states organized wars with other states (which, using hoplites, were remarkably cheap), and provided some religious goods (especially temples and communal festivals). They paid for these through indirect taxes, especially harbor and market dues, and revenues from communally owned land and minerals.[113] Later anecdotes show that plenty of office-holders tried to enrich themselves or to seize power, but they met greater resistance than in most ancient states. Hesiod's *Works and Days* has few parallels as a tirade against elite predation, and there is some evidence for a widespread assumption that the natural response to excess was the rise of a tyrant – the one thing that oligarchs most wanted to avoid.[114]

The leaders of these formative states faced competitive and transaction-costs constraints: they had to prevent rival rulers from emerging (or from conquering their *polis* from outside), and to generate the revenues they needed for military and religious goods. The trade-offs that began in the eighth century reduced elite feuding, presumably lowered and distributed more fairly the costs of security and religion, and clarified property rights. As usually happens, the price of the alliance between middling aristocrats and poorer free men was a reallocation of property rights.[115] Beginning in the late eighth century, new ideas of citizenship formed, guaranteeing free local-born men rights in their own bodies and land. The process was

[110] Mazarakis Ainian 1997. [111] Morris 1998c; 2000. [112] Hölkeskamp 2000a; 2000b.
[113] Andreades 1933. [114] McGlew 1993. [115] North 1981: 20–32.

slow, and is best known from Solon's reforms at Athens in 594 BC, but was well under way by the late archaic period. The logical consequence of the strengthening of citizenship was the development of chattel slavery, since free citizens working their own land had few incentives to labor for wages.[116]

Some aspects of citizen equality worked against economic growth. In classical times, those *poleis* that pushed male equality furthest also erected strong barriers to women's economic activity and fostered a belief that commercial exchange violated the reciprocity that should prevail among citizens.[117] However, we do not know how pronounced these attitudes were in the eighth century; and classical Greeks found ways around them. One was to use agents; another was to deal in city states other than their own (a practice formalized by the late sixth century in the status of the *metoikos*, or "co-resident").[118] The prominence of debris from metal casting at eighth-century sanctuaries might indicate that some traders took advantage both of the ready market provided by crowds at festivals and of the sanctuaries' ideological neutrality, as spaces outside the everyday world. But whatever the precise mechanisms, Corinthians and Euboeans were involved in trade from one end of the Mediterranean to the other by 700. De Angelis argues from grain silos at Megara Hyblaea that by the same date Greek colonists generated agricultural surpluses for trade with the Aegean. Conquest of Sicily's plains, watered by more reliable rainfall than the Aegean, doubled the arable land under Greek control by 500 BC. If De Angelis is correct that grain trading tied Sicily and the Aegean together from the eighth century, colonization fundamentally changed the land: labor ratio in the Greek world, allowing Aegean Greeks to exploit comparative advantages in some agricultural goods (wine, oil) and in manufactures such as pottery, while Sicilian Greeks sold them grain. Rather than a developed Aegean core coupled with an underdeveloped periphery, as world-systems models would predict,[119] gains from trade benefited all parties.[120] The initial eighth-century settlements in Sicily seem very poor, but in the sixth century Syracuse, Akragas, and Selinous built some of the finest temples in the Greek world. State duties on imports and exports presumably paid for them.[121]

The first steps in extending Greek economic activity across the Mediterranean may have been parasitic on Phoenician initiative. Certainly at Pithekoussai, the first permanent Greek base in the west, there is some evidence for a mixed Greek, Semitic, and Italic population.[122] Here, and

[116] Finley 1980: 67–92; 1981 [1959–65]: 97–166; Morris 2002. [117] Schaps 1979.
[118] Reed (2003: 62–74) presents the limited archaic evidence.
[119] Wallerstein 1974–89: vol. 1, applied to the Mediterranean in Sherratt and Sherratt 1993.
[120] See the lucid discussion in Irwin 2002. [121] De Angelis 2000; 2002; 2003.
[122] Ridgway 1992; Boardman 1994; Docter and Niemeyer 1994.

probably at other sites too, Greeks and Near Easterners transferred knowledge and technology. The eighth century saw the first major expansion of the Greek stock of knowledge since the introduction of iron in the eleventh century, much of it probably through this route. Greeks probably borrowed from the Near East the shipping technology that took them to Pithekoussai more quickly, more safely, and more cheaply.[123] The alphabet, probably devised by a bilingual "adapter," was another striking borrowing. Greeks may have added vowels to the Phoenician consonantal script to make it easier to record poetry.[124] Once in use, the script greatly reduced information costs. The return of representational art, monumental architecture in stone, and life-size stone sculpture in the eighth and seventh centuries all added new communicative technologies, again drawing on Near Eastern and Egyptian models. Tool marks on stone blocks at Corinth show that iron chisels were now common. Even that most characteristically "Greek" invention, the hoplite panoply, owed much to Near Eastern bronze hammering techniques, but in this area the Greeks rapidly overtook their teachers. By the 660s Greek mercenary hoplites were important in Egyptian resistance to Assyria, and Greek military technology transformed Italian warfare.[125]

The move toward middling oligarchic citizen states dominated the Aegean basin, but was not the only Greek response to the eighth-century crisis. In Crete, Thessaly, and Laconia, citizen communities, sometimes highly egalitarian, saw themselves as descendants of Dorian conquerors, and ruled over large serf populations.[126] Sparta took this idea further, responding to eighth-century pressures by conquering neighboring Messenia and reducing its population to helotage.

Sparta was the greatest archaic military power, and probably one of the wealthiest states.[127] But in classical times, states like Athens that defined citizenship more broadly proved most successful. They had moved into Jones' "optimality band," providing the most important goods of security and property rights without creating autonomous state institutions and rulers that could act rapaciously. Classical authors agreed that predation was the hallmark of tyrants, who pursued their own profits at the expense of the community's economic health, depressing its growth.[128]

(c) *Conclusion*

Greek economic performance declined between 1200 and 1000 BC, and living standards were probably lower between 1100 and 800 BC than at any time since the Middle Bronze Age. After 800, recovery began. In the slump

[123] Morrison and Williams 1968: 12–69; Casson 1971: 43–60, 71–6; Wallinga 1993: 45.
[124] Powell 1991. [125] Snodgrass 1980: 104–5, 148–52, 154.
[126] Van Wees 2003. [127] Hodkinson 1998; Powell 1998.
[128] Particularly Hdt. 1.59; 5.78; Thuc. 1.17; cf. Arist. [*Oec.*] 2.34.

at the beginning of EIA and the recovery at its end Greeks created new economic and social structures and new systems of thought. These were profound and long-lasting transformations. Around 1000, Aegean Greece was one of the poorest regions in the north Mediterranean, but by 700 it was one of the most dynamic and expansive. It was still poor compared to Egypt, Anatolia, the Levant, or Assyria, but over the next quarter-millennium a structural revolution pushed Greece into the "optimality band," in which the state is strong enough to provide security and guarantee property, but not strong enough to engage in destructive rent-seeking. The structures that began forming in the eighth century enabled classical Greeks to enjoy an unusual period of intensive, per capita economic growth, and remarkably high living standards for a pre-modern society.

The causes of these EIA processes remain obscure. We need to study them on a large scale; there was a general east Mediterranean crisis in the twelfth and eleventh centuries, and a general population explosion and episode of state-formation in the eighth and seventh. But much about the Greeks' response to the vast impersonal forces of climate and demography was unique.

CHAPTER 9

THE IRON AGE IN THE WESTERN MEDITERRANEAN

MICHAEL DIETLER

I INTRODUCTION

The economic history of the Iron Age in the western Mediterranean is a complex tale in which encounters and entanglements between diverse indigenous peoples and foreign agents from several expanding states of the eastern and central Mediterranean played a recurrent and crucial role. The chronology, nature, and consequences of these encounters have been the subject of a great deal of historical and archaeological research for many years. The last decade, in particular, has witnessed not only a significant increase in the quantity of archaeological data bearing on these issues, but a transformation of interpretive perspectives and theoretical discussion. However, despite these improvements, there remain major gaps in, and problems with, the data that present serious difficulties for writing economic history.

One significant problem with the important, but patchy, textual record is that it comes almost exclusively from one of the several foreign colonial agents involved in the region (i.e. Greek sources). This has resulted in a tradition of strongly Hellenocentric historiography. But Greek economic history in the western Mediterranean can be properly understood only if it is contextualized within a larger social landscape in which Greeks were, in many instances, of marginal importance (except to themselves). Moreover, it must be recognized that Greeks were as much transformed as they were agents of transformation in the dynamic history of encounters in the region.

Archaeological research offers a broader potential base for reconstructing a more balanced economic history grounded in the material record of everyday life of all the societies involved. However, it is beset with its own problems. Research coverage tends to be highly variable from one area to another along the Mediterranean coast in terms of density of coverage, scale of excavation, methods employed, and extent of publication. For example, excavation of Phoenician settlements has been far more limited than that of Greek colonies, systematic survey has been practiced in only some regions, and settlement and burial data are quite unevenly available. Moreover, for a variety of reasons, we know a great deal more about trade than about any

other aspect of the economy. Inevitably, the brief review presented here will reflect these limitations, even as it attempts to unsettle and move beyond some traditional Hellenocentric assumptions.

The western Mediterranean is taken here, somewhat arbitrarily, to include essentially the Mediterranean coastal zone running from southern Spain through southeastern France (North Africa is excluded for reasons of space and competence). The time period covered extends from the eighth century BC to the Roman conquest (roughly the second century BC).

The region under consideration here is characterized by a diverse and dynamic landscape of social identities, linguistic communities, political formations, and modes of interaction. However, in very general terms, one is dealing with indigenous societies constituting three broad linguistic groupings (Iberian, Celtic, and Ligurian) and, on the other hand, with three different major sources of external traders and colonists. The earliest external agents from the eastern Mediterranean were Phoenician traders who established several trading settlements on the coast of southern Spain as early as the eighth century BC. Greek traders were sporadically active in Spain as well, but did not establish any colonies until the sixth century BC. The Phoenician settlements were eventually incorporated within the expanding commercial and political sphere of the former Phoenician colony of Carthage during the sixth and fifth centuries BC before succumbing to Roman domination following the Second Punic War. In southern France, Etruscan traders began to frequent the region in the late seventh century BC, and they were quickly followed, at the beginning of the sixth century BC, by the first colonial settlements of Phocaean Greeks at Marseille (ancient Massalia) and, in Spain, at Ampurias (ancient Emporion) and perhaps near Malaga (ancient Mainake?). In southern France, Etruscan goods disappeared in the face of a gradual dominance of Massaliote products throughout the lower Rhône basin from the fifth century BC until the expansion of Roman trade and Roman military annexation of the region in the late second century BC.

II INDIGENOUS SOCIETIES

Given the situation outlined above, an assessment of the economic history of the western Mediterranean must be grounded in some more detailed consideration of the dynamic social and cultural landscape of the region during the Iron Age, although space precludes more than a schematic summary. As noted earlier, languages belonging to three distinct indigenous linguistic groups (Celtic, Iberian, and Ligurian) were spoken in the region. Celtic languages (which are still spoken in parts of Ireland, Britain, and Brittany) belong to the Indo-European family, whereas Iberian languages did not (they are now extinct and, despite the development of several

regional variants of Iberian scripts based upon the Phoenician alphabet, are still largely incomprehensible). Because it is known only from toponyms and ethnonyms, Ligurian is even less well understood and its affiliation is uncertain; although most scholars seem to agree on a tentative placement within the Indo-European family.[1]

As a general summary of an extremely complicated situation, suffice it to say that Ligurian languages are associated with peoples occupying the area from Marseille eastward into Italy. The term Iberian, on the other hand, is used most consistently to designate peoples in western Languedoc, Roussillon, and along the Mediterranean coast of Spain. Use of the term Celtic is more complex and widespread in its distribution. However, Celtic speakers were clearly a particularly important component of the peoples inhabiting the lower Rhône basin and the interior regions of western Languedoc and Spain.

Textual, toponymic and coin-legend data also present us with a much larger number of names of peoples associated with smaller and more precisely localized territories.[2] At least some of these (particularly groups named on coins) have a much more likely chance than do broad linguistic categories of representing genuine foci of indigenous identity and of being meaningful native ethnonyms. However, it should be remembered that the bureaucratic division of the landscape of Gallia Narbonensis and Hispania under Roman administration into *civitas* territories, based upon Roman perceptions of these indigenous groupings, froze into homogeneous static form what was undoubtedly a momentary state in a fluid process of continual transformation of heterogeneous systems of identity and political relations. Before Roman control, there is no reason to expect a uniform model of ethnic identity, territorial definition, or political structure. Indeed, there is good reason to expect considerable temporal and spatial diversity.

A few of these group names appear in very early texts, and then disappear from the record (e.g. the Segobrigai around Massalia, the Elisyces of Western Languedoc, the Tartessians of southwestern Spain). However, most date to the second century BC and later. Among all these names, a few are applied to fairly broad areas (e.g., the Sordones of Roussillon, the Elisyces of western Languedoc, the Volcae Arecomici of eastern Languedoc, the Cavares, Vocontii and Sallyes of Provence) and appear to encompass smaller named groups. These are generally interpreted as political confederations of smaller "tribal" units; and at least some were probably alliances between peoples speaking different languages, as the term "Celto-Ligurian" applied to the Sallyes by Greco-Roman authors may indicate. The duration, nature, and structure of such political alliances (e.g., asymmetrical patron-client

[1] Cf. Lambert 1994; Whatmough 1970.
[2] See especially Barruol 1973; 1975; 1980; Gayraud 1981; Ruiz and Molinos 1998.

arrangements, loose associations of equal partners through cross-cutting religious institutions, etc.) are not yet clear, but were probably extremely variable.

One theme that has attracted a great deal of recent research attention and publication is a process called "Iberization" or "Iberism."[3] These terms have been used to describe (often somewhat ambiguously) either the process of formation of a local Iberian culture (a kind of *in situ* ethnogenesis), especially in southern Spain; or the diffusion through trade of elements of such a culture formed elsewhere; or the actual displacement of local populations by Iberian immigrants. What is clear is that, both in the larger context of Spain and within the western Languedoc-Roussillon region, the phenomena described as Iberization were rather heterogeneous, exhibiting a great deal of local variation. There is also general agreement that Iberization was a transformation associated in some important way with the development of colonial trade relations in which Ibero-Punic goods played a significant role. Untermann has recently used linguistic data (including the disappearance of Iberian names in later inscriptions written in Latin) to suggest that the general population of western Languedoc/Roussillon was largely Celtic speaking and that Iberians were a specialized urban group of literate merchants who controlled trade and other economic transactions until the Roman conquest.[4] At present, this issue is an active research frontier that is certain to stimulate an increasing volume of fieldwork and publication.

III FOREIGN AGENTS: TRADERS AND COLONISTS

(a) *Phoenicians and Carthaginians*

The first agents from the eastern Mediterranean to establish an economic presence in the western Mediterranean were Phoenician traders/colonists who founded a number of small settlements along the coast of southern Spain and on Ibiza.[5] This process began around 800 BC according to the most secure calibrated $^{c}14$ evidence (at Morro de Mezquitilla), or perhaps as early as 900 BC if one credits a few less secure dates.[6] These sites (e.g. Cadiz/Gades in southwestern Spain and a dense concentration along the southeastern coast – Guardamar in Alicante, Toscanos and Morro de Mezquitilla near Malaga, etc.) were located at the mouths of rivers. Often these were rivers leading to rich metal resources (especially silver, but also gold, copper, tin, lead, and iron) and the sites were situated to exploit both good ports and agricultural land. It has been suggested frequently that,

[3] Cf. Gailledrat 1993; 1997; Garcia 1993b; Panosa Domingo 1993; Py 1993a; Ruiz and Molinos, 1998.
[4] Untermann 1992.
[5] Aubet 1993; Frankenstein 1979a; Gras et al. 1995; Moscati and Amiet 1988; Niemeyer 1996.
[6] Castro et al. 1996; Mederos 1997; Moret 2000.

before the conquest of Tyre by the Assyrians in 573 BC, these Spanish settlements were an important component of a trans-Mediterranean Phoenician metal trade, although other products may have been exploited as well. It is clear that these colonies were importing significant quantities of material from the eastern Mediterranean, producing their own products for export (e.g., wine), and engaging in trade with surrounding native societies. The late seventh century BC appears to have marked the apex of Phoenician trade expansion in the western Mediterranean, and many of the early establishments had disappeared or become "indigenized" by the early sixth century BC. This decline is often credited to an economic crisis in the Phoenician network provoked by the fall of Tyre, although the phenomenon is actually considerably more complex than is allowed by this simple explanation.[7]

During the sixth and fifth centuries BC, the increasingly powerful former Phoenician colony of Carthage became active in southern Spain, founding its own colonies and taking control of some of the older Phoenician sites. The rapidly expanding urban centers of Gadir/Cadiz, Malaka/Malaga, and Ebusus/Ibiza eclipsed older Phoenician trading ports such as Toscanos in size and importance. Carthaginian expansion in Spain became particularly active under the Barcids during the late third century BC, with the foundation of Cartago Nova/Cartagena in 229 and the first extension of control over the interior of southern Spain. These territories were eventually annexed by Rome following the defeat of Carthage in the Second Punic War at the end of the third century BC. The history of all these Phoenico-Punic colonies involved processes of complex demographic and structural transformation, as well as changing economic and political relations with indigenous peoples and other Mediterranean states.[8]

Until recently, archaeological research on Phoenician and Carthaginian colonial settlements in Spain has been somewhat limited, although cemeteries were an early focus of attention. This was due in large measure to the fact that settlement excavations have been hindered by the existence of modern cities built over many of the ancient sites. For example, the coastal island site of Gades, one of the most important and (at an estimated 10 hectares) largest of all Phoenician colonies in the region, lies buried under modern Cadiz.

However, excavations and survey work during the past decade or so have dramatically increased the quantity of information on Phoenician colonization. Excavations at Sa Caleta, on the island of Ibiza, for example, have revealed a small town of about 4 hectares with characteristic Phoenician architecture and organizational structure and traces of iron and silver processing. After about a century of occupation, it was abandoned around

[7] Aubet 1993; van Dommelen 1998. [8] Aubet 1993; Gras et al. 1995; Niemeyer 1996.

600–590 BC in favor of Ebusus/Ibiza.[9] Another major Phoenician colony that has been extensively explored archaeologically is Toscanos, which was founded near Malaga around 740–730 BC. A small early settlement on a hill expanded quickly to include several more impressive domestic structures and a fortification. Around 700 BC a large two-storey warehouse, of a type that has also been found in Sardinia and North Africa, was constructed in the center of the settlement. It contained a large number of amphoras and other storage vessels. During the seventh century the settlement grew to its maximum extent (estimated at 12–15 hectares) and attained an estimated population of about 1,000 to 1,500. Traces of copper and iron working were also found for this period. By the beginning of the sixth century BC, the warehouse and large residences were abandoned, and the site as a whole appears to have been abandoned by around 550 BC.[10]

This pattern of expansion, fortification (during the seventh century BC), and eventual decline and abandonment (by the mid sixth century BC) appears to have been fairly typical for a number of other Phoenician settlements along the south coast. In general, these Phoenician colonies were quite small, with most ranging from less than 1 hectare to 3 or 4 hectares in size. Gades and Toscanos were exceptionally large, yet even these were quite small compared to Phoenician colonies elsewhere in the Mediterranean, such as Motya (40 hectares) or Citium (70 hectares).[11]

The well preserved port site at Guardamar, buried under modern dunes near the mouth of the Segura in Alicante, highlights some other difficulties in understanding the nature of Phoenician colonies. Founded by Phoenicians near the end of the eighth century BC, the town appears to have attracted a growing native population as well. This native presence became increasingly discernable after the mid-seventh century BC and dominant during the sixth century BC.[12] In general, without extensive excavation of structures, it is often difficult to distinguish Phoenician and indigenous Iberian settlements, and one should be extremely wary of identifications made solely on the basis of ceramics. There is no textual or archaeological evidence for Phoenician colonial settlements along the eastern coast of Spain north of a line running roughly from Alicante to Ibiza.[13] Untermann has argued on linguistic grounds that Ruscino (the name in ancient Greco-Roman texts for the site of Château-Roussillon and the river along which it is located) may be a Phoenician toponym, but there is nothing else at present to indicate that this was a colonial site.[14] On the other hand, the presence of small diasporic groups of Phoenician traders residing within indigenous Iberian settlements has been suggested for a few sites, such as

[9] Ramon 1991. [10] Niemeyer 1982; 1995. [11] Aubet 1993; van Dommelen 1998.
[12] Azuar et al. 1998; González Prats et al. 1997. [13] Asenio et al. 2000. [14] Untermann 1980.

La Peña Negra, at Crevillente, Alicante, and this is a possibility that should be explored further north as well.[15]

(b) *Etruscans*

In contrast to southern Spain, merchants from a few city states in Etruria have usually been credited with being the first alien agents operating on a significant scale in Mediterranean France.[16] This Etruscan presence is identified by Etruscan objects on consumption sites: primarily wine amphoras and, to a much lesser extent, *bucchero nero* drinking cups and pitchers, and a few bronze basins. This wine trade apparently emerged during the last quarter of the seventh century BC and began to wane with the increase in Massaliote wine production and trading activity during the late sixth century BC, although Etruscan amphoras continued to be imported in significant quantities in Languedoc into the fourth century BC. Not only were Etruscans the first colonial agents in this region, but the inhabitants of southern France were by far the biggest consumers of Etruscan exports.[17]

Unlike the Phoenician and Greek situations, there is no compelling textual or archaeological evidence to suggest the presence of Etruscan colonial settlements in the western Mediterranean, and it is assumed that the Etruscan presence was predominantly in the form of a "floater trade" conducted by small ships plying the coastal waters. However, the existence of diasporic trading posts in the midst of indigenous settlements (in the form of small resident groups of Etruscan traders) has been proposed for a few sites, most notably Saint-Blaise in Provence and Lattes in eastern Languedoc.[18] This suggestion is made primarily on the basis of quantitative analysis of imported ceramics, but also of epigraphic evidence in the case of Lattes.[19] An Etruscan inscription has also been found at the coastal site of Pech Maho, in western Languedoc.[20] All of this epigraphic evidence actually dates to the period after the late sixth century BC, when imports of *bucchero nero* had ceased and amphora imports were concentrated mostly in Languedoc. Very recent excavations in a fifth century BC house at Lattes offer some potential additional support for this hypothesis.[21] These combined data certainly indicate a distinctive relationship between Lattois consumers and Etruscan goods that is quite different from the contemporary situation in Provence, although at present the evidence for resident Etruscans is suggestive rather than conclusive.[22]

Two things are clear. The first is that trade in Etruscan goods was largely a coastal phenomenon: there are no indigenous sites with significant

[15] González Prats 1991: 184.
[16] Bouloumié 1980; 1987; Gras 1985a; 1985b; Morel 1981b; Py 1985; 1995. [17] Gras 1985a.
[18] Bouloumié 1982b; 1987; Py 1995. [19] Bats 1988b; Colonna 1980. [20] Lejeune et al. 1988.
[21] Lebeaupin et al. 2002. [22] Py 1995.

quantities of this material more than about 30 km. inland (although small numbers of *bucchero nero* drinking cups and bronze basins circulated more widely, and a handful of amphora sherds have been found as far north as Lyon). The second is that there is a particularly high concentration of Etruscan imports in the lower Rhône Basin.[23] Etruscan amphoras also constitute a significant proportion of imported materials as far west as Roussillon, but, with the exception of the Greek colony of Emporion, Etruscan imports are conspicuously absent from (or very poorly represented at) sites further south in Spain.[24]

The recent discovery of large quantities of Etruscan amphoras in the early levels of occupation at Marseille has led to the realization that the wine consumed by the first couple of generations of Massaliote colonists was also predominantly Etruscan.[25] This has also stimulated some provocative speculation about whether Massaliote, rather than Etruscan, merchants might have been primarily (or solely) responsible for the import and distribution of Etruscan wine into southern France before Massaliote wine production was fully developed. Indeed, radical arguments have recently been voiced suggesting not only that Massaliotes may have been responsible for a major portion of the Etruscan material found in southern France, but that the idea of Etruscan merchants trading in the region before the foundation of Massalia may be illusory.[26] However, as was demonstrated at the most recent *Convegno di Studi Etruschi ed Italici* (held at Marseille and Lattes in 2002), where these issues were hotly debated, most scholars remain convinced of both the temporal priority of Etruscan traders and an important Etruscan merchant activity in the region during the sixth century BC which persisted somewhat later in Languedoc.

In fact, the very framing of the question in terms of a distinct "Greek trade" and "Etruscan trade" in competition, seems a rather anachronistic projection of modernist conceptions of nationalist mercantilism and pervasive state control of the economy.[27] A more realistic scenario would envision a heterogeneous mixture of merchants from various cities (including Greeks from the central and eastern Mediterranean) plying the coastal waters in small ships with cargoes of mixed origins, at least during the first several centuries of the encounter. The fairly abundant shipwreck evidence (see below) tends to support this idea. There is little reason to imagine that merchant ships "flew the flag" (so to speak), that ship crews were ethnically homogeneous, or that the origin of cargoes is necessarily an indicator of the identity of merchants. Indeed, it is quite possible that Etruscan traders may have been resident at Massalia, and vice versa; just as it is probable that

[23] Py 1995. [24] Hérubel 2000; Morel 1981b; Rouillard 1991.

[25] Over 80 percent of the amphoras during the first half of the sixth century BC: Gantès 1992b; Hesnard 1994; 1995.

[26] Bats 1998; 2000. [27] Dietler 1990a; Gras 2000.

Phoenician merchants had a presence at the Etruscan port of Pyrgi.[28] Nor is there any clear reason to imagine that the much invoked naval battle of Alalia (around 540 BC) was fought over state concerns about trade or had much effect on the activities of merchants and consumers.

(c) *Massalia*

Massalia (modern Marseille) was the first permanent colonial settlement in southern France, and indeed along the entire west Mediterranean coast up to the Phoenician settlements in southern Spain. It also became by far the largest and most important colonial city in the entire region. The city was founded about 600 BC by Phocaean Greeks on the north shore of one of the best natural harbors in all of Mediterranean France and one of the last well-protected harbors between the Rhône and the Pyrenees.

Although the early city was well known from ancient textual references, archaeological documentation was limited until recently.[29] Fortunately, the archaeological exploration and understanding of Massalia has undergone a dramatic transformation, thanks to several grand-scale excavations along the edge of the ancient port and a very active program of smaller rescue excavations throughout the interior portion of the city and its perimeter.[30] These excavations have yielded massive quantities of ceramics and extremely well preserved organic material, including the remains of nine wooden ships dating as far back as the sixth century BC, and they have revealed the changing character of the waterfront over a period of more than a millennium.[31] Excavations on the interior of the ancient city, although still limited in extent, have revealed previously unknown details of domestic and public architecture, patterns of consumption, and funerary practices. They have also identified craft production areas, including metalworking and coin minting, and kilns and clay pits for the manufacture of Massaliote wine amphoras and other ceramics.

At its maximum extent, Massalia was a bustling port city of about 50 hectares with a population of perhaps 15,000–20,000 inhabitants.[32] This is vastly larger than any other settlement in the western Mediterranean (colonial or indigenous) until the Roman period. However, it is still relatively small by the standards of Greek colonies in southern Italy or Etruscan cities.[33] The city extended, eventually, over three large hills contained on a quasi-peninsula overlooking a small harbor and was defended by a rampart. On present evidence, it appears that the first generation of colonists

[28] Sourisseau 2002; Colonna 1985. [29] Cf. Benoit 1965; Clerc 1927; Vasseur 1914; Villard 1960.
[30] Bertucchi et al. 1995; Bouiron and Tréziny 2001; Euzennat 1980; 1992; Gantès 1990; 1992a; Gantès and Moliner 1990; Guery 1992; Hermary et al. 1999; Hesnard 1995; Hesnard et al. 1999; Tréziny and Trousset 1992.
[31] Pomey and Hesnard 1993. [32] Bats 1986: 23. [33] Tréziny 1986; 2002.

probably occupied only about 12 hectares on the western tip of the peninsula. However, by the middle of the sixth century BC the city had grown to around 30 hectares and included the Butte des Moulins. By the late sixth century BC an area of perhaps 40 hectares (now including the Butte des Carmes and extending to the Corne du Port) was enclosed by a rampart. From the late fourth through the second centuries BC, the settlement expanded again to reach a maximum size of about 50 hectares.[34]

The massive dressed-stone wharf that one now sees at the Corne du Port is a fairly late feature of the Roman period (first to third centuries AD), and its construction created such disturbance that possible earlier dock constructions in this area are difficult to detect. However, the excavations further west at the Place Jules-Verne have revealed the presence of a substantial wharf construction of large stone blocks in this area already in the late sixth century BC, thus refuting the earlier hypothesis that ships were simply beached on the shore. Over the centuries the shoreline continued to shift as a result of silting and changes in water level, and dock installations were repeatedly reconstructed. During the fourth century BC, this area was apparently used for shipbuilding; and the shore is littered with the remains of wooden hoists for maneuvering ships into drydock for the last few centuries BC. From the first century AD on, a series of more substantial wharves (of wood and stone construction) and warehouses (filled with large storage jars, called *dolia*) were built.[35]

Inside the walls of the city there is not yet enough evidence to reconstruct a comprehensive plan of streets, quarters, and public buildings. However, the scattered patches of evidence indicate rapid expansion and continual transformations of the settlement, including changes in the structure of domestic units, the organization and orientation of housing blocks and streets, and the function of particular sites.[36] For example, the Rue Leca site, at the base of the Butte des Moulins, served as an extra-muros dump for houses on top of the hill during the late sixth and early fifth centuries BC. Around the mid-fifth century BC it became a potters' area, with the installation of a very large circular kiln for amphoras. At the end of the century it was replaced by a building with evidence of iron and bronze working, and during the late third century this was replaced by an impressive public bath complex. This in turn was destroyed in the second century BC and replaced with a large domestic structure with an interior courtyard and a workshop for metallurgy.[37]

Strabo (4.1.4; 12.1.41) noted the presence of two large temples dedicated to Artemis and Apollo, and a sanctuary to Athena; however, archaeological evidence of these and the other public structures that were normal for a

[34] Gantès 1992a; Tréziny 1995; 2001. [35] Hesnard 1994; 1995; Hesnard et al. 2001.
[36] Moliner 2001. [37] Conche 2001.

major Greek city is still meager.[38] Hypotheses about the location of the *agora* in the space between the Saint-Laurent and Moulins hills, at the Place de Lenche (and perhaps later near the Place Villeneuve-Bargemon), and the temples on the promontory of the Butte Saint-Laurent or elsewhere, are as yet unconfirmed by archaeological evidence.[39]

(d) *Massaliote colonies*

In addition to its own urban expansion, Massalia was able, eventually, to establish a series of secondary colonial settlements along the coast that were mentioned by various Greek and Roman authors (e.g., Strabo 4.1.5; 4.1.9). Most of these have been positively identified by archaeological research. The earliest was Agathe (modern Agde), founded at the end of the fifth century BC at the mouth of the Hérault river.[40] During the late fourth century BC, Olbia was founded near modern Hyères.[41] Later colonies included Antipolis/Antibes, Nikaia/Nice, and Tauroeis (probably near Six-Fours-les-Plages), all in the third century BC.[42] Another small Massaliote outpost, a fishing village founded near the beginning of the first century BC, has also been identified recently at the site of La Galère on Porquerolles island, near Hyères.[43]

A Greek presence of a different kind has also been suggested: small diasporic communities of Massaliote traders resident at indigenous settlements. These have been proposed to have existed as early as the sixth century BC near the site where the colony of Agde was later founded, as well as at sites such as Arles, Espeyran, Lattes, La Monedière and Pech-Maho.[44] However, in most cases the archaeological demonstration of this hypothesis is less than clear; and even the more generally accepted cases of early Agde and Arles present some interpretive enigmas.[45]

The functions of the Massaliote colonies were probably somewhat mixed.[46] Strabo (4.1.5 and 9) emphasized their essentially defensive character, stating that they were established as strongholds to defend against the indigenous peoples, and especially to keep the sea lanes clear. However, it is uncertain whether this is an accurate reflection of the goal of their foundation or reflects a set of subsequent conditions that had developed by Strabo's time. In any case, the Provençal colonies were clearly not defending Massaliote landholdings because it appears that it was only through Roman intervention that these settlements acquired narrow strips of land that were not under native control. The defensive character of some colonies would seem to be supported by lack of significant resources of trading interest

[38] Gantès 2001. [39] Gantès et al. 2001; Tréziny 1995. [40] Nickels 1981; 1982; 1995.
[41] Bats 1988c; 1989: 216–20, 1995. [42] Ducat 1982; Brien-Poitevin 1990. [43] Brun 1991; 1992.
[44] Nickels 1983; 1995; Bats 1992: 272. [45] Arcelin 1990; 1995. [46] Bats 1992; Morel 1992; 1995b.

around a site such as Antibes and the impressive fortifications and highly uniform layout of a settlement such as Olbia.[47] However, it is less clear in a case such as Agde, which was at the mouth of a river leading to important metal resources and which, in contrast to the Provençal colonies, appears to have had a more developed territory.[48] Agde was also the only one of these sub-colonies to develop its own ceramic industries for trade to the natives of the region, and none appears to have been a producer of wine. All of the colonies were quite small in comparison to Massalia. Agde and Olbia, which are the best explored and documented of these sites, covered areas of about 4.25 and 2.5 hectares, respectively.[49]

(e) *Greek colonies in Spain*

Among the other Phocaean establishments in the west and central Mediterranean were at least five founded on the eastern and southeastern coasts of Spain.[50] Emporion was founded within a few decades of Massalia just south of the Pyrenees on the Catalan coast.[51] Although excavations began nearly a century ago, a good understanding of the settlement has emerged in publications only recently, and much remains to be explored below the levels of the third century BC. Emporion offers several intriguing contrasts to Massalia. In the first place, the size of the Greek settlement at Emporion was never more than about 5 hectares, and the population probably did not exceed 1,500 people.[52] Ancient texts (Strabo 3.4.8; Livy 34.9) indicate that the earliest settlement (called the *Palaiopolis*) was originally located on a small island. This site lies under the current village of San Martí d'Empúries, which is no longer an island. Recent excavations have shown that, again in contrast to Massalia, it was occupied by an indigenous settlement before its colonization by Phocaean settlers.[53] The texts further indicate that the colony later expanded to the mainland (to a site now referred to as *Neopolis*). The texts also emphasize that the Greeks were essentially surrounded by a large native settlement of 105 hectares that was initially separated from them by a common rampart, and that later the two communities became a creolized polity with a hybrid legal system. Modern excavations have tended to confirm the small and dependent nature of the colony and to suggest an intimate process of coexistence with the indigenous peoples of a type quite different than at Massalia, although the location of the initial adjacent indigenous settlement of the native "Indiketans" remains something of an enigma.[54]

[47] Ducat 1982; Bats 1989: 220; 1995. [48] Garcia 1993a; 1995. [49] Rouillard 1991: 258.

[50] Morel 1975; 1983a; 1983b; 1992; 1995a; Cabrera and Sánchez 2000; Rouillard 1991; 1995; Sanmartí-Grego et al. 1995.

[51] See Aquilué et al. 2002; Marcet and Sanmartí-Grego 1989; Rouillard 1991: 244–81; Sanmartí-Grego 1992.

[52] Sanmartí-Grego 1992: 29. [53] Aquilué et al. 2000; 2002. [54] Sanmartí-Grego 1992.

Other Greek colonies established on the Spanish coast have been much less fully documented archaeologically, if at all, and are known primarily from sometimes contradictory textual references.[55] Rhodes (at Rosas, just north of Emporion) was founded at the end of the fifth century BC. Mainake was the westernmost Greek colony. It has yet to be identified archaeologically and its location and nature are controversial; but, it was possibly located near Malaga, was probably founded in the sixth century BC and was short lived, existing during the period between the decline of Phoenician colonies and the expansion of Punic colonial activity in Spain. Hemeroskopeion (of uncertain chronology) was probably on the coast of Valencia and was possibly a Massaliote outpost. Alonis was probably at Santa Pola and was probably founded in the fifth century BC. All these settlements appear also to have been extremely small in their territorial extent – essentially very small coastal trading centers that had no political hegemony over their hinterlands and were, rather, tolerated by and dependent upon their more powerful Iberian neighbors. In other words, they fit well the Greek conception of the emporion.[56] Of the Spanish emporiae, only Emporion and Rhodes minted their own coins, and Rhodes did not do so until the third century BC. Only Emporion, Rhodes, and Hemeroskopeion produced their own ceramics for modest export, and none developed their own wine production.

IV AGRARIAN PRODUCTION AND SUBSISTENCE

(a) *Basic foods*

The basic global repertoire of cereal crops and domestic animals was quite similar for both colonists and indigenous societies in the western Mediterranean, although there were significant variations in the relative importance of different elements in the diet as well as in the culinary practices used to prepare food.[57] For indigenous sites, both faunal and seed/plant remains appear to have varied little from site to site, except in relative quantitative terms, from the Bronze Age through to the Late Iron Age; although these relative differences were often important and characteristic of, for example, coastal and interior agrarian strategies and local cultural preferences.[58] Barley, hard wheat (*Triticum aestivo compactum*), and spelt (*Triticum dicoccum*) were the most common sources of starch, and these are found in archaeological contexts with variable remains of millet, oats, lentils, chick peas, vetch, and a few wild plants. Ovicaprids, cattle, and pigs were the basic sources of meat. Within this trio of domesticates, ovicaprids

[55] See Rouillard 1991. [56] Bresson and Rouillard 1993. [57] Bats 1988c; 1992.
[58] Cf. Alonso 1999; Buxó 1992; 1997; 2001; Columeau 1978; Courtin 1974; Courtin et al. 1976; Erroux 1976; Garcia 1993a; Py 1984: 317–23.

are nearly always present and often dominant in archaeological faunal samples in terms of number of individuals, but cattle sometimes represented a greater meat-weight.[59] Horse and dog represent a minor proportion of the domesticated faunal remains at all sites where they are found, and wild fauna (primarily deer and hare) sometimes provide a small contribution. Fish and shellfish were another important source of protein for both colonists and indigenous societies. One can detect specific cultural preferences in this culinary domain. For example, Greeks were avid consumers of fish, but showed an aversion to shellfish; whereas many native settlements showed a taste for both fish and shellfish, with selective preferences for particular species varying from period to period.[60]

(b) *Wine and olive oil production*

One of the major initial differences in diet and agrarian practices between indigenous and colonial settlements was the central importance of olive oil and wine to the diet of colonists, both Greek and Phoenician. Although grapes and olives were indigenous to the Mediterranean regions of France and Spain, the concept of wine and olive oil as processed foodstuffs, as well as the techniques of their production, were introduced to the western Mediterranean by Greeks, Etruscans, and Phoenicians.[61] Native societies in both France and Spain quickly developed a taste for wine and incorporated its consumption into indigenous feasting practices as an addition to traditional grain-based beers and mead, and wine became the focus of extensive trade between indigenous peoples and colonists from the earliest moments of the encounter.[62] However, olive oil appears to have met with general indifference or resistance for many centuries, at least in France. Reciprocally, Greeks were equally resistant to grain-based indigenous forms of alcohol.

In France, production of wine was generally limited to Massalia until after the Roman conquest. Massalia imported most of its wine as well until the late sixth century BC, but then came to rely upon wine from its own vineyards as a major export commodity to supplement the meager grain production of the city through trade. Following the Roman conquest (especially during the Augustan period), wine production centers sprang up at various locations in Gallia Narbonensis and elsewhere in Gaul.[63] However, recent evidence indicates that limited wine production for local consumption had also begun several centuries earlier at a few indigenous coastal settlements, most notably the port town of Lattes, where a variety

[59] Cf. Arcelin et al. 1982: 131–7; Colomer and Gardeisen 1992; Columeau 1978; 1980; 1984; 1985; 1987; Crégut and Gagnière 1980; Gardeisen 1999a; 1999b.
[60] Bats 1988c; Brien-Poitevin 1992; Sternberg 1995.
[61] Buxó 1997. [62] Dietler 1990b; 1996. [63] Brun 1993.

of evidence (including traces of vineyards) indicates production as early as the late third century BC.[64] Stone olive presses have been discovered at Lattes and a number of sites in the hinterland of Marseille dating from as early as the fourth century BC.[65] However, it is probable that these were primarily for the production of oil for export to Massalia and other Greek settlements rather than for local consumption.

In Spain, the situation was rather different, with indigenous production of wine and olive oil beginning much earlier. Most of the early Phoenician colonies initially imported wine from diverse sources in other regions of the Mediterranean, and sherds of Phoenician amphoras, in particular, are found on settlements of southern Spain from the eighth century BC on. Moreover, Ibiza was producing wine for export by the late sixth century BC, and the evidence for even earlier wine production at Phoenician colonies around the straits of Gibraltar is also increasingly clear.[66] However, there is also strong evidence for significant indigenous wine production in southern Spain as early as the seventh century BC. Wine pressing vats, large quantities of grape pips, and local native imitations of Phoenician amphoras (known as "Iberian" or "Ibero-Punic" amphoras) have been found together at Alt de Benimaquia (Denia, Alicante), clearly documenting wine production by the beginning of the sixth century BC. Similar botanical and/or amphoric evidence suggest wine production at at least half a dozen other Iberian sites as well, with some dating to the seventh century BC.[67] By the late fifth century BC, production was occurring in Catalonia as well, but not in Iberian Languedoc which continued to import its wine from further south.[68]

(c) *Tools and storage facilities*

Archaeological evidence of farming tools is relatively rare, as the vast majority of all metal objects recovered from settlements consists of jewelry and dress ornaments.[69] However, metal sickles, adzes, axes, etc. are recovered, and fishing equipment (hooks, weights, etc.) is somewhat more plentiful at coastal sites.[70] Plant processing equipment is more widely found. Grind stones and rotary grinders, often of basalt, are known from house floors or domestic rubble at most settlements.[71] As with the metal for tools, these were a subject of widespread regional trade.[72] Clay ovens and perforated clay "grills" (either part of an oven structure or used over an open hearth) found in many domestic structures were probably used to bake cereal loaves or roast meat or fish.[73]

[64] Buxó 1996. [65] Brun 1993; Garcia 1992b. [66] Ramón 1991; Ramón Torres 1995.
[67] Domínguez 1987; Gómez and Guérin 1993; Guérin and Gómez 1999.
[68] Gailledrat 1997: 283. [69] Raux 1999; Tendille 1982. [70] Pons et al. 2000; Feugère 1992.
[71] Alonso 1999; Py 1992b. [72] Reille 1999a; 1999b.
[73] Daumas and Laudet 1981–2: 30–1; Lagrand 1959: 195–6; Py et al. 1992.

Grain storage practices and facilities varied from region to region. The most common practice attested during the Late Bronze Age and Early Iron Age in indigenous French and Spanish contexts was storage in large ceramic urns or jars (with a maximum storage capacity of about 100 liters). These are a common feature of domestic contexts at all settlements, and examples of such large urns associated directly with carbonized grain at a number of sites make the inference of this function fairly certain.[74] Thicker, larger capacity specialized storage jars common at Greek sites (*pithoi* in Greek; *dolia* in Latin) began to make a timid appearance on some indigenous French sites in the late sixth century BC. However, these were at first of much smaller capacity (50 to 100 liters) than the more common examples of *dolia* found from the third century BC and later; and they were rare until the mid-fifth century BC, when their use became widespread.[75] In contrast to France, *dolia* are not found on indigenous Iberian sites before the Roman conquest, as local wheel-made jars (*tinajas*) continued to be the preferred storage vessel.[76] Other large storage jars (35 to 100 liter capacity) in a porous chaff-tempered, barely-fired fabric (called "*vases mal cuits*" or "*vases en torchis*") have also been identified at many sites throughout Mediterranean France and northern Spain, and probably existed at other sites where they are difficult to distinguish from common daub rubble.[77] At Le Pègue the function of these vessels has been clearly established by their association with large amounts of carbonized grain and acorns.[78]

Large capacity specialized granary structures, as opposed to storage vessels in houses, are rare in Mediterranean France. Raised granaries on post supports, of the type common in many more northerly areas of Europe, have been identified at only a few sites in the region.[79] However, some house structures at a few late sixth or fifth century sites have been identified as specialized granaries on the basis of the presence of large numbers of large storage jars.[80] Moreover, in later centuries, multi-room houses at sites such as Lattes often contained special-function rooms filled with large *dolia* and *vases mal cuits* that clearly served a grain storage function.[81] In western Languedoc and, especially, Iberian Spain, there is evidence for raised granaries of another type: rectangular foundation structures of stone and mud brick that supported a platform above an aerated space.[82] These structures became common in the Iberian domain between the fifth and third centuries BC and they resemble structures widespread in Greek, Phoenico-Punic, and later Roman contexts around the Mediterranean.[83]

[74] Garcia 1987a: 46–8. [75] Garcia 1987b: 48–63. [76] Garcia 1997: 91.
[77] Lagrand 1985: 43; see Garcia 1987b: 64–6. [78] Lagrand and Thalmann 1973: 29–30, 54.
[79] See Audouze and Buchsenschutz 1991: 161.
[80] Cf. Arcelin et al. 1982: 123–4; Lagrand 1985: 43; Lagrand and Thalmann 1973: 108.
[81] Dietler et al. 2002; Garcia 1992a; Py 1996. [82] Gracia Alonso 1995.
[83] Garcia 1997; Gracia Alonso 1995; Rickman 1971.

In western Languedoc and Catalonia, underground pit granaries (or silos), useful for long-term anaerobic storage, are also common. These have been found at only a few sites and in small numbers outside the Aude basin and Catalonia, but they are found in dense concentrations in these two regions, especially between the fifth and third centuries BC.[84] Individual silos range in capacity from 300 liters (in domestic contexts) to over 10,000 liters (in collective storage fields: "*champs de silos/campos de silos*"). The plain surrounding Emporion is particularly remarkable in this respect, as there are over thirty fields of silos within a radius of 15 km around the site of the Mas Castellar at Pontós, some of them nearly 3 hectares in extent.[85] The enormous quantity of grain represented by these silos, the fact that they must be emptied immediately once opened, and their proximity to the coast, suggest the probability of significant grain production for export to Greek colonies and/or elsewhere from at least the fifth century BC until after the Roman conquest (when these structures ceased to be employed). Such silos can be reused only a few times (with sterilization by fire). Hence, such fields of silos undoubtedly represent the collective result of an extended temporal process in which a limited number of silos were in use at one time, and one should be cautious about overestimating the quantities of grain in circulation at a given moment. Nevertheless, the collective storage capacity is impressive, and they offer compelling evidence that these two regions became major suppliers of grain as a colonial trade network escalated in scale in the western Mediterranean during the fifth century BC. It is worth emphasizing that these concentrations of silos occur in zones of production and not in presumed centers of colonial consumption (such as Massalia or Emporion), nor in the hinterland of Massalia. Little is known about grain storage at Greek or Phoenico-Punic settlements, except for the presence of large numbers of *dolia* sherds at Marseille and other Greek sites. Rows of these *dolia* have been found in warehouses linked to ports, some of which could have been used for grain storage.[86]

(d) *Agricultural land, population, and food production*

For Greek colonies in the western Mediterranean, the extent and nature of a potential *chora* (i.e. the extra-urban land under direct political control) has been a subject of considerable research and debate.[87] This was the zone upon which the colonists would have depended for at least an important part of their subsistence. Especially in the case of Massalia, for which wine served as the primary commodity that articulated interaction with the

[84] Buxó 1997; 2001; Garcia 1987b: 67–93; 1997.
[85] Adroher et al. 1993; Buxó 1997: 253–60; Buxó et al. 1998. [86] Hesnard et al. 1999.
[87] E.g. Bats and Tréziny 1986; Clavel-Lévêque 1977; Guy 1995; Plana Mallart 1994.

natives of the region, the city also became dependent upon its *chora* for the vineyards that enabled it to sustain trade and political relations with indigenous peoples.

Despite the interpretive difficulties of investigating the establishment and evolution of such a territory, the weight of current opinion supports a reconstruction of the extent of the Massaliote *chora* that is far smaller than that proposed by earlier scholars.[88] Until at least the late third century BC, it appears to have been largely confined within a radius of about 10 km. from the city, in the area of the Huveaune valley that was ringed by mountains and hills dotted with fortified native settlements such as Les Baou de Saint-Marcel, only 8 km. east of the port.[89] It was not until about 400 years after its foundation that Massalia was able to expand its territory beyond this zone to some of the surrounding, more fertile plains; and the fate of its territory during the last couple of centuries BC appears to have been intimately linked to the expanding power of Rome. Ironically, Roman activity in southern France may well have first enabled Massalia to acquire a larger *chora*, and then taken it away after its ill-fated support of the losing side in the Roman Civil War.[90]

It has often been suggested that a small *chora* was typical of Phocaean colonies which, stereotypically, are considered to have had a commercial rather than an agrarian orientation.[91] However, Villard disputed this in the case of Massalia, stating that its ability to sustain a successful trading community grew out of its strength as a normal Greek *polis* with a balanced agrarian and fishing base.[92] Tréziny's analysis also shows that, in terms of relative size of city to territory, Massalia's *chora* was not significantly smaller than other (generally considerably larger) Greek colonial *poleis* in southern Italy.[93] A consideration of the Massaliote *chora* is impossible without also taking into account the sea. Not only was it a rich source of protein (from fish) but a convenient communication route that allowed Massaliote traders to expand the range of their native exchange networks in a dendritic fashion both east and west along the coast of Mediterranean France.

Population and subsistence productivity estimates are notoriously problematic. However, a few tentative figures are worth exploring in order to get at least some sense of the relative requirements of different kinds of settlements. Let us begin with Massalia. Bats and Py have offered tentative estimates of about 15,000 to 20,000 inhabitants for Massalia at the time of the Roman siege in 49 BC.[94] Using average consumption figures suggested by Gras of 6 hectoliters per person per year, one can estimate rather crudely that, in addition to other foods, such a population would

[88] Current: e.g., Arcelin 1986; 1992; Bats 1986; earlier: e.g., Clavel-Lévêque 1977; Villard 1960; Wever 1966.
[89] Guichard and Rayssiguier 1993. [90] Bats 1989: 204–5. [91] E.g. Lepore 1970.
[92] Villard 1992. [93] Trézinsky 1986. [94] Bats 1986: 23; Py 1993a: 46.

require about 90,000 to 120,000 hectoliters of grain per year.[95] Estimating ancient agricultural production figures is a guessing game with considerable problems, as ancient seed-to-yield and yield-per-land area ratios are not really known; and local variables such as soil fertility, labor intensity, and cropping, fallowing, and manuring practices would all be important sources of variation.[96] Nevertheless, with an emphatic caveat about the highly speculative nature of the house of cards being constructed here, it seems useful to at least attempt a crude estimate. Using an average yield figure of about 2 to 8 hectoliters per hectare, to feed the city would necessitate a minimum of about 11,250 to 45,000 hectares of good agricultural land for the lower population estimate, or 15,000 to 60,000 hectares for the higher population figure.[97] This amount should be doubled to account for biennial fallowing.[98] Hence, even employing the most productive figure for the smaller population would require 22,500 hectares of good agricultural land; and this would be in addition to the land devoted to olive and vine cultivation and grazing for livestock. The area of the small *chora* generally attributed to Massalia before the late third century BC would appear to be of clearly insufficient size to meet these demands. Moreover, Strabo (4.1.5) described the land of Massalia as being planted with vines and olive trees, but generally too poor for grain. Hence, the colony would have almost certainly been dependent upon external sources to maintain its grain supply, especially given the overwhelming importance of cereals in the diet of most ancient Mediterranean cities.[99] Most probably this was one of the main trade items sought from the surrounding indigenous societies, and especially from western Languedoc and Catalonia.

In contrast, the tiny Massaliote colony of Agde had a *chora* that could easily provide an adequate agrarian base for its small population of perhaps 1,500 people occupying a settlement of a little over four hectares in extent. This territory was demarcated by a cadastral system of uncertain date and is estimated to have contained about 20,000 hectares, with about half of that suited to grain production and arboriculture (an amount comparable to the much larger Greek city of Metapontum in southern Italy).[100] The *chora* was also well provisioned with water and pasturage, had lagoons for salt extraction, and easy access to fishing.[101] It also had basalt quarries that were used for olive presses and grindstones for both domestic consumption and export from the mid-fourth century BC on.[102] Agde imported its wine from Massalia, but was largely self-sufficient for the rest of its food needs.

[95] Gras 1995: 95.
[96] Araus et al. 2003; Halstead 2002; Isager and Skydsgaard 1992. [97] Garcia 1995: 155.
[98] If one can assume this as standard practice: see Halstead 2002 for an alternative view.
[99] Garnsey 1999. [100] Clavel-Lévêque 1982; Guy 1995. [101] Garcia 1993a; 1995.
[102] Garcia 1995; Reille 1999a; 1999b.

This kind of agrarian autonomy is dubious for most other Greek colonies before the Roman period given that many appear to have controlled little or no agricultural land and may have been entirely dependent upon trade with neighboring indigenous settlements and sea links to provide basic subsistence. Emporion, for example, had a population of perhaps 500 when it was confined to the 2 hectare island of the *Palaiapolis* and perhaps 1,500 when it expanded to the 5 hectares of the *Neopolis* and *Palaiopolis*, yet Greek texts indicate that it was surrounded by a large indigenous population and had little room for a *chora* until after the Roman conquest.[103] Indeed, it has long been considered the classic case of a Phocaean commercial town without a territory, although this has recently been challenged.[104] Plana Mallart, for example, sees the gradual development of an Emporitan *chora* as something linked to the merging of Greek and indigenous populations in the town from the fourth century BC on, something that also involved the transformation of relations with surrounding native hillfort towns and the eventual establishment of a *chora* that she estimates at about 36,000 hectares, extending about 18 km. inland. However, the existence and size of a possible Emporitan *chora* proper, as opposed to a simple zone of economic influence, in the pre-Roman period remains a subject of debate.[105] Many Phoenician colonies appear to have had better possibilities for establishing a semi-autonomous subsistence base than their Greek counterparts. They appear to have been founded in areas with little or no indigenous population in the immediate vicinity which were also rich in agricultural potential and wild game; although, with the obvious exception of Ibiza, the territories were not large.[106]

Indigenous settlements in both Spain and France were roughly comparable in size to most of the Greek and Phoenician colonies (with the exception of Marseille). The vast majority of native sites were less than 10 hectares in extent, and many were as small as 1 or 2 hectares, although they were usually densely settled (at least from the sixth century BC on). The coastal site of Lattes, in Languedoc, is unusual among indigenous settlements in approaching perhaps 20–25 hectares at its maximum extent. Py has estimated that it may have had 4,000 inhabitants during the fourth century BC, and this should be considered a maximum figure for most indigenous towns in the pre-Roman Iron Age. These settlements were located frequently on hilltops, but are also found on the edges of lagoons and in river valleys.[107] They followed agro-pastoral subsistence strategies that varied according to location and region. In some cases (e.g., Enserune, Pontos), the large numbers of silos and other grain-storage facilities excavated inside or near

[103] Rouillard 1991: 257; Sanmartí-Greco 1992.
[104] Vallet 1968.
[105] Cf. Plana Mallart 1994; Rouillard 1991: 263–76.
[106] Aubet 1993.
[107] Belarte 1997; Py 1993a; Ruiz and Molinos 1998.

settlements indicate a capacity for significant surplus grain production, some of which may have been stimulated by the demand of Phocaean and Phoenician colonies.

V TRADE

(a) *Trade goods and their production*

As noted earlier, we know far more about trade in the western Mediterranean than about any other feature of the economy. Many aspects of this issue have already been covered in previous sections. Phoenician trade in southern Spain is evident from the mid-eighth century BC, with Phoenician amphoras found on indigenous sites far to the interior. Gades, in particular, appears to have developed a very active trade with the rulers of Tartessus in the interior of the Guadalquivir valley who provided silver from the rich local mines, especially those in the mountains near Huelva and Seville. Discovery in recent years of mines and metallurgical complexes of the eighth and seventh centuries BC near the mines of Riotinto and Aznalcóllar, and the presence of silver and gold slag in furnaces, attest to a couple of centuries of intense industrial activity. The Phoenicians of Cadiz may have exported tons of metal in ingot form, much of it perhaps to the eastern Mediterranean and the Near East, and it is generally assumed that the rich metal resources of Spain were the primary attraction for Phoenician colonists.[108]

Near the end of the seventh century BC, a few objects from this Phoenico-Punic-Iberian domain began to appear in southern France as well. Initially, these consisted of a small number of finds (a few bronze belt hooks and some apparent local imitations of ceramics of Punic type) at a few scattered sites in western Languedoc and Roussillon.[109] But from the mid-sixth century BC on, the quantity of Iberian wine amphoras, in particular, became significant. East of the Hérault river, Phoenico-Punic and Iberian amphoras never constituted more than a tiny minority of the amphoric material. Although they are found on scattered settlements in Provence and Eastern Languedoc (including Marseille and its colony, Olbia), the imports of this area were always heavily dominated by vessels of Etruscan and Massaliote origin.[110] However, in western Languedoc and Roussillon (particularly west of the Orb river), Iberian amphoras became the numerically dominant type.[111]

The rubric "Phoenico-Punic" is used rather generally to indicate a series of amphoras that actually have diverse origins (the Levant, North Africa, Sicily, Sardinia, Spain) within the Phoenician and Carthaginian colonial world and that were produced from the eighth through the first centuries BC.

[108] Aubet 1993; Ruiz and Molinos 1998.
[109] Janin 2000; Nickels et al. 1989; Solier 1976–8; Taffanel et al. 1992.
[110] Dietler 1990b; Py 1990; 1993a. [111] Gailledrat 1997; Ugolini and Pezin 1993.

This term is used for convenience, but also to compensate for a degree of ambiguity in the classification of these amphoras and the lack of precise determination of the origin of some types. The works of Cintas, Mañá and Vuillemot form the basis of the typology of such amphoras from the central and eastern Mediterranean, and Ramón has developed separate classifications for those produced on the island of Ibiza and the region of Gibraltar.[112] "Iberian" amphoras (also called "Ibero-Punic") are closely based on Phoenico-Punic forms, but were produced in indigenous Iberian contexts from Andalousia to Valencia to Catalonia. Not surprisingly, they exhibit a bewildering diversity of fabric types.[113] Iberian amphoras are presumed to have served primarily for the transport of wine, although olive oil and *garum* are also possible, and grain and beer have been identified in a few Iberian amphoras.[114]

An important unresolved question about these amphoras from Spain is how they arrived in southern France. Does their presence indicate that merchants from the Phoenico-Punic colonies in Spain (or elsewhere) actually traveled north and interacted with indigenous peoples of the region? Or did they come directly to the port of Emporion, after which the amphoras were traded further north by Greek merchants? Or did Emporitan merchants sail south and acquire these amphoras (along with metal and other goods), and subsequently redistribute them north of the Pyrenees? It has usually been assumed that Greek traders from Emporion were the main agents articulating and dominating this trade between the two colonial domains. However, there is no compelling evidence to support this. Indeed, although it is rarely considered, Iberian merchants may have participated as well. It is worth noting that, unlike the situation around Massalia, the inhabitants of Roussillon and Western Languedoc adopted the Iberian script rather than the Greek alphabet; and it is possible that Iberian may have served as a regional trade language (much like Kiswahili in East Africa). What is more, the trade that brought Iberian amphoras to the shores of southern France also resulted in the transport of Iberian painted pottery into the region and was implicated, in as yet poorly understood ways, in the process known as "Iberization" that became particularly marked among indigenous societies of western Languedoc and Roussillon during the fifth century BC.[115] In any case, as is suggested below by the discussion of shipwrecks and commercial inscriptions on lead tablets, perhaps the most likely scenario is a complex mixture of all of these strands of trading activity without clear ethnic limitations on trading.

The evidence for Etruscan trade activity in the region has already been discussed earlier. Here, I will simply reiterate that it consists overwhelmingly

[112] Cintas 1950; Mañá 1951; Vuillemot 1965; Ramón 1991; 1995.
[113] Castanyer et al. 1993; Mata Parreño and Bonet Rosaldo 1992; Ribera 1982; Solier 1968.
[114] Gailledrat 1997: 280. [115] Gailledrat 1997; 2000.

of Etruscan wine-transport amphoras, but also of much smaller quantities of Etruscan *bucchero nero* pottery and scattered examples of Greek ceramics. There is also a small number of Etruscan bronze basins found primarily in funerary contexts.[116] The forms of *bucchero nero* found on indigenous sites are a two-handled drinking cup called *kantharos* and, in minor quantities, a wine pitcher, or *oinochoai*.[117] Scattered examples of Etrusco-Corinthian pottery (primarily drinking cups) have also been found with the other imports, as have a few examples of various early Greek ceramics, primarily from central Italy (Ionian cups, Protocorinthian cups, "Rhodian" bowls, etc.).[118]

Among the various kinds of amphoras produced in Etruria, only a limited range was exported to France; and some of these may have been produced exclusively for export.[119] Although the typology and chronology of Etruscan wine amphoras have been established with some precision over the past couple of decades, the precise centers of production have not been definitively located.[120] However, various kinds of evidence point toward several cities of southern Etruria (Vulci, Cerveteri, Tarquinia, and Populonia) as the most likely sources of wine exports to France.[121] It has also been suggested that merchants from the Etruscan settlement at Aleria on Corsica may have been especially important in the resurgence (or extension) of trade in Etruscan wine amphoras during the late phase that lasted into the fourth century BC in Languedoc, long after *bucchero nero* ceramics had disappeared.[122]

As suggested earlier, the articulation of Massalia's trade with native societies depended for centuries primarily upon two related products: wine and ceramics designed for its consumption. Over the centuries, Massalia used several types of amphoras to transport its wine.[123] These amphoras were made from local clays with the artificial addition of mica temper imported from a source about 90 km. east, along the coast of the Maures mountains.[124] Excavations at the site of Saint-Jean du Désert have further revealed traces of a vineyard in close proximity to the city dating probably to the third to first centuries BC.[125] The vast majority of the wine produced by Massalia was consumed in Mediterranean France, but small quantities of these amphoras have also been found at a few late Hallstatt and early La Tène sites (in temperate France, Switzerland, and southern Germany) as well as in other areas of the western Mediterranean.[126]

[116] Bouloumié and Lagrand 1977; Dedet 1995: 293–4.
[117] Jovino 1993; Lagrand 1979; Py 1979; Rasmussen 1979.
[118] Bouloumié 1980; 1987; 1992; Gras 2000; Py 1993a. [119] Gras 1985b.
[120] Carduner 1981; Gras 1985a; Marchand 1982; Py 1985; Py and Py 1974; Sourisseau 1997.
[121] Albore-Livadie 1978; Gras 1985b; Py 1995; Sourisseau 1997; Spivey and Stoddart 1990: 55.
[122] Gras 2000. [123] Bats 1990; Bertucchi 1992; Py 1978b.
[124] Picon 1985; Reille 1985; Reille and Abbas 1992. [125] Boissinot 1995.
[126] Bats 1990; Bertucchi 1992; Dietler 1990b: 194–229.

From the sixth through the fourth centuries BC, Massalia also imported fineware ceramics from Athens in large, but varying, quantities, and some of this (especially drinking cups) was traded to native peoples as well.[127] Beginning in the early third century BC, Campanian ceramics replaced Attic wares as the dominant imported tableware.[128] Massaliotes also began production of their own ceramic fineware within a generation after the founding of the colony. This initially involved two series of wheel-made tablewares, known as "*Céramique claire*" (also known previously as "pseudo-Ionian") and "Gray-Monochrome," that were simultaneously consumed at Massalia and its sub-colonies, traded to the native peoples of the region, and quickly imitated in indigenous workshops. A much larger repertoire of forms of these wares was consumed at Greek sites than at native settlements (where, initially, drinking-cups and wine-pitchers tended to be the only numerically significant Greek forms in demand). *Céramique claire* remained popular until the second century BC with forms derived from Ionian, then Attic, and finally Campanian models, whereas Gray-Monochrome enjoyed a much shorter existence (early sixth to the end of the fifth century BC).[129] From the beginning, Gray-Monochrome production at Massalia incorporated forms derived from the local native repertoire (especially a carenated bowl that became the most popular form on indigenous sites of the Rhône basin), indicating an obvious orientation toward the native market. Massalia also produced a series imitating Attic black gloss ceramics from the last quarter of the fifth through the last quarter of the fourth centuries BC.[130] A major portion of the common cooking ware used at Massalia and its subcolonies was also presumably manufactured there; but, during the second and first centuries BC, Massaliote cooking ware was supplied by indigenous workshops in its nearby hinterland.[131] Pottery production apparently took place at several different locations within Marseille at different times, as kiln wasters and/or kilns have been identified at the rue Nègrel, the rue Leca, the Centre Bourse, and the Butte des Carmes.[132]

Despite its small size, Emporion is important in the context of a discussion of trade in the western Mediterranean because, as noted above, it has frequently been credited with a dominant role in controlling the trade in various kinds of imports to indigenous societies in western Languedoc, Roussillon, and Catalonia, and serving as a bridge between the Massaliote and Phoenico-Punic trade zones. Some scholars have seen a division of Mediterranean France into two large colonial spheres controlled by

[127] Dietler 1990a; Py 1993a. [128] Morel 1981a; Py 1993a.
[129] Ionian, Attic, Campanian: Bats 1988c; Lagrand 1963; Py 1979–80; Gray Monochrome: Arcelin-Pradelle 1984.
[130] Py 1978a; 1993b. [131] Bats 1988c; 1993; Arcelin 1993.
[132] Benoit 1965; Conche 2001; Bertucchi et al. 1995; Bertucchi 1982.

Massalia and Emporion, respectively, with the border between the two lying around the Hérault valley.[133] Although it had its own coinage (see below), produced its own ceramics (*Céramique Claire* and Gray-Monochrome) for local consumption and very limited export, and (according to Strabo 3.4.9) was known for its linen production, unlike Massalia, Emporion never developed a wine production of export capacity.[134] Rather, it was primarily an importer of wine of various origins and a large consumer of Attic ceramics, both of which features are also reflected on indigenous sites of the area, albeit with some important variations. Consideration of the relative quantities of imported ceramics at Emporion suggests that Massalia was not a major supplier, at least after the sixth century BC, and that trade at Emporion was independent of Massaliote influence. From the fifth century BC on, quantities of Massaliote amphoras at the site are relatively small (despite being much higher at nearby Rhode[135]), whereas the majority of amphoras were always of Iberian origin. However the mix of wines was quite heterogeneous, including those from Corinth, southern Italy, and Carthaginian Africa or Sicily.[136] It is also clear that when Massaliote imports of Attic pottery were in decline during the fifth century BC, they continued to be very strong at Emporion.[137]

As noted above, the central question to be resolved is whether the comparable mix of amphoras on native settlements of western Languedoc, Roussillon, and Catalonia (including particularly the quantitative dominance of Iberian amphoras) was a result of Emporion acting as a central clearing-house and controlling middleman or whether a heterogeneous mix of Emporitan, Iberian, Phoenician, Carthaginian and other traders were operating throughout the region. Evaluating the relative plausibility of these alternative hypotheses is difficult, given that the shipwreck evidence that is helpful in Provence (see below) is largely missing in these waters. Much argument tends to swirl around the isolated shipwreck of El Sec, found off the coast of Majorca and inscriptions found at different sites, possibly indicating Greek, Punic, and Iberian traders.[138] While the data are ambiguous, the idea of an Emporitan monopoly seems the least credible hypothesis: such a concept is an anachronism for the trading situations of the period. In any case, it is difficult to imagine how the tiny, precarious settlement of Emporion would have been capable of enforcing trade restrictions on the myriad small ships plying the coastal waters (or why it would have had an interest in doing so rather than simply trying to entice them to stop and trade at Emporion). One suspects that a lingering Hellenocentrism accounts for the fact that some have continued to credit the idea.

[133] Sanmartí-Grego 1992. [134] Rouillard 1991: 261. [135] Martin et al. 1979.
[136] Sanmartí-Grego 1995. [137] Rouillard 1991. [138] Arribas 1987.

(b) *Shipwrecks and the nature of maritime trade and traders*

Shipwrecks have furnished important complementary information about the nature of maritime trade in the western Mediterranean that is not available from terrestrial consumption sites. They offer crucial data about the size and cargo capacity of trading ships, the specific composition of cargoes, the possible origin of ships and the identity of traders, and the pattern of trading activity. In conjunction with the recent finds of well-preserved ships in the ancient port of Marseille, at the Place Jules-Verne and the Centre Bourse, they have also provided information about shipbuilding techniques and vessel performance characteristics. Nearly seventy shipwrecks have been investigated in the western Mediterranean with dates extending from the sixth century BC through the Roman period. Hence, they also allow the reconstruction of the historical development of all these features over many centuries. Of course the nature and quality of the evidence are highly variable, ranging from scatters of broken amphoras to well-preserved ships with cargo still in place.[139]

Because of preservation factors, the vast majority of all the shipwrecks found are located along the rocky Provençal coast, whereas the flat sandy coast of Languedoc and Roussillon, which actually would have presented more severe difficulties to navigation (scarcity of protected harbors, difficulty of navigation without prominent landmarks), has yielded relatively few. For whatever reason, there have been very few finds of shipwrecks off the Spanish coast.[140] The evidence is also skewed chronologically, with at least seventeen identifiable shipwrecks dating from the sixth through the third centuries BC and over fifty dating from the Roman period. Among all these, the bay of Marseille (which had a dangerous entry in antiquity) has yielded twenty-seven shipwrecks, of which four date to the sixth through the fourth centuries BC, six date to the late third and early second centuries BC, and seventeen date from the mid-second to mid-first centuries BC.[141]

Some ships show a relatively homogeneous cargo. For example, the sixth century BC wreck of the Ecueil de Miet, interpreted as an Etruscan ship bound for Massalia, was loaded with perhaps around 100 Etruscan amphoras as well as *bucchero nero kantharoi*.[142] The very recent discovery near Hyères of the Grand Ribaud F shipwreck also showed a homogeneous cargo of Etruscan amphoras and Etruscan bronze basins, although in this case the number of amphoras is thought to number over 800.[143]

However, the majority of ships before the Roman period had much more mixed cargoes. For example, the late fifth century BC wreck of Plane 2 (near

[139] Cf. Bouloumié 1982a; Hesnard 1992; Long 2002; Long et al. 1992, 2002; Pomey and Long 1992; Tchernia et al. 1978.

[140] Phoenician shipwrecks are somewhat better represented in the Eastern and Central Mediterranean: Junqua-Naveau 2003.

[141] Hesnard 1992. [142] Hesnard 1992; Pomey and Long 1992. [143] Long 2002.

Marseille) had a cargo of about fifty mixed Italo-Greek, Massaliote, and especially Punic amphoras, an assortment of Attic fineware ceramics and at least sixty copper ingots.[144] The fourth century BC wreck of El Sec, off Majorca, carried (along with a *lebes* and other central Mediterranean bronze objects, several *pithoi*, and Attic ceramics) a cargo of twenty-nine different types of amphoras: Corinthian, Greco-Italic, Samian, Chian, Punic, Ibizan, and other types.[145]

It is important to emphasize that this pattern of heterogeneous cargoes on pre-Roman ships is not unusual: it is mirrored by other finds in the central Mediterranean.[146] Moreover, in addition to its mix of amphoras, the El Sec ship also had fifteen Punic graffiti and twenty-four Greek graffiti on Attic vases that make the "ethnic" identification of the vessel very difficult. Most probably, these features are an indication of the heterogeneous identity of ship crews and traders.[147] This complex heterogeneity of trading activity is also indicated by a lead tablet dating to roughly 475–450 BC found at the indigenous site of Pech Maho in Languedoc. On one side it has a Greek inscription recording the purchase of a ship at Emporion by a Greek merchant, with all the witnesses to the sale bearing Iberian names. On the other side is an older Etruscan inscription with the names of Etruscan and Latin merchants involved in some commercial transaction at Massalia.[148] This points toward the open nature of ports such as Massalia, Emporion, and Pech Maho, with a diverse mix of merchants and sailors of varied origins and allegiances engaging in trade.

This information about mixed cargoes and crew suggests something important about the general nature of trade in the pre-Roman period. It was, for the most part, probably a small-scale enterprise carried out by merchants of mixed origin, moving back and forth along the coasts of the western Mediterranean. These merchants carried heterogeneous lots of cargo that were either acquired piecemeal at successive ports along the way or at ports that were redistribution centers, where goods coming from various regions were reloaded for secondary export. They traded their goods and took on new materials at various ports and beachheads along their routes according to demand.[149]

The aggregate data from shipwrecks of the western Mediterranean certainly indicate that the cargo capacity of ships of the sixth to third centuries BC was generally quite small: it rarely exceeded 100 amphoras and was more often around fifty. However, the wreck of El Sec (near Majorca), with 474 amphoras, and the wreck of Grand Ribaud F (near Antibes), with over 800 amphoras, indicate that ships with a significantly larger capacity did exist as

[144] Hesnard 1992; Long 1990: 58–60. [145] Arribas et al. 1987. [146] Long et al. 1992.
[147] Hoz 1987; Rouillard 1991. [148] Lejeune et al. 1988.
[149] See also Morel 1982: 487–8, 1983b: 565–70.

well by the fifth century BC. These ships may be evidence of the emergence of a parallel practice of a more direct form of trade between major ports at that time. However, while the Grand Ribaud cargo was quite homogeneous, the amphoras of El Sec were extremely diverse. Moreover, even the Grand Ribaud ship is quite small in comparison to the huge increase in scale during the Roman period, when ships carried cargoes of up to 10,000 amphoras of wine weighing 400–500 metric tons.[150]

The things sought by Phoenician, Greek, and Etruscan merchants in exchange for wine and ceramics, are generally more speculative because little physical evidence has been preserved. For this reason, another shipwreck worth noting is the Languedocian site of Rochelongue, near Agde.[151] What makes the site interesting is the nature of the cargo, which consists of a heterogeneous collection of about 1,700 bronze objects of various origins (Iberian, Atlantic, central European, Italic) that were presumably destined for recycling. This is undoubtedly connected to the phenomenon of "Launacian hoards," a series of collections of bronze objects of diverse origins found between Montpellier and the Tarn river and dating to the seventh to fifth centuries BC.[152] A few other shipwrecks from the fourth century BC and later also provide information on the goods that were circulating in exchange for the wine and ceramics found on most ships. One, found about 18 km. west of Marseille, was filled with limestone blocks quarried from a coastal site nearby that were presumably destined for construction projects in the Greek city. Others have yielded ingots of copper, tin, and lead.[153]

What is important to remember in considering trade patterns in the ancient western Mediterranean is that, apart, perhaps, from matters of civic security and grain supply, one cannot conceptualize trade in terms of the direct collective needs or demand of city states or, even worse, of vague ethnic designations such as "Etruscans." Rather, trade must be understood in terms of the complex micro-scale relations between human agents in the domains of production, distribution, and consumption. It involved the activities of thousands of heterogeneous traders plying the coastal waters, stopping at colonial emporiae and native ports alike, and taking on cargo according to what they believed would be desired at the particular ports they frequented. Moreover, those desires were the product of a variety of local tastes and perceived uses expressed in numerous different languages and determined by specific cultural logics and the social relations of consumers in those contexts. It was the knowledge and relational networks of traders, undoubtedly aided in many cases by the establishment of gift-sustained

[150] Pomey and Long 1992; Pomey and Tchernia 1978; Tchernia 1986; Tchernia et al. 1978.
[151] Bouscaras and Hugues 1967; Garcia 2002.
[152] Garcia 1987a; Soutou and Arnal 1963. [153] Long et al. 1992.

friendships and small diasporic communities resident at various ports, that provided the indirect linkages between disparate consumers and producers who had little knowledge of each other.

(c) *Coinage*

Coinage, meaning standardized metal tokens of value with impressed symbolic devices, was an innovation of the eastern Mediterranean, attributed to Ionian Greeks or their Lydian neighbors, at the end of the seventh century BC.[154] This should not be confused with the invention of specialized (or "primitive") monies, in general, which had been a feature of many economies for a much longer period of time.[155] During the sixth century BC, the practice of coinage quickly spread to the Greek colonies in southern Italy.[156] Massalia was the first source of coinage in the western Mediterranean, and it began to mint coins only during the last quarter of the sixth century BC. It was followed in this practice by a few other Greek colonies in Spain (Emporion, Rhode) and by various native societies, but generally not for several centuries in the latter case. Among the Etruscan cities, Vulci and Populonia began to mint limited series of coins in the late sixth and early fifth centuries BC, and other cities adopted the practice in later centuries.[157] These coins are very rare outside the Etruscan region in the western Mediterranean, but a few early Populonian examples have been identified on native sites in Provence.[158] It was not until after the mid-fifth century BC that coinage was adopted in the Phoenician cities of the eastern Mediterranean and at Carthage (based upon quite different Persian and Sicilian-Greek models, respectively), and generally not until the late third century BC that Punic colonies in Spain (Cadiz, Ibiza, Almuñécar, Carthago Nova) began to produce coins.[159] The earliest indigenous coins of the western Mediterranean were actually fifth century BC imitations of Massaliote obols by the neighboring Saluvii.[160] However, these were very few and sporadic in their production. Most indigenous series of the Mediterranean region began only in the second and first centuries BC, although several Iberian coinages began during the late third century BC. The earliest on the eastern coast of Spain were of silver and based largely on the coinage of Emporion and Rhode, while those in the Punic zone were of bronze and based on Punic models, although the iconography was often quite original.[161]

The first Massaliote issues were small silver coins with a diverse range of raised relief motifs on one face only.[162] From the mid-fifth century BC,

[154] Grierson 1978. [155] Dalton 1965. [156] Stazio 1995. [157] Catalli 1984; 2000.
[158] Martos 2000. [159] Acquaro 1988. [160] Martos 2000.
[161] García-Bellido and Ripollès 1997. [162] Furtwängler 1978.

Massalia began to issue new types of silver coins (*oboles*) with representational motifs on both faces and with weights aligned according to the system of Syracuse.[163] Obols continued to be minted into the first century BC, but these were also augmented by additional new coin types in subsequent centuries, including the first bronze coins, in four denominations, from around 240–220 BC. From the late third century BC, weights conformed to the Roman system.[164] Production of the "petit bronze" with a charging bull on one face increased dramatically during the early first century BC, when they also began to circulate in large quantities on indigenous sites of Provence and eastern Languedoc. Recent excavations at the Place Villeneuve-Bargemon at Marseille have revealed a rare *in situ* coin production workshop, dating to the Hellenistic period.[165] Unlike the situations at Athens and Pella, where coin production occurred near the *agora*, the Massaliote workshop was located adjacent to the port.

In Spain, Emporion and Rhode also began minting coins in the fifth and third centuries BC, respectively.[166] As noted above, minting coins was a relatively late phenomenon in the Phoenico-Punic sphere in Spain. Production began around 325 BC at Ibiza and Ibiza coins have been found not only along the coast from Languedoc to Andalousia, but as far away as north Africa, Campania, Sicily, and Sardinia.[167] Coin production began at Cadiz around the time of the Barcid takeover of the regional silver mines, at roughly the same time as at Almuñécar and Carthago Nova.[168]

In indigenous contexts in southern France, isolated hoards of Massaliote and other alien coins are found on scattered sites of the lower Rhône basin from the fifth century BC on.[169] However, the distribution of Massaliote coins was largely confined to the lower Rhône Basin until the end of the third century BC, and there is no quantitatively significant evidence of monetary circulation in Mediterranean France until the second century BC. What is more, it is only on settlements dating to the first century BC, when the region had been under Roman administration for at least a generation, that coinage (then mostly bronze) is found distributed widely enough and in quantities large enough to begin considering the possible development of a monetary economy in the indigenous domain.

All of the early coinage throughout the Mediterranean was in high value precious metals: especially silver, but also some gold and electrum. Bronze coinage appeared in the third century BC. Coins were not made originally for purposes of trade, and in the western Mediterranean generally they could not have played a significant role in ordinary, small-scale commercial activities until the first century BC (for centuries after its first development,

[163] Brenot 1992. [164] Brenot 1990. [165] Hermary et al. 1999.
[166] Richard and Villaronga 1973. [167] Campo 1976.
[168] Acquaro 1988. [169] Gentric 1981; Richard 1992.

there was no "small change" suitable for small-scale exchange and there was relatively little coinage in circulation). Coins were a form of special-purpose valuable produced for a limited range of (largely political) practical and symbolic functions, including making state payments (e.g., for military operations and building projects), collecting taxes and tribute, and affirming the power of a polity to define standards of value. The range of uses to which they were put once in circulation was undoubtedly much larger than the specialized functions that motivated their production, and this eventually included trade (at least for large transactions). For example, the lead tablet from the settlement of Pech Maho (in Languedoc) mentions a transaction in which coins constituted part of a large payment for a ship.[170] However, as the small quantities and limited distributions of coins suggest, during most of the Iron Age, most exchanges in the western Mediterranean were transacted through barter (i.e., direct exchange of goods and services). This means that trade generally occurred without the intervention of coinage, except perhaps as an indirect abstract scale of relative value used increasingly in negotiating transactions. Moreover, coinage was clearly not essential to the development of extensive trade relations. The Phoenician colonies in Spain, for example, carried on a major trans-Mediterranean metal trade without minting coins, and indigenous societies of France and Spain were aware of the idea of coinage without seeing any need to mint coins for centuries. This is not to negate the significance of coinage for the functioning of Greek and, eventually, Punic colonial city states – it clearly had a major role in the political life of these polities and the economic domains in which the state intervened. But, before the Roman conquest, the western Mediterranean was never an integrated monetized economy in anything like the modern sense.

VI CONSUMPTION AND ITS CONSEQUENCES

(a) *Indigenous consumption*

Consumption is a feature of the ancient west Mediterranean economy that has received much less attention than either trade or production. Often, it has been treated simply as an epiphenomenon of production and considered as a "natural" response to the availability of goods. This has been especially true in the case of Greek goods, where native demand was seen as part of a process of "Hellenization" in which an inevitable desire to imitate Greek culture played a central role. However, recent research on the initial phase of the colonial encounter in France, in particular, has challenged the assumptions underlying this perspective and focused on identifying and

[170] Lejeune et al. 1988.

attempting to understand the limited, highly specific, and socially situated nature of indigenous demand for alien goods and practices. A contextually sensitive study of the phenomenon of consumption has been proposed as an effective means of exploring the issue of agency in the encounter and understanding the process of entanglement by which native societies were drawn into increasingly complex and asymmetrical relations with wider Mediterranean structures of power.[171]

Given that a trade in wine and drinking ceramics was the primary feature articulating indigenous and colonial societies for several centuries and was always a major component of colonial relations, theoretical exploration of the social dimensions of alcohol and feasting has provided new insights into the social and cultural logic of demand for this product in different societies and the ramifications of its adoption in different contexts.[172] Appreciating the important role of feasts in articulating the regional cultural economy and the place of alcohol in feasting has enabled a better understanding of the desire for wine and the links between the wine trade and the adoption of alien ceramic production techniques (the wheel and controlled-draft kiln) for new series of tablewares in the lower Rhône basin. The changing nature of the wine trade in the Late Iron Age has also been pursued, and locally specific resistance to, and subsequent demand for, other alien goods and practices (such as writing, coinage, elements of cuisine, architecture, agrarian practices) have also been analyzed.[173]

(b) *Greek and Phoenico-Punic consumption*

Although the goods and services sought by colonial agents and received in return for wine and other items has been a subject of some discussion, this has not generally led to a nuanced conceptualization of the logic of consumption in colonial contexts.[174] In fact, demand for different products would have been highly specific in nature and volume according to the traders involved and the consumption markets they were serving. For example, it is highly unlikely that residents of the Etruscan city states from the rich metalliferous zone of Tuscany would have been interested in importing iron, while Massaliote smiths may well have had such a demand. It is evident that metal resources (especially silver, but also gold, copper, tin, lead, and iron) were a primary attraction for Phoenician and Greek merchants in southern Spain and, to a lesser extent, in western Languedoc.[175] Indeed, Greek texts are quite explicit in describing the Phoenician interest in Tartessus and its rich silver resources, and their own interest in Spanish

[171] Dietler 1990a; 1998; 1999. [172] Dietler 1990b; 1996.
[173] Tchernia 1983; 1986; Amouretti 1992a; Bats 1988a; 1988c; Morel 1995a; 1995b.
[174] Barruol 1975: 91–100; Benoit 1965: 191–213; Bouloumié 1989; Dietler 1990a.
[175] Aubet 1993; Rouillard 1991; Domergue 1994; Garcia 1995.

metals. Recycled bronze objects, of the kind represented by the Launacian hoards noted earlier may also have been sought, including by Etruscan metal workshops. As noted earlier, grain would also have been a major import commodity for Massalia and other Greek colonies. Evidence for major grain production for export in indigenous contexts is most obvious in Catalonia and western Languedoc beginning in the fifth century BC, but suggestive evidence of surplus storage exists in the lower Rhône basin as well.[176] In fact, although the Rhône basin was very poor in metal resources, it would have been a rich potential source of grain and livestock products for Massalia. Moreover, Massaliote shipbuilders would have seen several products of the nearby forests and garrigues of the Rhône basin (e.g., timber and pitch) as an invaluable resource. Residents of the city would also have sought timber for house construction and wood for fuel. Vintners would have needed pitch for coating their wine amphoras; and individuals would have desired various medicinal and culinary herbs of the region. Salt and fish from the coastal lagoons would also have been desirable. The same kinds of resources would have been sought by Phoenican shipbuilders and other colonists in Spain, and timber may even have been a potential export product to more heavily deforested regions.[177] Recent finds of stone olive-presses at a number of indigenous sites in the lower Rhône basin (primarily in Provence near Marseille) suggest that, by the fourth century BC, Massalia may have begun to rely at least partly on indigenous production of olive oil as well.[178] During the second century BC, Massalia also began to import cooking ceramics from native workshops.[179] Labor was also an important potential commodity for Phoenician and Greek colonists, especially at Massalia; and indigenous labor (both hired and slave) may have helped Massaliote wine and olive production, construction projects, and urban services. Labor as an export item in the form of slaves may also have been a feature of the economy, although it is probable that the demand for slaves from local native societies was far lower before the advent of Roman trade in the region.[180]

The Greek and Phoenician colonies also had a compelling need to maintain security through political alliances (quite probably fueled with lavish gifts) and mercenary services. This feature is best documented for Massalia, for which written records suggest a checkered history of relations with the surrounding natives (e.g., Just. *Epit.* 43.4; Strabo 4.1.5). It is clear that Massalia had military allies among the native peoples. Caesar (*B Civ.* 1.34) mentions the Massaliotes calling upon the local Albici people to help them defend the city against his troops in the first century BC, and Polybius (3.41) noted somewhat earlier that the Massaliotes used Celtic mercenaries

[176] Garcia 1997. [177] Treuman 1997. [178] Brun 1993.
[179] Arcelin 1993. [180] Daubigney 1983.

for their own defense. Such protection could have been arranged either by establishing political alliances with selected local tribes (and perhaps inserting themselves in native politics by helping certain groups in their struggles against others) or rewarding the services of groups of mercenary warriors. This kind of arrangement for peace and protection could also easily take on the character of a "protection racket," where native groups extracted a continual stream of goods from Massalia in exchange for promises not to attack the settlement.

(c) *Consequences: Hellenization to postcolonial approaches*

For many years, a concept known as "Hellenization" served as the primary explanatory framework for understanding the consequences of trade and cross-cultural consumption that constituted the essence of the pre-Roman colonial encounter in Mediterranean France. Initially, this concept conflated both a description of the process of social and cultural change in the colonial situation and its explanation.[181] It was axiomatically assumed that, even in the absence of a coercive imperial domination of the Roman kind, imitation or absorption of Greek culture (or that of other Mediterranean "civilizations") by "barbarian" societies would have been a natural and inevitable result of contact. Hence, the focus of analysis was to chart the gradual clumsy progress of this self-evident phenomenon. An identical logic underlies much of the older literature on the "Orientalizing" phenomenon among native societies in Spain, in which Iberian ethnogenesis was provoked by the absorption of "civilized" Phoenician and Greek objects and practices (such as writing, wine-drinking, and stone sculpture). The roots of this flawed interpretive paradigm and the untenable assumptions of the inherent superiority and attractiveness of Greek and Phoenician culture and the one-way flow of transformative influences, can be traced to a tradition of Hellenophilia that had a powerful influence on the structure of cultural capital in modern European societies. This was a product of the "invented tradition" of ancestral cultural links to the ancient Greco-Roman world that developed during the European Renaissance and was greatly elaborated during the Victorian period.[182]

Although the influence of this perspective lingers on, since the 1980s there has been a growing dissatisfaction with the concept of Hellenization, and there has been an increasing effort to try to reconceptualize interpretive models. World systems models, which have become popular among some scholars researching relations between the Mediterranean and Iron Age temperate Europe, have had considerably less impact in the western

[181] E.g. Benoit 1965; Jacobsthal and Neuffer 1933.
[182] See Dietler 1995; 2005; in preparation; Morris 1994a.

Mediterranean.[183] This is both because such macro-scale analyses have virtually ignored developments in the zone of direct encounter in the south and because they are seen as structurally overdetermined and too crudely mechanistic to provide real insight into the complex nature of colonial relations and social and cultural transformations in this much better documented region.[184] Seeking to understand the broader economic and political structures of these encounters in more subtle ways, the search for alternative approaches has involved, particularly, efforts to understand cultural borrowing as an active, selective process by indigenous peoples and to explore the complex ramifications of trade and colonial interaction as a contingent historical process.[185] Increasingly, as theoretical insights from the historical anthropology of colonialism and postcolonial studies have begun to make inroads, there has been an attempt to break down the somewhat monolithic dichotomies that informed earlier conceptions of colonists and natives, and to examine the transformative cultural and social effects of the colonial process on Greek and Phoenician settlers and traders as well as on native peoples.

VII CONCLUSION

This chapter has presented a highly compressed, and inherently partial, synthesis of the current state of research on the economic history of the western Mediterranean during the Iron Age. The past decade has been extremely productive in terms of generating new research questions, strategies, and data. This has led to much improved understanding of such things as the nature and volume of trade, changes in agricultural and craft production, the logic and consequences of consumption, and transformations of the regional political economy. However, quantitative measures that would constitute standard categories of formal economic analysis (growth, per capita output, income distribution, productivity, etc.), to the extent that they may even be relevant, remain largely beyond our capacity to estimate in any meaningful way. Our understanding of economic performance remains, for the most part, at an impressionistic qualitative level, although there has been much improvement in this regard. Comprehension of the structures and institutional contexts of economic activity and the historical trajectories of economic processes have seen more progress, and research on economic issues remains a major focus of current activity throughout the region.

[183] E.g. P. Brun 1987; 1992; Cunliffe 1988; Frankenstein and Rowlands 1978; Sherratt 1993; although, see Frankenstein 1979a.

[184] Dietler 1989; 1995.

[185] E.g. Bats 1988a; 1992; Dietler 1989; 1990a; 1998; in preparation; Domínguez 2002; Gailledrat 1997; Morel 1983a; 1983b; 1995a; 1995b; Py 1990; 1993a.

CHAPTER 10

ARCHAIC GREECE

ROBIN OSBORNE

1 INTRODUCTION

The Greek world of the seventh and sixth centuries differed markedly from the Greek world of the ninth and eighth centuries. Scholars have talked of a structural revolution in the eighth century.[1] For the economic historian the dramatic changes come later and concern both structure and performance.

Some of the changes were slow, important for their cumulative impact rather than making a marked difference in the short term. Population is one case in point. Except for slaves, where there may have been a sharp increase in numbers in some cities in the sixth century, population grew at a rate of perhaps 0.5 percent a year.[2] Such a growth rate would have more than doubled the population during the period in question, but given a high degree of population mobility, few at the time would have perceived clear change. Population growth itself entails and stimulates growth in consumption and production. Distribution of fine pottery and of quality housing suggests per capita as well as aggregate increase in consumption. And although the conditions of agricultural production did not alter significantly, with climate likely to have been more or less constant and no signs of significant advances in agrarian technology, the spread of Greeks to environments more favorable for agriculture than the Greek mainland and Aegean is likely to have increased per capita agricultural production also. Outside agriculture, too, much technological change seems to have been more a matter of degree than of kind: iron had already established itself as the dominant "working metal" by 700, ship-construction methods do not seem to have altered,[3] technical developments in pottery are primarily linked to decoration, not to productivity. But other technological changes were dramatic: the invention of the Greek alphabet made possible communication at a distance, and if early writing suggests predominantly leisured

[1] Snodgrass 1980 talks of "Structural revolution" in his chapter titles.

[2] Scheidel 2003b. See also above, Chapter 3.

[3] On the ships used to transport goods in the archaic period see Snodgrass 1983: 16–17; note also Dietler's discussion of the western Mediterranean (Chapter 9), where ship remains have been best preserved.

use, by 500 there is a significant corpus of surviving inscribed material which indicates that written communication had become an important part of relations between individuals and communities engaged in exchange with one another.[4] And, once more, the changed scale of the Greek world means that even unchanging technologies might service economic growth as e.g., iron and ships became more readily available for use. In a similar way, the building of roads is unlikely to have been technologically different in 500 from 700, but what was potentially the case in 700 was realized on a significantly wider scale subsequently and with dramatic effects on possibilities of land transport.

Other changes were dramatic even at the time. Take the expansion of the Greek world. From the second half of the eighth century onwards Greeks established settlements in Italy and Sicily, in southern France, north-west Spain and north Africa, in the northern Aegean, Hellespont area, and Black Sea. A recent listing of (only) cities whose founding is attested in literary sources counts some thirty cities plausibly established in the fifty years from the 730s to the 680s.[5] Not only did these communities extend the Greek world, they also almost certainly urbanized it. Several mainland Greek communities seem in the eighth century to have primarily lived in clusters of villages; these new communities all had single centers. If the reasons for that were in part defensive, its effects were also economic. Or take the invention of coinage. The earliest coinage comes from late seventh-century Lydia; in the first half of the sixth century electrum coinage seems to have been slowly adopted by a relatively small number of Greek cities in Asia Minor, but after the first silver coinage was minted around 550 a very large number of Greek cities took to minting. A recent count produces over forty cities minting by 500, and those spread from Cyprus through Libya to Sicily and South Italy.[6] Coinage was one mark of another dramatic change: Greek cities acquired formal institutions. Magistracies, laws, treaties with other cities not only about peace and war but about how to treat individual disputes arising between their citizens, all of these gave a framework for economic activity practically absent in 700. And all these individual dramatic changes also served to highlight a further characteristic of this world – its diversity. The cultural diversity apparent in the regional styles of late Geometric pottery increases during the seventh century, with numerous local styles of fine pottery production, local alphabets, and localized practices in cult and burial. Although in some respects the material culture of sixth-century Greece becomes more uniform, the array of weight standards, as well as types, of newly adopted coinage reveal ongoing diversity.

[4] On the early use of writing for leisure see Powell 1991.
[5] Osborne 1996a: 121–2. [6] Osborne 1996a: 253–5.

This initial survey will have made it clear that under all the major indicators of economic change – population, growth, urbanization, production and exchange, institutions, and stock of knowledge – there are reasons to believe that the period between 700 and 500 BC in Greece saw significant developments. This chapter seeks both to analyze those developments in more detail by comparing and contrasting the archaeological evidence relating to c. 700 BC and c. 500 BC and to explore how the picture that we can create on the basis of archaeological evidence relates to the picture of the economy offered by one further resource making its dramatic appearance in this period – literary texts.

II MATERIAL EVIDENCE FOR THE ARCHAIC GREEK ECONOMY

(a) *The Greek World c. 700 BC*

Material evidence for the economy of c. 700 BC comes in the form of moveable goods, whether made in Greek cities or imported to them, and in the structures of the cities and settlements themselves.[7]

We know far less about the settlement of the Greek mainland and islands in the eighth century than we would like to. Few settlements have been extensively excavated, and those that have tend to be sites with unusual settlement histories. We know most about a number of sites in the Cyclades which were abandoned around the end of the eighth century or shortly thereafter. Some of these settlements, notably those at Zagora on Andros and Koukounaries on Paros, have been extensively excavated. Zagora, although a small settlement with a population of no more than a few hundred, shows a particularly dense area of settlement with adjoining houses whose regularity indicates that there was a master plan for the settlement.[8] Such clustering could, indeed, represent an economic choice, maximizing possibilities for specialization and economic collaboration, but Zagora occupied a site whose location seems heavily determined by defensive considerations and whose material assemblage reveals a relatively low degree of contact with the wider world, and it would be rash to posit primarily economic motivation, or economic consequences, for its precocious "town-planning." It is Corinth, apparently settled in a cluster of villages, which seems much more closely in touch with a wider world in the late eighth century.[9]

The sites with continued later occupation that have attracted most attention to their Geometric and early archaic levels are the sites settled by Greeks outside the Greek mainland, the so-called Greek "colonies."[10]

[7] The best general introduction to the archaeology of Greece is provided by Whitley 2001.
[8] Cambitoglou et al. 1971; 1988; Morris 2000. [9] Roebuck 1972.
[10] On the use of that term see Osborne 1998; on the phenomenon Osborne 1996a: 114–29; Boardman 1999.

Map 10.1 Greek and Phoenician trade in the period of the Persian Wars
Source: Boardman et al. 1988: 448–9

Map 10.2 Greek settlements abroad
Source: adapted from Osborne 1996: Fig. 32

Scholars dispute the extent to which these settlements were official foundations organized by the mainland Greek cities that they came to claim as their mother-cities, but even if these were opportunist settlements with populations generally drawn from a number of different Greek cities, the question of economic motives for and consequences of foundation still arise. There can be no doubt that the establishment of Greek communities abroad expanded knowledge of the central Mediterranean and its peoples and allowed further exploration of resources and markets in much increased security. Most areas settled by Greeks enjoyed on average something like a fifth more rainfall than did the south-eastern part of the Greek peninsula, and in the case of Libya the establishment of a Greek settlement inland at Cyrene is directly linked to its peculiarly high levels of rainfall.[11] It is arguable that from the very beginning some, at least, of these settlements exploited their fertile territories in order to produce surplus agricultural produce for export; this seems to be the case at Megara Hyblaea where there is early construction of large grain silos.[12] But did the foundation of those settlements abroad also have an economic motivation? Their existence is simply unthinkable without widespread Greek awareness of the wider world and its resources, and without would-be settlers having confidence that the density of ship movements in the area were sufficient to ensure that regular links to mainland Greek communities could and would be maintained. That the earliest of these settlements, that on Pithekoussai, which had a territory with limited agricultural potential, attained a size comparable with the very largest of mainland communities (see Morris, Chapter 8 above) is itself good evidence for the connectedness of the new settlements.[13]

Evidence from the eighth-century countryside is very much more sparse than evidence from towns. The numerous intensive archaeological surveys conducted on the Greek mainland and in the islands since the 1970s have in general yielded only very small numbers of eighth-century (Geometric), or indeed seventh-century (early archaic) sites, with distinct expansion in the late archaic and classical periods. But this general picture conceals quite a lot of variation from area to area, and in some areas the promise has been held out of even more early evidence than was noted by survey.[14] The possibility of different patterns of nucleated or dispersed residence corresponding to different economic strategies with regard to subsistence and exchange certainly exists, but the dramatically late (sixth century) appearance of rural settlement in Laconia seems more likely to be a product of political and

[11] Osborne 1996a: 54–5, 58–60; Hdt. 4.158.

[12] De Angelis 2002; see also De Angelis 2000. [13] Osborne 1996b: 40–1.

[14] Catling 1984 for the promise of more. The figures in the table are derived from Bintliff and Snodgrass 1985; Cavanagh et al. 2003; Cherry et al. 1991; Jameson et al. 1994; Mee and Forbes 1997; Renfrew and Wagstaff 1982.

Table 10.1 *Rural sites in ancient Greece*

Boeotia	No. of sites	S. Argolid		Laconia		Methana		Melos		Keos	
		MG	3							PG	1
G	5	LG	16	G	0	G	8			G	1
A	22	A	27	EA	1	A	10	G & A	40	A	10
C	26	C	43	LA/EC	87	C	48	C	28	C	15

A: Archaic, C: Classical, E: Early, G: Geometric, L: Late, M: Middle, P: Proto-

social than of primarily economic factors. Although the changing patterns of rural settlement are unthinkable without some population growth, translating survey data into population figures is fraught with difficulty.[15]

More direct evidence of the degree to which mainland Greece and the surrounding islands were connected to the wider Mediterranean world by c. 700 is provided by moveable goods. Goods manufactured elsewhere in or outside the Greek world are found in large quantities in at least some Greek sanctuaries at the end of the eighth century and in the early part of the seventh century. While at the Thessalian sanctuary of Pherai the vast majority (98 percent) of the 3,739 objects dedicated during this period come from Thessaly itself, the major sanctuary at Olympia or the sanctuary of Hera on the island of Samos yield very different patterns.[16] At Olympia very large numbers of dedications come from parts of Greece significantly distant from the western Peloponnese – in particular 397 out of 793 non-local dedications come from the Argolid and Attica, and a significant proportion (24 percent) come from outside Greece altogether, both from the west (Italy, 8.9 percent) and from the east (especially north Syria, 5 percent). At Samos non-Greek imports (85 percent) greatly outnumber imports from the Greek world (15 percent), and what is most notable is the variety of origins that are attested: Rhodes, the Cyclades, Corinth, the Peloponnese, Macedonia, on the one hand; Cyprus, West Persia, the Caucasus, Assyria, North Syria, Phoenicia, Phrygia, Egypt, and the Balkans on the other. Sanctuaries, and sanctuaries of some deities in particular, attracted exotic goods, and the impressive array of imported goods demonstrates the liveliness of the demand for, and supply of, relatively low bulk and high value, non-utilitarian goods in the eastern and central Mediterranean at this date. This lively demand may have caused some eastern craftsmen to establish themselves in Greek cities: scholars have deduced the presence of eastern craftsmen from material remains at Knossos and elsewhere.[17]

Another side to this picture comes from the distribution of Greek pottery. Some Greek pottery (Athenian, but above all Euboean) had been reaching

[15] Osborne 2004a. [16] Kilian-Dirlmeier 1985. [17] Hoffman 1997.

both the near East and Italy from the late ninth or early eighth century. Most Greek pottery in the eighth century was distributed only locally: of the ten regional styles of Geometric fineware analyzed by Coldstream, only Corinthian and to a very small extent Laconian pottery was being exported at the end of the eighth century.[18] Whereas earlier styles of Geometric pottery made at Corinth are found only locally, Corinthian pottery begins to be found in the area of the Corinthian gulf and the Ionian islands in the first half of the eighth century, and by the late eighth century Corinthian was to be found on most sites known to have been settled by Greeks in Italy and Sicily.[19] Not the least interesting feature of this pottery is that different sites appear to have exercised distinctly different tastes for decorative patterns etc. This emerges in particular from the recent analyses by Michael Shanks: the proportions of Corinthian pots of the various different patterns of decoration found at the sanctuary of Perachora in Corinthian territory are actually very much more similar to the proportions found at Syracuse than to the proportions found at Corinth itself, and the distributions at Syracuse are distinct from those at Pithekoussai or at Aetos on Ithaca.[20] While some of these differences may be accounted for by the greater dominance of cemetery or of sanctuary finds at different sites, there seem to be some implications for the way in which Corinthian pots were marketed.

Fine pottery is unlikely to have formed of itself a complete cargo in any vessel, as even those will admit who in the debate about its value have championed a relatively high value for it.[21] The significance of the increasingly wide and specialized distribution of fine pottery during the last quarter of the eighth century depends upon how it relates to other goods, and in particular to the movement of agricultural produce and raw materials, particularly metals. The closest that we come to seeing directly the traces of the movement of agricultural produce comes in the distribution of so-called SOS amphoras, vessels probably mostly made in Attica and marked with neck decoration whose squiggles and rings sometimes look like the letters SOS, and seem likely to have been applied to enable rapid "brand recognition." Such vessels were made for a period of some 200 years, but already by the end of the eighth century they had reached sites in Crete, the Ionian sea, southern Italy, Etruria and Sicily, and also to Cyprus and Al Mina in the eastern Mediterranean and even to Spain in the west.[22] Many of these are not sites which receive Athenian fine pottery in either the later eighth or the seventh century, suggesting that, at the very least, demand for prestigious olive oil, which is what these amphoras most probably carried,

[18] Coldstream 1968.

[19] Payne 1931; Amyx 1988; Benson 1989; Neeft 1991.

[20] Shanks 1999: 181–9.

[21] The case against pottery having high value is made by Gill 1991 and Vickers and Gill (1994). The opposition has been led by Boardman 1988a; 1988b.

[22] Johnston and Jones 1978.

was not sufficient to create a market for fine pottery from the same origin. Fine pottery may not have been a specialist trade item by 700 BC, but it is at least highly plausible that those engaged in exchange between Greece and Italy chose where they picked up their fine pottery with the same care that they exercised in selecting whose oil they carried.

Imported goods at Greek sites and Greek goods outside Greece thus show a broadly similar pattern of distribution by the end of the eighth century. That is, quite a range of imported goods from the Near East was available to Greeks, but different eastern items were in demand in different places and for different purposes. The range of Greek items from different Greek cities which found their way to sites in Sicily and Italy and to some Near Eastern sites was perhaps less extensive, but there seems to be a similar pattern of different items being in demand in different places. Two different sorts of explanation might be held to account for these patterns. On the one hand, the patterns might be the result of somewhat sporadic contact, as in a pattern of exchange where occasional subsistence crises determined the exploration and exploitation of particular markets. On the other hand, the patterns might be the result of a relatively high level of knowledge and a relatively high frequency of contact, leading to discriminating demand and indeed to discriminating supply. That the second model may be the correct one is suggested by the way in which the patterns of contact revealed by imported goods are not random: certain Greek sites seem consistently strongly connected with particular Near Eastern sites over relatively extended periods of time (as Samos with Egypt); equally, different sites, and even different sites of the same type, often show very different patterns of contact (a notable case involves the very different assemblages of the two major Corinthian sanctuaries, of Poseidon at Isthmia and of Hera at Perachora).[23]

(b) *The Greek World c. 500 BC*

Some aspects of the material evidence from c. 500 BC is directly comparable with the evidence from c. 700 BC. As the table of results of archaeological surveys from the Greek mainland and Aegean above shows, the archaeological record from the countryside is richer in c. 500 BC than it was c. 700 BC. Areas with some Geometric rural occupation have greater archaic occupation, and areas with little or no Geometric occupation begin to show signs of small rural establishments, although the residential status of these is not always clear. In most areas that have been surveyed there seems to have been a modest increase in evidence for human presence in the countryside, but in one or two cases the change seems to have been dramatic, so dramatic

[23] See, briefly, Osborne 1996a: 95–8.

that their explanation demands something more than gradual population growth or changes in residential fashion.

Most notable of all is the case of the territory of Metapontum, where there is clear evidence for the division of a very large area of countryside (almost 20,000 ha.) into a regular grid plan in the second half of the sixth century. This land division is accompanied by an explosion of rural settlement: in a survey area of 31.5 km^2, the number of sites identified as farms rose from five in the first half of the sixth century BC to sixty-six in the second half (and then further to 116 in the first half of the fifth century). Palaeobotanical evidence shows a marked increase in olive pollen in the late sixth century. There is much that is not yet understood about this territory, but the dramatic evidence strongly suggests that land ownership and distribution were politically important, and that the produce of the land was, and was expected to continue to be, foundational in the city's economy, something further supported by the ear of grain that became Metapontum's coin type when she began to mint silver in just this period. Scholars have wanted to link Metapontum's land division to a political revolution in which tyranny was overthrown, but whatever the political circumstances, the implications for the Metapontine economy cannot have been trivial.[24]

We know of some later Greek settlements abroad which attempted to divide land equally from the beginning.[25] Archaeology has been unable to produce evidence for regular land division or for inalienability of land from the earliest years of Greek settlements abroad; regular division, of both rural and indeed urban territory, appears as a secondary phenomenon, marking a moment of conscious (political) reform, and dates no earlier than the end of the seventh century.[26] Regular land division on this massive scale implies strong state institutions and a conception of inhabitants as having equal stakes, presumably by virtue of some notion of citizenship. This land division also presupposes a measure of prosperity and economic confidence. Such prosperity is even more evident in urban land division, which demands the laying out of streets and construction of new buildings. At Selinus in the early sixth century, half a century after the city's foundation, the settlement was completely replanned, with spacious blocks laid out and quickly built upon.[27] Here, however, the grand scale of domestic structures is dwarfed by a massive program of temple building which sees nine temples, several of them extremely large (temple GT of c. 520 measured 50 × 110 m.) and

[24] Carter 1990a; 1990b.

[25] So, most clearly, the third-century settlement at Black Corcyra (*SIG*^{3} 141). See more generally Burford 1993 for the most important evidence.

[26] Di Vita 1990; Métraux 1972; I harbor considerable scepticism about the ingenious work of Tréziny 1999. For the Greek mainland see Boyd and Jameson 1981.

[27] Di Vita 1990: 354.

some with elaborate sculptural decoration, constructed in the eighty years from c. 560 to c. 480 BC.

The earliest Greek temples were constructed in the eighth century.[28] Although some eighth-century temples were very large (one hundred feet in length), in terms of construction they merely magnified the domestic. The stone temples in the Doric and Ionic orders, with tiled roofs and, in some cases, sculpted stone reliefs, that have become the hallmark of Greek architecture were an invention of the late seventh and early sixth centuries. By the end of the sixth century every self-respecting community had built a stone temple for itself, often on a massive scale.[29] Such temples were probably the largest investment made by most archaic cities, and were enormously demanding both in manpower resources and in technical expertise. The latter is indicated by the fact that treatises by architects about their work seem to have been some of the earliest works of Greek prose. At Metapontum monumental stone temples were built both in the town (one with sculpture) and in the countryside, where the temple at Tavole Palatine was built in the second half of the sixth century, more or less at the same time as the rural land redivision.

If stone temples marked sanctuaries as places of communal investment, individuals had also disposed of significant amounts of wealth by dedicating it in sanctuaries already in the eighth century, but the sixth century saw the development on the Greek mainland and in the Aegean of dedicating large stone statues. Snodgrass has suggested that it would be reasonable to calculate that on average some 270 tons of stone for sculptural monuments was being transported by sea each year from the middle of the seventh century onwards.[30] Building stone was not always brought so far, but the size of individual blocks (up to 73 tons), not only reveals the labor demands of these building programs but is itself proof that it was manpower unaided by technical devices such as the block and tackle which was responsible for moving them.[31] When we add to these religious demands that it was also during this period that the earliest stone-built city walls were constructed, the scale of public demand for labor becomes even more significant. More significant indeed than in the classical period, when block-size for buildings falls as technical devices materially assist human effort in these enterprises, and when bronze takes over as the normal material for free-standing statuary.

Building programs in the classical period can be shown to have exploited the agricultural year, concentrating in months when labor was not in such high demand in the fields, but the economic significance of these projects

[28] Mazarakis-Ainian 1997; Osborne 1996a: 89–90; Morris 2000: 273–6.

[29] Osborne 1996a: 263–4 gives a list of some fifty seventh- and sixth-century temples whose stylobates measure more than 10 m. in width.

[30] Snodgrass 1983. [31] Coulton 1974.

is only minimally affected by such considerations. The economy of the eighth-century city seems to have supported relatively few who were not full-time producers of food. Sixth-century cities seem to have been on average distinctly larger communities, but their economies had to support not just larger absolute numbers who were at best part-time food-producers but a larger proportion. Although few cities built continuously, and few sustained a steady demand even for stone sculpture, the distribution of sanctuaries with substantial stone temples, significant accumulations of free-standing stone sculpture, or extensive city walls, encompasses small cities not known to have had special resources as well as large and well-resourced cities. Whether cities resorted to corvée labor, whether they raised money by taxing all or some of their residents (literary sources refer to archaic taxes on produce), or by obliging a few rich members to fund large projects (as in the "liturgy" system well known in classical Athens), it remains the case that the economy of Greek cities in general could in the sixth century reckon to support a sizeable workforce to devote to non-productive activities.

How was this possible? If we pick up the story of the distribution of Greek pottery from where we left it in c. 700 BC, the seventh century yields a pattern in which Corinthian pottery comes to be found all over the Greek world, but where different sites attract different assemblages of Corinthian pottery.[32] Fine pottery from quite a wide range of other Greek cities comes to have at least a limited circulation outside the city itself. Some of the best studies of distribution are those of Laconian (Spartan) pottery. With this pottery the strongly contrasting preferences of different sites and areas are particularly clear.[33] But Laconian pottery also shows another pattern: it reaches a wide range of sites in the later seventh century, and a much narrower range of sites a century later. This is not least a reflection of the increasing prominence of Athenian pottery. Mid seventh-century Athenian pottery is hardly found outside Attica and Aegina. Sixth-century Athenian pottery replaces Corinthian pottery as the standard fineware pottery. Exactly why this change occurred is not clear: scholars talk of a decline in the quality of Corinthian pottery, but the Athenian pots which take over the market are generally different in shape and not direct competitors. It looks as if the demand for pottery changed, with perfume jars and jugs going out and cups and amphoras coming in (Ionian cups dispute the market with Attic in the west as well as in the Black Sea). But if demand changed with regard to shape and use, the nature of the market remained constant: with Athenian sixth-century pottery, as with Corinthian pottery earlier,

[32] On Proto-Corinthian see Shanks 1999. No full discussion of the distribution of Corinthian pottery exists, but hints can be gleaned from Neeft 1987.

[33] Nafissi 1989.

different sites acquired different selections, and those selections do not even show particularly strong regional patterns. If differential distribution suggests that pots are being moved by those regularly enough involved in exchange of goods to know the particular local preferences of those living at particular sites, then the evidence is that Athenian pottery was being moved by men who knew local preferences very clearly and precisely.[34] By the end of the sixth century we have one very marked example of this: an Athenian vase-painting workshop associated with pots signed by one Nikosthenes took to imitating the distinctive shapes of Etruscan *bucchero* pottery and exporting pots of particular shapes to particular Etruscan cities.[35]

Further evidence that the same Greek ships plied to and fro more or less regularly, with cargoes not restricted to luxury goods, comes from Egypt. Egypt was unusual, in that, at the insistence of the Egyptian authorities, Greek contact was funneled through one particular site, Naucratis.[36] But this insistence that exchange be concentrated at that one site has the advantage of increasing our confidence that what is revealed by the excavation of Naukratis applies to contact between Egypt and the Greeks more generally. One feature of the archaeological record at Naukratis points particularly strongly to repeated visits by the same Greek ships. This is the presence at Naucratis of Chian "chalices" which have painted upon them, before firing, dedications to particular deities from particular donors.[37] Although scholars have speculated about the possibility of local imitation vessels or the transport of Chian clay to Naucratis, the most plausible explanation is that these pots were ordered from Chios, with specific instructions as to what should be written upon them. That this is not an isolated phenomenon, but involves quite numerous sherds, strengthens the case for regular plying of the sea routes to Naukratis.

Evidence for what was being moved back and forth between Greek cities and Egypt is sparse, and the content of archaic trade at Naucratis cannot be definitively determined.[38] Because of the regularity of the Nile floods, Egypt could supply cereals more reliably than any other part of the Mediterranean, and it was also a source of linen and papyrus; on the other hand it needed wine and oil, and also silver. Egyptian hoards have provided some of our best evidence for the chronology of archaic Greek coinage, but those hoards make it clear that it was as silver, not as coins, that the Egyptians were keen on Greek coins (the coins are often damaged and are clearly treated as bullion). But although silver coins were clearly prestige items, not even they can be regarded as the equivalent of the exotic manufactured goods prominent in eighth-century exchange. Naucratis enjoyed what is very likely to have been a unique status among Greek settlements, a classic "port

[34] Osborne 1996b. [35] Tosto 1999. [36] On Naukratis see Möller 2000.
[37] Möller 2000: 136–40 and 167–8 for the evidence. [38] Möller 2000: 209–14.

of trade" at the junction of two quite different economic systems,[39] but the exchange of goods which sustained and justified it was not the exchange of luxury potential gifts but of more or less basic commodities.

The economic significance of the pattern of marketing pottery lies in the degree of knowledge of supply and demand that it suggests. The better potential consumers know what they can get where, the more likely they are to acquire what they want. This applies not simply to manufactured goods, like pots, but also agricultural products and particularly to those which are processed. One aspect of this relates to the uncertainties of the Mediterranean climate: interannual variability leads not infrequently to years of shortage or of glut. Horden and Purcell have stressed the role of wine and olive oil in turning temporary labor surplus into storage and redistribution credit. Improved knowledge of supply and demand both enables short-term shortage to be met from short-term glut, and enables longer term strategies of agricultural labor investment. But improved distribution of knowledge also enables specialization, not simply in a particular crop, but even within that crop in exactly what one makes from it. Foxhall has pointed to the importance of what she terms "semi-luxuries" – particular sorts of wine or oil or honey, instances of goods that may be widely produced but where local production values may lead to one particular form of the product having a certain cachet.[40] Together these features point to the ways in which increased knowledge of the market enables marked increases in agricultural efficiency by matching supply to demand. Marketing a distinctive product in a distinctive container may be what was already happening with the olive oil carried in SOS amphoras; by the sixth century a whole array of distinctive amphora types had been developed, although amphora shape was not of itself sufficient to indicate the particular origin or nature of the goods inside.[41]

The greater knowledge upon which improved communications depended may in part have been enabled by writing. Before 700 BC most extensive inscribed texts are metrical, and there is little sign of use of writing for necessary communications between people.[42] The earliest formal texts of city decisions date from the end of the seventh century and take the form of inscriptions outlining civic procedures. It is not until the fifth century that the inscribed text of an official agreement between states about settlement of disputes arising between their citizens survives, but it is highly probable that such agreements began in the sixth century.[43] What we do have from the sixth century is a number of personal communications relating to trading activity. In the most famous of these, a lead letter found at

[39] This is the core argument of Möller 2000. [40] Horden and Purcell 2000: 216; Foxhall 1998.
[41] Johnston and Jones 1978; Dupont 1998; Dupont 2000. [42] Powell 1991.
[43] For the earliest surviving agreement see Meiggs and Lewis 1969: no. 31. On these agreements more generally see Gauthier 1972.

Berezan,[44] one Achillodoros writes to his son that a certain Matasys has deprived him of his cargo and is reducing him to slavery on the grounds that he, Achillodoros, is in fact a slave of one Anaxagores who himself has laid claim to Matasys' property. What is significant here is that the various parties involved know each other: no explanation is needed to the son as to the identity of Matasys, and it appears that Matasys himself has been moving back and forth between cities. In other words, here we have a network of regular exchange relations, where the actors travel back and forth frequently enough to form involved relationships with one another, and we have no reason to think that the surviving lead letter was not part of a much more extensive written correspondence.

If writing had some economic consequences, the archaic "invention" with the most far-reaching economic implications was coinage. Not that coinage necessarily had immediate economic consequences: bullion would have fulfilled the role that Greek silver coinage fulfilled in Egypt equally well. But how far was that true within the Greek world proper?

The earliest coins are made of electrum, an alloy of gold and silver, sometimes referred to as "white gold," which occurs naturally in Lydia. The coins were found in a deposit at the temple of Artemis at Ephesus. Herodotus says that the first people to strike coins were the Lydians themselves, adding that they were also the first retail traders (*kapeloi*) (1.94.1). Although persistent attempts have been made to date the origins of coinage back to c. 700 BC, a date at the very end of the seventh century is more likely. That the earliest coins were indeed Lydian seems very probable, but it was within the Greek world that the idea caught on, first among the cities of Ionia, which also began to mint electrum, and then in the rest of the Greek world, where from c. 550 BC onward silver coinages were minted. If the first coins were Lydian then it is not appropriate to try to explain their appearance in terms of the Greek economy; but the question of whether the rapid spread of coinage in the Greek world had either economic reasons or economic effects is an important one.[45]

The utility of coinage rests in the way in which it can serve a number of functions which previously had not been served by a single medium. That is, coins measure value, store wealth, and can constitute a medium of exchange. The assessment of value does not depend upon measuring it against a single common measure: we meet a number of measures of value in earlier Greek literature (cattle appear as a measure of value in some circumstances in the Homeric poems). Payments can be stipulated in terms of particular objects as well as in terms of an abstract value, and some

[44] Bravo 1974; Dubois 1996: no. 23.

[45] For recent general discussions of the origin of coinage see Howgego 1995: 1–18; Osborne 1996a: 250–9; Kurke 1999: 3–23; Kim 2001; Seaford 2004.

Greek cities went on stipulating fines in terms of metal vessels, etc., even once coinage was available.[46] Wealth can be stored in a variety of forms, with precious metal objects sharing at least some of the useful properties of coinage. But it is perhaps as a medium of exchange that coinage has potentially its greatest transformative effect, and upon the way in which people thought as well as the way in which they acted: Heraclitus talks of the exchange of goods for gold and gold for goods when he wants a familiar image by which to introduce his readers to the idea that all things might come from and return into fire (DK fr. 90).[47]

Various aspects of early coinage cast some doubt, however, on whether coinage did effect any immediate revolution in exchange. The first is the fact that early coinages are of electrum. Electrum is both very valuable and of uncertain metallic content. Although Lydian electrum coins seem to vary less in their proportions of gold to silver than does naturally occurring electrum, nevertheless variation does still occur, and no one who took a coin could be quite sure what they were getting in metal. That there was perhaps an element of "token" to the earliest coins might indeed well explain the point of stamping the standard weights of the metal in the first place: the stamp could act as an indicator of origin and a guarantee that the coin could be exchanged at a standard rate within the area of authority of the stamping body. But if that is true, then the converse is likely also to apply: that there could be no certainty of the coin being accepted as of a standard value outside that area of authority. This is compounded by a second aspect. From the beginning different mints seem to have minted according to locally prevailing weight standards, and in consequence standard coin weights, and with them values, were significantly different from place to place. If coins have an advantage over bullion that they can be counted rather than weighed, this advantage is countered by the use of different standards.

The use of local weight standards links in with another remarkable feature of archaic Greek coinage: that coins are not issued simply by cities with access to a suitable precious metal, but are issued by a very large number of cities. In a very large number of cases the minting body had to import the silver (or electrum) from which to mint its coins. There is unlikely to have been any economic advantage to doing this, rather than simply using another city's coins (as Cretan cities seem to have done). To mint a coinage, and to do so to a weight standard that either did or did not correspond to the standard used by one's neighbors, was clearly a political and not simply an economic matter.

It has sometimes been suggested that the explanation for the spread of coinage should be seen as entirely political. The great thing about coinage was that it gave an easy way of making, and receiving, standardized

[46] Von Reden 1997b. [47] Seaford 2004.

payments, such as cities might need to give to state officials or mercenary soldiers or to receive from residents as taxes. Political developments during the archaic period can be seen to have favored standardized measurement of citizens (see further below), and coinage fits into that picture by turning precious metal, the classic gift, into a commodity.[48] Even if we do put stress on the political, therefore, it is on an aspect of politics with extremely strong implications for how economic transactions and relationships were conceptualized.

The way in which Herodotus (1.94) links the Lydians being the first to mint coins with their being the first retail traders is very suggestive of the implications of coinage as he saw it in the late fifth century. None of the drawbacks to archaic coinage as a means of exchange between different Greek communities, or between Greek communities and the outside world, applied to exchange within the city, and it has become increasingly clear that the picture of ordinary citizens manipulating tiny coins for small everyday market transactions, familiar from Aristophanes, was equally possible in the sixth century, when abundant fractional coinage was already available.[49] This is peculiarly important. Exchange between communities will often necessarily have been between parties unknown to each other or at least parties who were not engaged in everyday social and political exchanges of other kinds. Exchange within the community was not like that: as Hesiod's remarks in *Works and Days* emphasize, economic exchanges between neighbors were necessarily social, and brought definite social obligation, even if the scale of the obligation could never be well defined. The introduction into the sphere of neighborly exchange of a common standard of value and means of payment arguably changed the nature of these transactions: by giving exchange items a value in terms of a commodity which was not affected by season, condition, or supply and demand, the introduction of coinage into transactions within the city made the complete discharge of obligations possible and indeed normal. Parties to an exchange might continue to desire that there should be an uncertain social residue to their exchanges, as mistresses (*hetairai*) might desire to distance themselves from prostitutes (*pornai*), or lovers (*eromenoi*) to keep away the charge of being rent-boys, but coinage offered the possibility of eliminating that residue for the party who so desired.[50]

Issues of the nature of the social relations involved in economic transactions have taken us out of the range of questions which it is easy to answer from the archaeology, and into areas for which literary texts are a necessary guide. In the third part of this chapter, in parallel with this early survey of

[48] Compare von Reden 1995a: 171–94. [49] Kim 2001.

[50] Davidson 1997: part II; von Reden 1995a: pt. III; on *hetairai* and *pornai* see Kurke 1999: ch. 5, although I find much of the detailed reading of texts unpersuasive.

the material evidence, I look at what we can learn from surviving literary representations of economic transactions.

III THE LITERARY REPRESENTATION OF THE ECONOMY

(a) *The economy c. 700: the* Iliad, Odyssey, *and* Works and Days

The *Iliad* and the *Odyssey* lie at the end of long oral traditions which it is reasonable to believe have their roots in the Bronze Age.[51] There has been much scholarly debate both about where the end of the oral tradition lay, with some scholars maintaining that the poems reached the form in which we have them only in the sixth century, and about what, if any, historical reality is being presented in the "realistic" parts of the poems.[52] For current purposes I will presuppose, as I believe to be most plausible, that the poems were circulating in something close to the form in which we have them by shortly after 700 BC, and that the presentation of "daily life" offered in glimpses in the *Iliad* and *Odyssey* reflects at least the image, if not the reality, of life c. 700 BC.[53]

The *Iliad* and the *Odyssey* are imaginative literature, set in a time of heroes whose physical strength is explicitly said far to exceed that of the poet's contemporaries. Much that the heroes do is a projection of fantasies. Heroes regularly feast on meat (e.g., *Il.* 8.545–7, 9.459–74), not bread: this should not be taken as an indication of a pastoral past in which meat was the staple diet, but as the creation of a larger-than-life world by treating the exceptional feasts of contemporary festivals as regular fare.[54] Quantity, quality, and frequency are highly susceptible to being heroized: the world of the past was bigger and better and enjoyed the good things of life more often. But it is important that those who hear or read literature can make sense of it: behind it all there needs to be a structure that is more or less familiar, the reader or listener must be able to imagine what is being described.

Agriculture remains very much in the background in the Homeric poems: in the *Iliad* agricultural tasks emerge in similes (e.g., *Il.* 4.433–5, 5.499–502, 10.183–6) or as part of the background to the remarkable scenes of the city at peace which Hephaestus creates on the shield of Achilles (*Il.* 18.541–9). In the *Odyssey* agriculture is very much the norm against which are contrasted the fantastic places to which Odysseus travels, and the perversions of the Suitors who compete for Penelope's hand while he is away. The

[51] West 1988; Sherratt 1990; but for questioning of this view see Powell 2002.

[52] For a long fluid tradition see Nagy 1996. For arguments about the necessary contemporaneity of the realistic parts of the poems see Morris 1986a, and compare Griffin 1986.

[53] See further Osborne 1996a: ch. 5, 2004b.

[54] For contrary claims about Dark Age pastoralism see Snodgrass 1980: 35–6.

absence of ploughing and sowing is one thing that marks the Cyclopes out as uncivilized (*Od.* 9.105–15), and Eumaios the swineherd marks out the excesses of the Suitors as much by the agricultural rhythms of his life as by his fidelity to his master.[55] When, in the final book, Odysseus visits his father Laertes on his farm, the careful description returns the reader or listener from the violent slaughter in the palace to a familiar world, much as a man in Homer's own world might return home from the slaughter of the battlefield. Grain is the staple food in this world, and wine the staple drink (*Il.* 5.341–2); pigs are kept for sacrificial feasts and goats for milk and meat; ox-sacrifices form noteworthy occasions (*Od.* 3.5–11). If most labor goes into producing grain, pride and care go into vegetables and fruit (*Od.* 24.244–7, 336–44).

For the Greeks at Troy, all supplies have to come from abroad, but when ships from Lemnos arrive in *Iliad* 7.467–75 they bring wine, bronze, iron, hides, oxen, and slaves. Most of the items on this list would have been necessarily items of exchange for most Greeks. The inclusion of wine on the list fits with the identification of the wine with which Nestor and Circe feast their visitors as "Pramnian" (*Il.* 11.639, *Od.* 10.235), and suggests that wines were differentiated and that people might go to some trouble to acquire particular sorts or origins of wine.

Stories told by various characters in the *Odyssey* feature non-Greeks plying the seas to acquire and dispose of items in exchanges unlikely to encourage further contact. The fullest and most important of these is Eumaios' story in *Odyssey* 15.390–484. He tells of the visit of Phoenicians carrying "ten thousand charming things" to his father's city on the island of "Syria," of how they visited the palace, seeking to sell gold and amber jewelry, made the acquaintance of the young Eumaios' Phoenician nursemaid, herself once kidnapped and enslaved by "Taphian" pirates, and of how, at the end of their year of trading, they took the nursemaid off with them, promising to take her home, and she took Eumaios with her. Here is an image of exchange which is neither based on supplying subsistence needs, nor a matter of disposing of goods quickly so as to move on "down the line." These traders stay to learn about their market, and to become trusted, but they accumulate this knowledge not to deploy future visits more efficiently but to maximize the gain from a single stay. Just as on some previous occasion Taphians had visited and Eumaios' father had taken the one-off opportunity to acquire a skilled and exotic slave, so now the Phoenicians offer a one-off opportunity to acquire exotic goods.

Between them, these two episodes from *Iliad* 7 and *Odyssey* 15 suggest that the audience of the poems was aware of the possibilities both of relatively regular exchange, for items basic to Greek life but themselves irregularly

[55] Vidal-Naquet 1970.

distributed over Greek lands, and of irregular exchange for items of low bulk and high value. Ships are a source both of items crucial to survival as a Greek (cattle for sacrifice, bronze for armor, iron for weapons and agricultural tools [as at *Il.* 23.826–35]), and of items by which individuals within a community set themselves apart. The context in which they use exotic items to set themselves apart is primarily the gift exchange: exotic goods derive ultimately from merchants, but subsequently they circulate as gifts. The silver mixing bowl which Menelaus takes from his store chamber to give to Telemachus at *Odyssey* 4.615–19 is presented as having been a gift to Menelaus from Phaidimos king of Sidon.[56]

Hesiod's *Works and Days*, a piece of "advice literature," has little interest in goods that set individuals apart. He knows that the desire for such items can be manipulated so that gifts turn into bribes (*Op.* 38–9). But his basic concern is with the acquisition of items basic to Greek life. At one point the poet imagines consuming Byblian wine (*Op.* 589), but in general he is concerned with the production of what is needed for subsistence. The poem is framed as advice to his brother Perses that he should secure his livelihood by hard agricultural work, rather than by quarrels and disputes. Hesiod's world is one where justice and hard work guarantee prosperity, where it is particularly important to deal fairly with a neighbor (*Op.* 342–51), and where one borrows at one's peril.

For all that, however, Hesiod is well aware of the profits to be had from selling goods abroad. He presents himself as a hater of the sea, but he recognizes trading as a route out of debt and hunger, representing his own father as one who took to the sea to escape poverty (*Op.* 631–40). The risks of sailing are such that, Hesiod advises, one should not put all one's goods in a single ship, but he nevertheless also advises filling a large rather than a small ship, since the bigger the cargo the bigger the profit (*Op.* 689–91, 643–5). The implications of Hesiod's giving information on the right and wrong season of the year for sailing is that to choose to trade is to choose that as a regular pursuit, not an occasional one. Hesiod's expectation seems to be that markets can always be found for the sorts of goods that inland Boeotia produces, not that one simply takes periodic advantage of good harvests or of poor harvests elsewhere.

Dependent labor of various forms (hired women, bought slaves) appears in *Works and Days*. But Hesiod presents a world of small economic units, as if the audience for the poem would undertake agricultural tasks and sailing the seas personally. This, along with his belief that the supply of good things is limited, has caused his world to be labeled a "peasant" world.[57] But another marked feature of Hesiod's world is the very limited social hierarchy that is visible. Of superiors, only the rulers who settle disputes

[56] See further, and differently, von Reden 1995a: pt. 1. [57] Millett 1984.

are ever visible. Everyone else appears to be like Hesiod himself, except for dependent laborers and the craft specialists, the rival potters mentioned in passing, and the blacksmith whose forge is a tempting place in which to spend time in winter. Just as Hesiod's world is morally over-simplified, so it is socially over-simplified: Hesiod's presentation of the individual as in charge of his own destiny is a convenient fiction, forgetful of relationships of power. The poem is a vehicle for moral teaching, not a descriptive sociology.

(b) *The economy c. 600: Making sense of Solon*

The imagined community of most surviving poetry after Hesiod is, like Hesiod's, the community of the poet into which the reader or listener is invited as if a member. Much archaic lyric and elegiac poetry is indeed about relations within the poet's imagined community, and in particular about political, social, and personal relations. Much of the poetry is about the construction of a personal identity, setting up behavior for emulation or avoidance, challenging or confirming values assumed to have more general currency. Much of the poetry plays with ideals paraded already in the poetry of Homer and Hesiod, where martial and sexual prowess, the ability to speak well, and the ability to do well by one's friends and harm one's enemies, through gift and act, are all in play. Just as the description of the suitors of Penelope in the *Odyssey* shows how the same values set forward as admirable in one context can be redescribed as despicable in another, so archaic poetry plays with the possibility of redescribing behavior in less as well as more flattering terms.

The relationship between the projection of a poetic persona and the conduct of social relations more generally is not an easy one to deduce: continuing to play an anachronistic game can be ironically knowing or aggressively reactionary. Distinguishing between the two demands making assumptions about context, but we rarely have the evidence on which to base such assumptions. We come closest to being able to control the context where the poetry can be most closely linked to a particular political situation, and for archaic poetry this means with the poetry of the Athenian Solon. Because Solon came to be regarded in the classical period as the man to whom Athens owed its classical lawcode, much ancient scholarly effort was made to excavate Solon's politics from his poetry. The poetry indeed invites this, as Solon uses the poetic medium to defend his political actions.

Some lines ascribed by some ancient writers to Solon appear also in manuscripts of Theognis (e.g., fr. 15 = Thgn. 315–18, fr. 24 = Thgn. 719–28), but Solon distinguishes himself from Theognis and other archaic poets by his interest in the people. Declaring that he gave them as much honor as was sufficient for them (fr. 5), he expresses concern about how they fare under a sole ruler (fr. 9) and about the effect of "great men" on the community as

a whole. Most importantly, in terms of the representation of the economy, he claims to "have brought the people back together again" (fr. 36.1–2), that the "black earth" is a witness to this, to which he gave back freedom by tearing up boundary markers (fr. 36.5–7), that he restored to Athens many who had been sold abroad, fleeing debt, and freed others who had been enslaved at home (fr. 36.8–15). What exactly these poetic claims refer to, and how Solon achieved what he boasts of has been debated ever since the fourth century BC. Ancient authors already took sides on whether or not Solon enacted later revolutionaries' calls for land redistribution and the cancellation of debt. In terms of the representation of the archaic economy, what is important is that the economic relationship between the elite and the rest of the community has become a political issue, and that that issue turns on personal labor and on access to land.

Poets would go on for many years after Solon imagining the world of the gift. Much of the poetry of Pindar and of Simonides in the late sixth and early fifth century continues to explore the power of the gift in social relations.[58] But Solon reveals the possibility of imagining a world where the gift has lost central place even in political relations. That such a world was indeed the world of sixth-century Athens is suggested by Solon's own reputed division of the Athenian people into census classes according to wealth, and the use of those census classes to determine access to political office. Hesiod's was a world in which land, and farming it productively, was essential to personal independence; Solon's is a world in which land, and farming it productively, was essential to political status. Personal prowess continued to translate into *kudos* and could give standing within a community, but it could no longer guarantee political status.[59]

What brought about this politicization of the Athenian economy? Crises of over-population or soil exhaustion, though often suggested, are implausible: the archaeological evidence for rural exploitation of Attica suggests that it had reached nothing like its classical intensity during the archaic period. That the growth of the archaic economy brought relatively sudden wealth to some, is not implausible, but interannual variability had always brought sudden enrichment and sudden impoverishment, and the evidently increased political competition should be related to the absolute size and increasing need for self-regulation in communities, and not primarily to economic change. The Solonian crisis was a crisis in social relations and the distribution of political power. Increased political competition is seen in the attempted coup of Cylon in the late seventh century, in the attempt by Damasias, shortly after Solon's reforms, to retain political power after the end of his archonship, and in the eventual tyranny of Peisistratus. Increased social tension may be behind the lawmaking activity of Dracon,

[58] Kurke 1991; Carson 1999. [59] On athletics and *kudos* see Kurke 1993.

a quarter of a century before Solon. Solon ruled out the enslavement of fellow Athenians for debt, and seems to have put an end to the underclass of sharecropping *hektemoroi* ("sixth-parters"). Whether such actions are more plausibly presented as Solon preventing social relations being turned into economic relations, or preventing economic changes leading to pressure on established social and political relations is not easy to decide. That there was an economic and social demand for dependent labor emerges from the expansion of chattel slavery at Athens, which appears to be a feature of the sixth century.

The area in which gift exchange continued to dominate politics was in inter-state relations. Throughout the stories which Herodotus tells of the archaic Greek past, gifts are rife.[60] Only when one state was subordinated to another in a tribute-paying arrangement, as in the Persian or Athenian empires, was the relationship between communities commodified in the way that relations within a state such as Athens had become officially commodified. The continued role of the gift in diplomatic relationships between cities opened up the possibility of debating when a gift was a bribe in inter-state relations; within the city there was reduced room for doubt.[61]

IV CONCLUSION

The material evidence from archaic Greece leaves us in little doubt that between c. 700 BC and c. 500 BC the economy was transformed. In both aggregate and per capita terms, consumption and production had increased. Settlements had become larger and more distinctly urban, displaying communal facilities of various sorts, most impressively temples and fortifications. Self-sufficiency can never have been easy to achieve in a world where the climatic variation from year to year was marked, but by 500 BC knowledge of what could be acquired from where had become highly sophisticated, and the network of shipping, and indeed roads, such as to deliver what was desired. Greeks could still imagine a world where there were people who did not know the value of the goods they exchanged, but it is notable that the story in Herodotus which turns on this is set outside the straits of Gibraltar, at Tartessos near Cadiz (Hdt. 4.152). Within the Mediterranean markets could be expected to be broadly inter-dependent.

The literary evidence from archaic Greece supports the idea of an economic transformation. Hesiod and the Homeric poems know of routine exchange relations of a commercial sort, but they know too of outlandish figures who offer outlandish goods and who disappear without trace. In

[60] Gould 1991.

[61] On international relations as personal relations see Herman 1987; Mitchell 1997. On bribery at Athens see Harvey 1985.

their world knowledge of what can be acquired where is imperfect. Such ignorance contributes to the value of the objects within gift exchange. Objects have a value that is unrelated to their price in the market, because there is no market for goods whose value derives in part from their individual history of gift-exchange. By contrast, Solon puts a value even upon the individual citizen, whose political capacity is now determined by his wealth. That there was, broadly speaking, a transition from gift to commodity during the period from the eighth to the sixth century has often been suggested.[62] What I have tried to do here is to trace both the economic background to that change and its political origins.

By 500 BC Greek communities were willing to undertake vast community projects involving huge quantities of labor, serious financial commitments to suppliers of stone from elsewhere, and a timetable that might extend not just to years but to decades. Most harbors saw relatively regular visits from generally well-known ships carrying staples, semi-luxuries, and the sorts of Athenian pottery the community had a reputation for liking. All of this was paid for by coinage which not only enabled direct comparisons and assessment of value for money, but which was the stuff in which, ultimately, the political standing and privileges of the paying citizen were measured. Coinage followed, rather than caused, the commoditization of the world of the Greek city, but it is not inappropriate that it should come to serve as its symbol.

[62] Morris 1986b.

CHAPTER 11

THE PERSIAN NEAR EAST

PETER R. BEDFORD

1 INTRODUCTION

The Achaemenid Persian empire at its greatest extent covered an area from the Indus river in the east to Macedonia in the west, from the Aral Sea in the north to Elephantine in Egypt in the south. It was the largest polity that had yet existed in the world. Cyrus II laid the foundation of the empire when he led a successful Persian rebellion against his Median overlord in 553–550, going on to conquer Lydia in 546 and Babylon, which gave him control of the Near East, in 539. Later kings, notably Darius I (522–486) extended Persian hegemony westwards into Europe and eastwards across Central Asia. In a series of battles over 333–331 Alexander defeated the Persians to lay claim to their empire. The Achaemenid Persian empire thus lasted for slightly over two hundred years. It incorporated a myriad of languages and cultures (some seventy peoples and tribes according to Hdt. 3.90–4), as well as diverse forms of economic subsistence. This chapter focuses on one major region of the empire, the Near East.

Given that the Achaemenid Persian empire inherited and adapted pre-existing economic structures in the Near East, some reaching back into the second millennium, if not earlier, and that any consideration of economic growth cannot be confined to just an analysis of the Persian period, it is necessary to draw out the economic history of the Near East in the centuries preceding the rise of the Achaemenid Persian empire, specifically the period of the Neo-Assyrian (c. 950–612) and Neo-Babylonian (612–539) empires.[1] While this chapter is organized around topics set out in the Introduction – growth, population, urbanization, institutional framework, production and exchange, stock of knowledge – it will become clear that due to the nature of the available sources it is difficult to give each of these equal treatment.

Like "the Greco-Roman world," "the Near East" is a construct. For the first millennium it is constituted by three broad geographical areas: southern Mesopotamia (Babylonia), northern Mesopotamia (Assyria and the area west to the Euphrates), and Syria-Palestine, each with differing

[1] For a preliminary treatment see Bedford 2005.

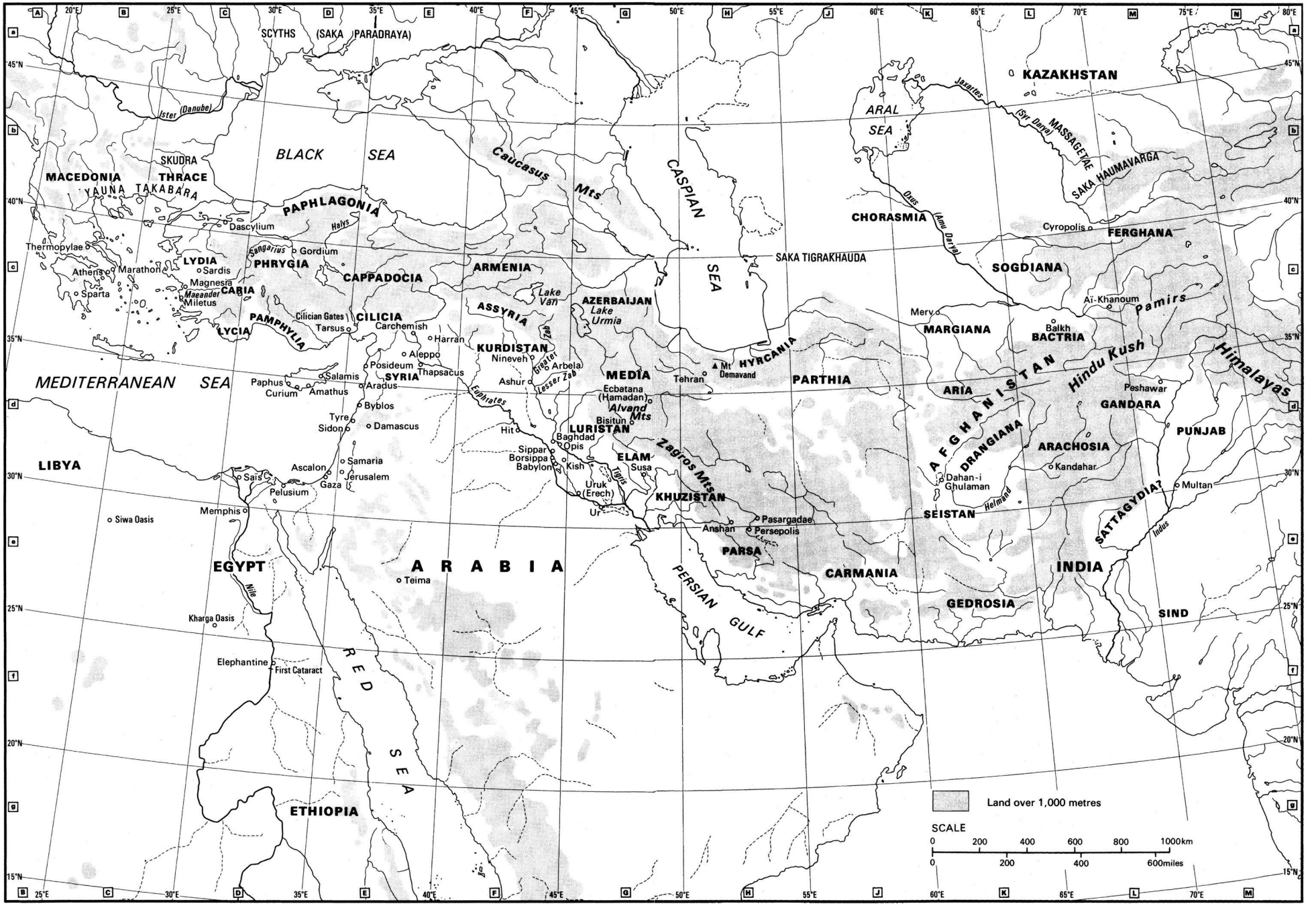
climates, crops produced, modes of exploitation of land and labor, levels of population and urbanization, and types of institutions. While the political unification of these areas under successive empires did indeed have an impact on their economies, it would be preferable to study each area individually. Some attempt is made at this in the present chapter, but the nature and distribution of the evidence remain problematical. For the Persian period much of the documentary evidence on economic matters comes from southern Mesopotamia (Babylonia) and cannot be generalized for the Near East as a whole. The archaeological evidence is predominantly from Syria-Palestine and is similarly specific to that region. Given that the Near East was one (large and important) section of the Achaemenid Persian empire, an understanding of its economy(ies) cannot be divorced from wider imperial economic structures.

II GROWTH

The character of the evidence makes it difficult to measure economic performance in any meaningful way. A case can readily be made for aggregate growth in the first millennium, coming off a low base at the close of the Late Bronze Age, but per capita growth is difficult to prove. Rising living standards of the ruling elites are no guide to the experience of the population at large, and in any case regional differences in economic performance have to be recognized and should be taken into account in the discussion concerning the performance of the ancient economy in general. Production in agriculture in Egypt and Mesopotamia was quantitatively so much superior to the production in Attica or Latium, that even if the latter regions experienced substantial growth and the former not, the performance of the former remained much better. Within the Achaemenid Persian empire one should undertake separate studies of southern Mesopotamia (irrigation agriculture), northern Mesopotamia, northern Syria, the Levant and Asia Minor (rain-fed agriculture), southern regions (Syrian steppe lands, suited only for extensive grazing). Other factors are the existence of rivers (for the water supply of humans and animals; as transportation routes) and ports (for any imports or exports).

Regional propensities for growth are highlighted when we focus on southern Mesopotamia (Babylonia). Date cultivation, a regional specialization, and barley were the two staples of agricultural production, while millet, sesame, watercress, mustard, garlic, onions, and leeks were also grown. Flax was grown to produce linen textiles. Sheep were important for the production of woolen textiles, as well as for meat; bovines were bred for traction, and for meat.[2] In the Achaemenid Persian period returns on the

[2] Potts 1997: 56–90, on agriculture and diet.



Map 11.1 The Achaemenid empire
Source: Boardman et al. 1988: 2–3

barley crop in the alluvial soil could often be 1:16 to 1:24, although 1:12 was common.[3] In order to obtain these returns investment was needed in the building and maintenance of canals and levees since agriculture was dependent on irrigation. Also, sufficient labor, draft animals, and agricultural tools were needed to take full advantage of the cultivatable area. Due to the fertility of the soil and the use of the seeder plough the soil could be densely sown. In the Persian period, indeed beginning around 650 (or earlier), agricultural production was flourishing in comparison with earlier in the first millennium, paralleled by an increase in population, and we should probably speak of economic growth in this period. In comparison, for example, with the Ur III period (c. 2100) where seeding rates were about 55.5 liters of seed per hectare of barley, producing about 1,200 liters per hectare (1:21), agriculture intensified in Neo-Babylonian and Persian periods with seeding rates of 133.3 liters per hectare at Nippur, yielding around 2,000 litres (1:15).[4] While the seed: yield ratio is lower for the Persian period, the amount produced per hectare is considerably greater.[5] Such intensification must have been dependent on improvements in agricultural technique; control of waterways and canal maintenance, use of animals and tools, and modes of seeding.[6]

While published data from the immediately preceding periods (reaching back into the second millennium) are lacking for comparative purposes, growth in agricultural production was periodic throughout the history of southern Mesopotamia rather than a steady development. There were earlier occasions when due to political organization and sufficient labor this region saw remarkable levels of agricultural production. One thinks here of the early fourth millennium, which led to the rise of urbanism, the Early Dynastic period (c. 2900–2400), the Ur III period, and the Old Babylonian period (c. 1900–1600). Political stability was a necessary but not sufficient condition to promote agricultural growth. In the Kassite/Middle Babylonian period (c. 1600–1200), for example, Babylonia was politically independent and stable, active on the international stage, and experiencing something of a cultural renaissance. Population density and urbanization were at relatively low levels, however, which hampered agricultural production.[7] The Persian period saw a set of conditions, which will be commented on below, that promoted agricultural productivity.

How the agricultural surplus was used is also significant for economic growth. In the Neo-Babylonian and Persian periods it was exploited by

[3] Dandamaev and Lukonin 1989: 130 cite 1:14 as the Persian period average.

[4] Adams 1981: 186; van Driel 1999: 217–18.

[5] Ur III: 1,200 liters yield minus 55 liters seed = 1,145 liters/hectare; Nippur: 2,000 liters yield minus 133 liters seed = 1,867 liters/hectare.

[6] For an overview of agriculture in the Neo-Babylonian and Persian periods, see van Driel 1988; 1990.

[7] See Liverani 1988: 606–13 for an overview.

institutional landowners such as temples to promote urban production, particularly for craft goods (for example, jewelry, garments) that were used mainly in the temples, although some of these handicrafts were exported, and a sizeable proportion of the produce was distributed to temple retainers (either those who worked for the temples, both slave and free labor, or who had rights to a temple prebend). The crown was also a major landholder that would have redistributed a part of this surplus to its own retainers.[8] Investment by both temples and the crown in the building and maintenance of canals and levees, as well as the upkeep of farmland, animals, and implements were economic desiderata. There was also a sizeable amount of land in private hands, although since our documentation for Babylonia in the Persian period largely comes from temple archives and the archives of individuals and family "firms" who managed property on behalf of temples and the crown, private landholding is underrepresented in our sources. Thus it is difficult to determine the percentage of private landholding over that held by temples and the crown.

Northern Mesopotamia (the region around the Assyrian homeland and west to the Euphrates river) was a rain-fed agricultural region for wheat and barley that had great potential with a seed–yield ratio perhaps averaging as high as 1:10.[9] Sufficient labor to work the land was again a salient issue. The Neo-Assyrian empire imported peoples from elsewhere in the empire, from Syria-Palestine and Babylonia, into this region as is evidenced by a significant increase in the number and disbursement of settlements in the eighth and seventh centuries.[10] This resettlement must have resulted in increased agricultural production, the like of which may not have previously been known in the area. Part of this surplus was spent on the building and maintenance of Assyrian temples and their cults as well as on the building of new, large royal cities in the Assyrian homeland. Some of this land and labor was granted to senior officials in the imperial administration, who may have used the surplus in constructing regional palaces and urban centers. This practice was developed further under the Persians in their satrapal system. Texts from or pertaining to these settlements and their agricultural production is scant, but Kuhrt contends that the end of the Neo-Assyrian empire did not necessarily result in the demise of all these settlements, so they were potentially a source of considerable agricultural wealth for the Persian empire.[11]

[8] Van De Mieroop 1997: 154–7, 181–5.

[9] Wilkinson 1994: 497; he also notes (484–5) that this region has a variety of land use zones reflecting differing physical geography and climate.

[10] Wilkinson 1995; Wilkinson and Barbanes 2000; Wilkinson 2000: 235–7.

[11] Kuhrt 1995b. For the Neo-Assyrian period, in addition to the works cited in n. 10, see Fales 1973 for the area around Harran; Kühne 1995 for the Habur region; and Fales 1990 on conditions in the Assyrian countryside more generally.

The significance of agricultural production in northern Mesopotamia during the Neo-Assyrian period lies in the fact that it was conducted by a population that arguably would have been less productive, from the point of view of the Assyrian economy, had they remained in their home territories. To be sure, some of this population was resettled in new Assyrian cities, but to generalize, residents of Syria-Palestine, a sizeable percentage of them urban residents as the Assyrian royal annals aver, would have been put into agricultural labor. Similarly, peoples from southern Mesopotamia, mainly Arameans and Chaldeans, many of whom would have been involved in pastoralism, as well as urban Babylonians, were deported and given over to agricultural work in northern Mesopotamia. This should have resulted in overall growth in agricultural production (new workers producing more than they consumed, including the costs of housing; how the resettled, formerly urban, population was organized for agricultural production is not directly addressed in our sources). I believe it would be fair to say, as van der Spek notes for the Seleucid period (this volume), that the resettlement of peoples in northern Mesopotamia was not the result of an economic plan with the goal of increasing agricultural production. The Assyrian royal annals state that its purpose was to punish recalcitrant vassals and to pacify their territories. But given the likelihood that for Syria-Palestine, at least, peoples from elsewhere in the empire were moved in lower numbers to replace the deported, largely urban, populations, the Assyrians may have been conscious of what they were doing. A similar policy was pursued by the Neo-Babylonian empire, which, taking Judah as an example, deported a portion of its (urban) population and did not replace them. Does this mean that these empires saw no need to replace urban populations in certain subjugated territories because they were of less economic utility? By the Persian period there was one clear outcome of the Babylonian policy of deportations to southern Mesopotamia: a marked increase in the amount of land under cultivation with consequent increases in agricultural production from the region. The Persians' own deportation of peoples to Persis increased in agricultural production, construction, and manufacturing, as evidenced in the Persepolis texts.[12]

By comparison with Mesopotamia, Syria-Palestine was less productive agriculturally due to the nature of the terrain, although it produced regionally specialized produce such as wheat, olives, grapes, and wine, along with peas, lentils, and mustard. The Assyrian empire may have had an effect on agricultural production given that David Hopkins interprets the intensification of olive cultivation in Judah during this period to be the result of Assyrian demands, and Gitin sees the establishment of industrial

[12] Aperghis 2001; Briant 2002: 433–5, 439–46.

production of olive oil in the Philistine city of Ekron in the same terms.[13] In Syria-Palestine the long distance trade conducted by the Phoenican cities had steadily increased during the first half of the first millennium.[14] In the early first millennium these cities were involved in regional trade, for example, the spice trade from Arabia, through Israel, to Tyre. The Phoenician coast and north Syria, extending into south-eastern Anatolia formed another zone of economic interaction. By the Persian period Phoenician political control extended from northern coastal Palestine to northern Syria and economically integrated the coastal and inland regions.[15] Most importantly, the Phoenician cities are well known for their trading interests focused on the Mediterranean littoral. Some have suggested population pressure as the impetus for establishing trading colonies, but the colonies were established only after a lengthy period of trading contact. The original impetus seems to have been mercantile at root, later intensified under pressure from the demands of imperial overlords. This trade was an important source of raw materials, especially metals, and the value of this trade steadily increased throughout the first millennium. Expanding trade networks were a feature of the first millennium (see further in section VI below). Investment in infrastructure, such as the famous Persian road system, facilitated trade.[16] Trade with the Gulf region and beyond, which is attested as early as the third millennium intensified under the Assyrians and was a feature of the Persian period economy.[17]

The Persian period should be viewed as a continuation of the Neo-Assyrian and Neo-Babylonian periods, although new developments can be detected that would have underpinned increased economic growth. As will be touched on in the following sections, it is possible to identify increases in population and agricultural production, improvements in institutional framework (specifically in Babylonia), and development in trade, but as with the immediately preceding periods the evidence intimates growth rather than offering the means to measure it. Overall, the evidence points to the likelihood of growth throughout the first millennium, especially given the demonstrable, although largely unquantifiable, increase in agricultural production. But if population was rising (see next section), growth depended on production outstripping population increases. Settlement of deported populations on more productive agricultural land should have facilitated this and underpinned growth. After the political and economic breakdown at the end of the Late Bronze Age economic performance improved, largely on the back of political stability, from c. 1000 onwards. Empires were at different times conducive to or disruptive to economic

[13] Hopkins 1997: 29; Gitin 1997: 87–91, but cf. Schloen 2001: 141–7.
[14] Bisi 1991; Bondì 1991; Liverani 1991; Sherratt and Sherratt 1993; Aubet 2001.
[15] Lehmann 1998. [16] Graf 1994; Briant 2002: 357–64.
[17] Salles 1990; Potts 1990 for the earliest periods.

growth, but in general the political and economic integration they fostered were positive for the economy. While emphasis is usually placed on the distinctive characteristics of the successive empires (Neo-Assyrian, Neo-Babylonian, Achaemenid Persian), the period c. 750 through to Alexander, at least, might be viewed as a single period – the regimes changed, but the form of polity (empire) and economic policies remained consistent. However, significant drivers of economic growth, such as capital investment, improved technology, and investment in human capital, are barely evident.[18] This means that in an economy based on agriculture there was very slow growth. If we allow 0.1 percent growth per annum, which is probably high, then economic growth over the period 1000–300 was 70 percent. Life at the beginning of the Hellenistic period had improved compared with the beginning of the Iron Age. But as Saller notes, "to say, for instance, that productivity and standard of living improved 50 percent sounds 'significant,' but takes on a different meaning if one adds 'over a thousand years'."[19]

III POPULATION

It is generally assumed that the population of the Near East increased throughout the first millennium, but the clear regional differences again highlight problems in viewing the Near East as an undifferentiated unit. The end of the second millennium saw considerable political disruption in Anatolia, Syria-Palestine, and Upper Mesopotamia which led to a decrease in urbanism (particularly in Anatolia and the northern Levantine coast). Despite population movements – Anatolians into northern Syria, Philistines on the southern Levantine coast – population across northern Syria and northern Mesopotamia may have decreased due to a prolonged period of desiccation.[20] Population levels in these areas begin to recover in the tenth century. Population fluctuations characterize Syria-Palestine in the first millennium. In Palestine, for example, it is estimated that the population west of the Jordan in 1000 was c. 150,000.[21] This ballooned to c. 400,000 by 750, the population high point for the pre-Roman period.[22] If these estimates are extrapolated for Syria, using a population density of 31 people per km^2 (the highest population density for Palestine; cf. 100–140 people per km^2 for classical Attica at its peak and 50–75 people per km^2 for classical Syracuse), the total population of Syria-Palestine c. 750, that is, around the time of Assyrian hegemony in the region, could be estimated at over 3 million people. The Neo-Assyrian and Neo-Babylonian periods witnessed a sharp decline in population in central and southern Syria-Palestine

[18] On these drivers see Saller 2002: 261–2, and above, Chapter 1. [19] Saller 2002: 258.
[20] Neumann and Parpola 1987; Wilkinson and Barbarnes 2000: 399–400.
[21] Broshi and Finkelstein 1992: 55. [22] Broshi and Finkelstein 1992: 53–4.

due to war losses and deportations. Carter estimates the population of late-Persian period Judah (450–332), a considerably smaller territory than the former kingdom of Judah consisting only of the Judean hill country and the area north of Jerusalem, to have been c. 20,000, coming off a low base of c. 13, 500 in the early Persian period (538–445); that is, about one-third of the population per km^2 of the same area in the eighth century.[23] Using this figure as a guide for inland central Syria and Palestine, and recognizing that population densities on the Levantine coast had recovered, a population of c. 1.5 million could be suggested for the whole of Syria-Palestine for the late-Persian period. This figure coheres with population estimates drawn from Aperghis' analysis of Herodotus' tribute list attributed to the time of Darius I (Hdt. 3.89–95) and which includes the extra expenses Babylonia and Asia Minor met by way of providing for the king's table (Hdt. 1.192).[24] At the arrival of Alexander in the Near East Aperghis estimates that the population of the Persian empire stood at around 30–35 million (including Egypt and the eastern provinces), but this seems to be on the high side, even accepting his calculations that lead to the conclusion that Mesopotamia would have had a population at the time of around 5–6 million.[25] Scheidel's estimation of 20–25 million, including also the Aegean, is likely to be closer to the mark.[26] In summary, the population of Syria-Palestine increased in the early first millennium (1000–750) under the independent kingdoms of the region from c. 1 million plus in 1100 BC to around 3 million in 800–750 and then went into sharp decline until a slight recovery in the Persian period to about 1 million plus again. On the basis of these figures, the activities of the Neo-Assyrian and Neo-Babylonian empires had a devastating effect on the population of Syria-Palestine, which as a consequence must have had profound ramifications for economic production and performance.

Population decreases in Syria-Palestine were partly offset by increases in Mesopotamia where deported peoples were resettled as a result of Assyrian, Babylonian, and Persian imperial policies. The Assyrian royal annals claim that well over one million persons were relocated throughout the empire in order to quell rebellions.[27] Even if that figure is suspect, there is no doubting the sizeable population movement. As already mentioned, the marked increase in village settlements in northern Mesopotamia, particularly in the late-Assyrian period (from Tiglath-Pileser III, c. 750 onwards) is evidence of where much of the deported populations were resettled. We should expect a natural increase in the population of Assyria during the Neo-Assyrian period as a factor as well. Figures for deportations under the

[23] Carter 1999: 201; Lipschits 2003. [24] Aperghis 2001: 79–81.
[25] Aperghis 2001: 79 for the total population; 74–6 for the population of Mesopotamia.
[26] See above, Chapter 3.
[27] Oded 1979: 19–22, who estimates the total number deported at 4.5 million, which must be considered too high.

Babylonian and Persian empires are not available, but it is clear that populations were not moved on the scale undertaken by the Assyrian empire.[28] The example of the Judean exile under the Babylonians and restoration under the Persians is clear evidence of the undertaking. According to the regional survey of Adams, the population of southern Mesopotamia was steadily increasing from the mid-seventh century, or perhaps a century earlier, with many new villages of various sizes coming into existence, some of this increase being due to resettlement of deportees.[29] Another factor in the increase in settlements in both northern and southern Mesopotamia was the sedentarization of formally (semi-)nomadic groups, a process that had already begun in Syria-Palestine with the formation of independent kingdoms in the early to mid-first millennium. In summary we can say that Syria-Palestine went through a sharp population increase in the period 1000–800, then a sharp decline, with some recovery in the Persian period. Northern Mesopotamia went through a steady population increase from 1000 until the Persian period. Southern Mesopotamia underwent a population decline until it was arrested by the early seventh century, at which point it saw a steady increase. As a general trend there was a shift in population from Syria-Palestine to Mesopotamia. A total population for the Near East (Herodotus' fifth satrapy [excluding Cyprus] and ninth satrapy) at the end of the Persian period of c. 7 million can be compared with an estimated population of 4.5 million at 1000, and 5.5 million at 750. While recognizing the regional differences, the population of the Near East as a whole increased around one-and-one-half times over the period 1000–350 (cf. a probable ten-fold increase in Mediterranean–Greek population between 900–300).[30]

In the Persian period, the economic ramifications of population density and urbanism can be seen in contrasting Judah in the Palestinian highlands with its neighboring coastal region. In Judah the population was in difficult economic circumstances as reflected in contemporary biblical texts (Haggai, Zechariah 1–8, Ezra-Nehemiah). The population struggled to subsist and found it difficult to generate a sufficient surplus to rebuild the Jerusalem temple and the city wall of Jerusalem. Jerusalem had few residents until Nehemiah enforced a synoikism (ca. 440). In comparison, the city of Der on the coast prospered in trade, building, and quality of life.[31] Throughout the Persian period the inland areas of central and southern Syria-Palestine were generally in economic decline in comparison both with the coastal regions and with the period preceding the arrival of the Mesopotamian empires. The comparison regarding economic performance can be further

[28] For the Persian period see Briant 2002: 433–5, 505–6.

[29] Adams 1981: 177–8, who notes that the population of Babylonia increased five or six times over the Middle Babylonian–Persian periods (1200–500); Brinkman 1984: 3–10.

[30] See above, Chapter 8. [31] Stern 1994.

extended when southern Mesopotamia, undergoing an economic boom and population increase, is brought into the picture, as will be touched on below.

IV URBANIZATION

As already noted there was considerable population movement in the Neo-Assyrian and Neo-Babylonian periods. This led to increased urbanization in the Assyrian home provinces and, later, in Babylonia, while urban centers decreased in central and southern Syria-Palestine. North Syria was relatively well urbanized with around a dozen cities in the 20–50 hectare range.[32] Cities in central and southern Syria-Palestine were few and generally considerably smaller than their Mesopotamian counterparts. Jerusalem, for example, might have been as large as 50 hectares at its height in c. 700, which would have given it a population of 5,000, assuming a population density of 100 persons per hectare. Urbanism was not extensive with most "cities" less than 10 hectares; for example Megiddo, redeveloped as an Assyrian provincial capital, was 6 hectares in size. Broshi estimates that in Iron Age II Judah and Israel about 34 percent of the population lived in "urban" settlements larger than 5 hectares (although it is questionable that a site under 10 hectares should be considered "urban").[33] Tyre was arguably the largest of the coastal cites at 53 hectares.[34] The Assyrian capitals of Assur, Nimrud (Kalhu), Khorsabad (Dur Sharrukin), and Nineveh were 75, 360, 300, and 750 hectares respectively. Although much of the area of these sites was not devoted to housing, residential areas may have been densely populated.[35] The Assyrian empire also promoted regional centers, such as Carchemish and Til Barsip/Kar Shalmaneser (60 hectares) in northern Syria and Dur-katlimmu on the Habur (55 hectares), a program followed by the Persians with their satrapal capitals. Few sites in northern Mesopotamia were larger than 10 hectares.[36] Babylon at its height in the early sixth century covered 850 hectares. Population estimates for Babylon and the main Assyrian cities have been resisted here due to the size and number of palatial buildings and temples on the sites, the extent of gardens and orchards, and the lack of estimates for the extent of private housing. A population

[32] Mazzoni 1995. [33] Broshi 2001: 83.

[34] Aubet 2001: 34 suggests a population for Tyre of about 30,000 (density 520 persons per hectare), which must be considered too high. On Sidon, the most important of the Phoenician cities in the Persian period, see Elayi 1989.

[35] Åkerman 1999–2001 argues for a population density of 600–700 persons per hectare in one neighborhood of Assur, giving a total population of about 50,000. She concurs with the estimates of Olmstead, Parpola, and Sasson for Nineveh of around 300,000, with a population density of 630 persons per hectare. These estimates must be judged as too high. See the discussion in Van De Mieroop 1997: 94–7.

[36] Wilkinson 1995.

for Babylon of 80,000 is generally accepted.[37] Babylonia from the seventh century was highly urbanized with a number of cities over 50 hectares (Babylon, Sippar, Borsippa, Nippur, Uruk). In southern Babylonia there were a further twenty-five sites in the 10–40 hectare range.[38] The largest cities in inland Palestine in this period – Lachish and Gezer – were only 7.2 hectares.[39]

With the decline of the Assyrian empire, the former royal cities in north-eastern Mesopotamia were probably reduced in size as the tribute that had supported them now went to Babylonia and, later, also Pasargadae, Persepolis, Susa, and other cities holding Persian treasuries.[40] Like the Assyrians, the Persians invested revenues in constructing new royal cities in their home province (Pasargadae and Persepolis in Persis). The rise of empires in the first millennium saw urban centers clustered in discrete areas: north-eastern Mesopotamia under the Assyrians, southern Mesopotamia under the Babylonians, and southern Babylonia and the Levantine coast under the Persians. The Hellenistic period marked a new era of urbanization in the Near East.[41]

The role of cities in the imperial economies is difficult to establish. They demanded considerable labor and materials in their construction.[42] Some of these cities were for royal display and were centers of imperial administration. The relationship between cities and their agricultural hinterland, which included villages, is difficult to establish on the basis of extant sources. Cities were not only centers of administration and specialist craft production, they were also agricultural centers with a large portion of their population directly engaged in agricultural production. Large cities commanded a hinterland of 5–6 km. radius, some of which was tilled by the people who lived within the city walls.[43] Cities situated on rivers could also be supplied from a wider economic region.[44]

V INSTITUTIONAL FRAMEWORK

In comparison with other aspects of the Near Eastern economy outlined in this chapter, information regarding institutions and organizations is relatively plentiful seeing that most extant documentary sources are generated by organizations (the state, temples, families, firms) and reflect institutional matters. This permits an extended discussion, although it is of

[37] Gates 2003: 181. [38] Adams 1981: 178.

[39] For Judah see Carter 1999: 215–48; for an overview of the archaeology of Palestine and Transjordan in the Persian period see Stern 2001: 373–460.

[40] On Pasargadae, Persepolis, Susa see Dandamaev and Lukonin 1989: 238–59; Potts 1999: 325–37; Briant 2002: 84–8, 165–70.

[41] See below, Chapter 15. [42] Parpola 1995; Briant 2002: 430–1. [43] Wilkinson 1989: 37–8, 44.

[44] On the role of waterways in trade see Fales 1993; Briant 2002: 277–84.

course possible to obtain only a partial picture. The central concern of this section is the impact of imperialism on institutions and organizations, specifically regarding the control and exploitation of agricultural land. An imperial polity is a type of organization, but in our period it was determinative for many other organizations and institutions in the economy. It should be noted, though, that the documentary base for this discussion is skewed. For the Neo-Assyrian period, most texts are generated by the imperial administration, so we obtain a reasonable understanding of the concerns and attitudes of those organizing the empire, although much of the information pertains to northern Mesopotamia.[45] In contrast, for the Neo-Babylonian and Persian periods, the texts are generated by temples and by important urban families that have close connections with the temples and the crown.[46] The geographical focus is southern Mesopotamia. We have little by way of administrative texts from Babylonia for these later periods, although it is possible to deduce information from the extant temple and family archives. The Persepolis Fortification and Treasury texts offer insight into aspects of the administrative organization of Fars (Persis), the heartland of the Persian empire, which, when taken together with sources from elsewhere in the empire, also afford an opportunity to make some generalizations.[47]

Regarding the control and exploitation of agricultural land, a regional approach again proves a fruitful way forward. In the first millennium Syria-Palestine underwent a series of developments in political organization. From around 1000 and continuing into the eighth century, the political landscape of Syria-Palestine changed from city states, that had characterized the Bronze Age, to a series of independent kingdoms controlling much larger territories.[48] On the face of it all these polities were organized under a king, had a clear sense of borders, and must have had established taxation regimes. They arguably also were characterized by family/kin-based land holding and "free" labor. Neo-Assyrian hegemony over the region developed from c. 745 and these independent polities were gradually extinguished and brought into the provincial system of the successive empires (Neo-Assyrian; Neo-Babylonian; Achaemenid Persian). By the Persian period Syria-Palestine had been under indirect or direct imperial rule for some two hundred years. What was the impact of imperial regimes on the Syro-Palestinian kingdoms? The first stage of Assyrian imperialism in Syria-Palestine was the extraction of tribute as an acknowledgment of political hegemony. This not only put

[45] Postgate 1979. [46] Oelsner 1976; 1984; 1987.

[47] Briant 2002: 422–71. On the Persepolis texts see also Koch 1990; Aperghis 1997; 1998; 2000; Brosius 2003a.

[48] For the Aramean kingdoms see Dion 1997 (economy: 325–66); Lipinski 2000 (economy: 515–97). For Judah/Israel see Ahlström 1993: 421–568. On Transjordan and the problem of the polities they formed see La Bianca and Younker 1995; Bienkowski and van der Steen 2001.

pressure on the economies of client states, it arguably had an impact on production and trade (see section on Growth above). The Arabian tribes maintained this status under successive imperial regimes. The second stage of integration into the empire, evident also in the Neo-Babylonian empire, was provincialization, the form of imperial organization inherited by the Persians. The client state, formerly independent, at least in respect of having indigenous kingship and institutions, was incorporated as a province. Kingship was eradicated and an Assyrian governor installed, portions of the population were deported and replaced by others from elsewhere in the empire; cities were destroyed. For the Syro-Palestinian kingdoms deportation meant the end of the family/kin-based agricultural holdings. It is unclear on what basis either the remaining population or those who were imported into the area held land. Did provincialization extinguish the property rights of the remaining indigenous population? The example of Jeremiah's purchase of a plot of land just prior to Judah's incorporation into the Babylonian provincial system (Jeremiah 32.1–15) might prompt one to think that it did not, but it could be viewed as a symbolic act expressing hope for a return to economic and social normalcy. In Babylonia under the Assyrians, by way of comparison, it appears that property rights were upheld, although it might be asked whether the favored status of Babylonian cities was a significant factor here. In Persian period Judah property rights are difficult to determine. Nehemiah 5.3–4 has Judeans mortgaging their fields to obtain grain during a famine and also borrowing to pay "the king's tax on our fields and vineyards," which likely point to ownership of land. Perhaps more salient is Leviticus 25.23, conventionally dated to the Persian period, which states that land is inalienable because it is "owned" by the deity. Judeans are merely granted usufruct by the deity. This was arguably a means of shoring up private ownership of land.

Under the Assyrians it is less likely that deported peoples received property rights, even usufruct. The problem is sharpened when we consider the deportation of peoples to northern Mesopotamia under the Assyrians. Land sales are scarce for the Neo-Assyrian period, and those that exist are clearly from "Assyrians," not deportees.[49] It is worth mentioning in passing that this land was likely to have also been held by family/kin groups since the witness lists on these sales include relatives of the vendor. Deportees would have had fewer legal and property rights than native Assyrians, and it appears that numbers of them were placed on agricultural land that was gifted to leading members of the Assyrian bureaucracy as a means of shoring up support for the incumbent king. Such grants are also evidenced in the Persian period where not only the royal family but also satraps and other officials controlled land in various parts of the empire (for example,

[49] Postgate 1989; Fales 1984.

Arsames). Babylonian and Persian practices (the latter indebted to the former) are seemingly different from those of the Assyrian empire. The Babylonian and Persian empires placed deportees from the same area together in villages on the alluvial land and, as noted below, they could have usufruct rights to land.[50]

Liverani contends that throughout the first millennium landed property had been moving from the hands of private owners into the control of large organizations such as the crown and temples and also leading families favored by relations with the crown.[51] Part of the explanation lies in imperialism; the crown commandeered the lands of subjugated territories, some of which was ceded to temples and the ruling elite. Another important factor for Liverani is debt burden. Private landholders forfeited their lands to creditors with the result that land was concentrated in fewer hands and the former landowners were reduced to hired labor or to working the land on behalf of its new owners. This is seemingly an accurate representation of northern Mesopotamia in the Neo-Assyrian period. However, for southern Mesopotamia in the Neo-Babylonian and Persian periods the picture is somewhat more complicated.

The differentiation between various groups in Babylonia during the Neo-Babylonian and Persian periods has been a recurring topic in a number of studies by Dandamaev.[52] He sees three economic "classes" (although he seeks to qualify this term to distinguish it from modern conceptions): first, those "who owned property in the means of production but did not engage in productive labor." This is the smallest group, consisting mainly of high royal and temple officials, large landowners, merchants, and businessmen (but slaves involved in business could be included). Second, the bulk of the population that "consisted of persons who possessed the means of production and were engaged in productive labor but did not exploit the labor of others." Free peasants and craftsmen, both "citizens" and deportees, constituted this group. Third, "the sector of compulsory labor," consisting of slaves, "the dependent populace deprived of property in the means of production," and free citizens working as debt slaves and hired workers. These "classes" cut across the legal status of the population. Here four groups can be identified. First, "fully fledged citizens" who were members of city or town assemblies; second, "free-born persons deprived of civil rights" who did not own land within the urban district's precincts (some settled on temple or royal land, others craftsmen and merchants); third, "various dependent groups" who were dependents of temples, the state, and private individuals; fourth, slaves, who could be distinguished from the third group as they could be sold. These legal and economic relations

[50] Eph'al 1978; Dandamaev 1983. [51] Liverani 1984.
[52] Dandamaev 1974; 1981; 1984: 647–8, 658–9; Dandamaev and Lukonin 1989: 152.

are not necessarily generalizable across the empire, but they are suggestive. The problem remains lack of sources from other areas for comparative research.

An important development under the Persians was the *hatru*, a corporate group formed of smallholders to whom the government had allotted land.[53] It first appeared in the late Neo-Babylonian period, but flourished under the Persians. *Hatru*s could be constituted of military personnel who received land on which was incumbent an obligation to supply a soldier, a horse, or military equipment. Other *hatru*s were named for administrative, craft, or agricultural occupations of their members, for the estates or administrative organizations to which their members were attached, or for the geographic or ethnic origins of their members (including deported populations). Here it is clear enough that settlement policies served the needs of the state by both expanding the amount of land under cultivation (increasing agricultural production and taxation) and having an obligated population for military service. We know that in the Assyrian empire landholding placed obligations on its owners, but from the available evidence this extended only to "Assyrians," not to deportees.[54] Deportees were incorporated into the Assyrian army, but not on the basis that we see in Babylonia under the Persians (this system was arguably used elsewhere in the empire; see the Jewish and Aramean military colony at Elephantine in Egypt).

Land held in *hatru*s was not alienable, but it could be inherited and passed on in dowries. It could also be used as a pledge in exchange for a loan. The significance of pledging land is summarized by Wunsch:

> . . . if the debtor fell behind with interest payments, the land converted into an antichretic pledge . . . [The creditor] thus became the virtual owner of the land and was entitled to rent it out. This shift in the control of the land through debt did not necessarily change the land's use or occupancy. The most appropriate tenant was the debtor himself. He ended up working the field, performing the duties that were linked with it while trying to repay the capital amount of his debt. This was of course more difficult under such conditions, as a substantial part of his crop had to be paid as rent to the creditor-lessor. Indebtedness therefore created a long-term dependency that provided the creditor with access to land and its usufruct even though no actual transfer of title took place.[55]

This is seemingly similar to the development Liverani sees for northern Mesopotamia under the Assyrians where debt led to loss of land, with the difference that the members of the *hatru* were not the "owners" of the land; that remained in the hands of the crown. It further coheres with Liverani's argument that throughout the first millennium land was increasingly in the

[53] Stolper 1985: 70–103. [54] Postgate 1974.
[55] Wunsch 1999: 408; similarly Stolper 1985: 104–7. This view is questioned by Jursa 2002a: 209–13.

control of the crown, temples, and elite families at the expense of "private" (families/kin groups) owners.

This discussion raises the vexed issue of land "ownership" in the Near East. We need concern ourselves here only with the first millennium, but it is worthwhile to be aware of the protracted debate over forms of ownership in third and second millennium Mesopotamia.[56] In the above paragraph both "control" and "ownership" of land in Babylonia were used, highlighting the problem of their relationship. In contrast to Liverani, Dandamaev holds that there was an increasing privatization of land in the Persian period.[57] If by "privatization" one means that the usufruct of land was dispersed more widely through the introduction of *hatru* organizations, this is true. However, if "privatization" is construed as ownership, in the sense that the land was alienable, it is not. As has already been mentioned, that land remained a crown possession. It is worthwhile to note in this context the common misperception, albeit now receding from the literature, that the crown was the actual owner of all the land in the empire. There were royal lands and lands that had been ceded to satraps and other members of the ruling elite, which might also be construed as part of the royal estate. There were also lands in the *hatru* class, which also belonged to the state. But taken together these accounted for but a fraction of all agricultural land. In Babylonia, for example, temples were arguably the largest landholders, although, as mentioned earlier, this too might be a misperception based on the extant sources from temple archives. Private property was considerable in Babylonia, even if it is underrepresented in our sources. This situation arguably obtained throughout the empire.

Two other developments in the Neo-Babylonian and Persian periods are significant in the economic life of Babylonia. The first is the emergence of family "firms." We have archives from a number of urban families that attest their close economic relationships with both the crown and local temples.[58] Two of the most closely studied are the Egibi and the Murashû families. Both families obtained management contracts to oversee production on land held by the crown and temples. Because temples held more lands than they were able to exploit with their own labor resources, they contracted with firms such as the Murashûs to place the land under cultivation. The Murashûs negotiated rental terms with the temples then rented on portions of the land to various farmers, often organizing for them labor, draught animals, equipment, water rights, tax payments, and the like, all as part of their contract.[59] The Murashûs were able to realize a profit from these

[56] Renger 1995 for an overview, with the Neo-Babylonian and Persian periods treated on 308–18.

[57] Dandamaev 1996.

[58] For example, Kümmel 1979; Stolper 1985; Joannès 1989; Jursa 1999; Beaulieu 2000; Bongenaar 2000a; Wunsch 2000; Abraham 2004.

[59] Stolper 1985; van Driel 1989.

transactions, leading scholars to characterize them as "entrepreneurs."[60] Other "entrepreneurial" activities of the Murashûs included contracting with *hatru* landholders to meet their tax payments through exchanging produce on their behalf, and charging a fee. This short-term credit facility has been considered "banking" by some commentators. While the Murashûs were clearly fulfilling a need for credit, they were lending their own silver as a business venture, not lending silver invested with them for a profit.[61] The activity of the Murashûs as middle-men between both temple and the state, on the one hand, and agricultural producers, on the other, is also an innovation of the Persian period. It facilitated agricultural production and arguably constitutes an economic advance over arrangements in the earlier first millennium.

The Egibis also managed large tracts of crown land in a manner similar to the Murashûs. They were further involved in *harranu* partnerships, a business partnership in which the two parties involved drew up a contract to share both profits and losses on a commercial agricultural venture.[62] As Wunsch explains it:

> One partner supplied the financial backing, while the other oversaw the field work, *i.e.*, lending the silver to farmers, collecting the payments due in commodities at the time of harvest in the countryside (usually at the canal), negotiating with officials about taxes and transport fees, renting boats for shipment, and storing and selling the products (although textual evidence is lacking for this last step).[63]

Seeing that the normal rate of interest for loans was 20 percent, the partners expected to see a return of over 40 percent on the investment to obtain a net return of at least 20 percent each. There are no examples where the capital to be loaned in a *harranu* partnership had first been borrowed in order to be invested; one of the parties had the capital at hand to invest. A sense of the political stability that underpinned business transactions in Babylonia is given by a long-term lease contract drawn up by the Murashûs with a certain Bagavir. He rented two fields to the Murashûs for sixty years with a penalty clause should he withdraw the land. The total amount of rent was paid in advance.[64]

The second significant development is the role of temples in the economy. Beside the crown, temples were the main landholding organizations in Babylonia and were thus major agricultural producers. They were also sites of specialized craft production, they were major slave holders (although it must be remembered that slavery in Babylonia was not as extensive or as economically important as it was in classical Greece or the Roman empire),

[60] Stolper 1985; Joannès 1995; van Driel 1999. [61] Similarly, for the Egibis, Wunsch 2002: 247–9.
[62] See also Lanz 1976; something similar may have obtained in Assyria in the Neo-Assyrian period, see Radner 1999: 109–19.
[63] Wunsch 1999: 395. [64] Dandamaev and Lukonin 1989: 135.

and they were major employers of free labor (both for agriculture and crafts).[65] Babylonian temples were always significant in the regional economy, and for the first millennium their importance reached a peak during the Neo-Babylonian and Persian periods. While Finley is correct to contrast temples as major landholders in Babylonia with "private" landholding in the Greco-Roman world,[66] it is important to note that the temples could be construed as a mechanism for agricultural production that served the interests and needs of the citizens of the city in which the temples were located (as well as serving the interests and needs of the organization and its elites). Following Dandamaev, who highlights that citizens obtained prebends or other rights to temple-managed production, we might say that the temples, while technically not "owned" by the citizens, were companies in which citizens were silent shareholders. That is, the temples held land on behalf of the citizens of a city. This is arguably an idiosyncratic view of Babylonian temples, but it deserves closer attention. It further serves to problematize the significance and role of "citizenship" in Babylonia in order to compare it with citizenship in, for example, Greek cities, specifically by bringing the issue of the relationship between citizenship and land holding into sharper relief.

It bears pointing out in respect of institutions that the Near East had a well-developed legal system based on a long-standing tradition; by the Persian period it was millennia old. In the Neo-Babylonian and Persian periods there is evidence for the drawing up of contracts, leases, "wills," land sales, slave manumissions, dowries, and the like, which is predicated on their enforceability. Babylonia had a system of courts and judges – some appointed by the crown, others appointed by the city, others appointed by the temple, as each of these organizations had their own jurisdictions – to whom disputes could be referred for resolution.[67] While witnesses could be called, the most significant element in any case was the written text. Courts would test the accuracy and legitimacy of documents in order to determine the outcome of a case. This is why private archives feature in the extant sources. Families and family "firms" needed to retain the written record of an economic or legal transaction in order to defend their claim to rights, ownership or legal status. Persian support for local legal traditions is evidenced throughout the empire.[68]

Both the Neo-Babylonian and Persian empires fostered the activities of *harranu* partnerships and family "firms" such as the Egibis and the Murashûs, thereby making a number of leading urban Babylonian families

[65] On slavery see Dandamaev 1984; Dandamaev and Lukonin 1989: 152–77; Baker 2001. On crafts see Renger 1971.

[66] Finley 1999: 28–9.

[67] These roles and relationships need further study; see provisionally Wunsch 1997–8; 1999–2000.

[68] Briant 1986b; 2002: 510–11, 956–7; Dandamaev and Lukonin 1989: 116–30.

wealthy. The close relationship between the state, the temples, and these families was mutually advantageous economically. While the state kept a watchful eye on the economic and social power of Babylonian temples, including, in the Persian period, taxing the temples, they were careful to manage the relationship so that temples remained economic engines in their respective areas of southern Mesopotamia.[69] This is understandable for the Neo-Babylonian period when the temples were, of course, indigenous organizations. It is significant that the Persians continued in broad terms the Neo-Babylonian policy towards Babylonian temples. Such an attitude was not limited to Babylonia. As a generalization, the Persians fostered good relations with organizations and leading persons in subjugated territories as a means of pacification and thus lowering the costs of running the empire. Respect for the cults of subjugated peoples, the use of local elites as administrators of subjugated territories, and the fostering of an imperial ideology that encouraged a view of mutual benefit (reciprocity) all enhanced the opportunity for economic performance.[70] The Assyrians were similarly concerned but had proven unable to integrate the empire sufficiently so that they were forced to undertake provincialization and mass deportation.

The outcomes of provincialization and mass deportation inherited by the Persians from the Neo-Assyrian and Neo-Babylonian empires nevertheless served their political and economic interests well. Increased agricultural production and economic activity in Babylonia are only part of the picture. The provincial system was developed by the Persians into the satrapal system of discrete regions headed by members of the Persian elite.[71] Within satrapies smaller polities were usually governed by indigenous leaders.[72] One significant development was in the area of taxation.[73] There can be no doubt that the Assyrians and Babylonians extracted taxes from their provincial holdings, just as they extracted tribute from client states. We do not know, however, how the central administration determined the amount to be paid by provinces, or what the amounts were for that matter, and tribute from clients seems to have been imposed on an *ad hoc* basis. While the Persians continued forms of taxation inherited from the preceding empires,[74] Darius I is commonly credited, on the basis of Hdt. 3.89–95, with implementing a taxation regime for the empire that took into account regional productivity, perhaps determined in part by a considered assessment of the

[69] Dandamaev 1976.

[70] Briant 1986b; Dandamaev and Lukonin 1989: 347–60.

[71] Petit 1990.

[72] Dandamaev and Lukonin 1989: 103–7, and on administration more generally, 96–116; Tuplin 1987: 113–37.

[73] Dandamaev and Lukonin 1989: 177–95; Tuplin 1987: 137–57; Briant 2002: 388–471; van Driel 2002: 153–322 offers a detailed overview of taxation in Babylonia in the Neo-Babylonian and Persian periods, which emphasizes our partial understanding.

[74] Zaccagnini 1989a; 1989b.

amount of land under cultivation, yields, and, for the Arabian tribes at least, the value of traded goods. In Babylonia, fields were measured and yields estimated, while in Judah individual families' concern to meet "the king's tax" (Nehemiah 5.4) could point to a similar system.

Herodotus 3.89–95 is a problematic text.[75] We do not know if the amounts listed account for all forms of taxation, including tariffs, payments made to the satrap and local governor, and the like, or are only taxes imposed by the central administration on production and trade. Further, the amounts are given in silver. Does this mean that all taxes were due in silver or are these amounts silver equivalencies for taxes that could be paid in silver and/or in kind? Nehemiah 5.4 again points to payment in silver, but the Persepolis Fortification and Treasury texts attest that taxes were received in both silver and in kind. And the satrapal treasuries included granaries from which one might conclude that some taxes were paid in kind. The Murashû texts show that the Murashûs were involved in receiving payment in kind from landholders and paying taxes on their behalf in silver.[76] This is a significant matter, since if most taxes were paid in silver, it was incumbent on landholders to market at least some their produce in order to meet their tax liability. This would have a direct impact on "exchange" in the economy.

VI PRODUCTION AND EXCHANGE

Agricultural production has been introduced above. Three points can be mentioned in passing here. First, to reiterate, imperialism and debt broke down traditional family/kin-based land holdings. As a generalization, agricultural production was reorganized so that large landholders (the crown, temples, elites) exploited the labor of formerly "free" peasants to work the land. The *hatru* as a form of tenancy in Babylonia was expanded under the Persians, but it reinforced the dependency of agriculturalists on these large landowners. Second, pastoralism was an important part of the Near Eastern economy, and exchange between the (semi-) nomadic and sedentary populations was necessary for both groups.[77] Pastoralists provided animal products to the sedentary and received agricultural or craft products in exchange. Pastoralists hired themselves out as shepherds for the villagers' herds, and nomadic pastoralists grazing their herds on the stubble of agriculturalists' fallow fields provided animal dung as fertilizer. Even in the first millennium it is not correct to see a sharp divide between these two modes of subsistence, especially in areas near the 250mm isohyet that marked the limit of dry farming. In changing climatic and political conditions some sedentary agriculturalists could switch to pastoralism in order to survive,

[75] Graf 1985: 86–96; Briant 2002: 390–8. [76] Stolper 1985: 149. [77] Schwartz 1995.

while pastoralists could engage in agriculture. Rowton understands the relationship between pastoralists and agricultural villages to be "dimorphic," and the connections between the two groups, including their exchanges, was based on kin connections.[78] If so, reciprocity rather than market exchange was likely to be operative. Third, I can currently see no way of determining the scale of non-agricultural production. In comparison with agriculture which could be taxed on the basis of expected yields, or livestock owned either privately or by organizations such as temples which could be taxed on the basis of the increase in animals, the scale of (semi-) nomadic pastoralism is much more difficult to judge. Regarding craft production, much of it would have been undertaken in families for their own use. We know of the production of elite craft goods (carved ivory, metalwork, garments) from Phoenicia, northern Syria, and Babylonia, but they must have been but a fraction of all craft production.[79] Babylonian temples were centers of craft production, including garments, largely for their own use. We have evidence in the Neo-Assyrian through Persian periods of merchants who sold manufactured goods locally and others operating over long distance.[80] The percentage of all production that manufactured goods accounted for is impossible to determine from our sources.

As a generalization, trade increased throughout the period.[81] With the domestication of the camel Arab tribes were active in the spice trade and were integrated into successive imperial economies.[82] The increase in long-distance trade is also evident with the Phoenicians, who established colonies throughout the Mediterranean littoral, while Greeks founded new settlements on the Levantine coast. For the Phoenicians a major impetus for trade was the demand for raw materials by their imperial overlords.[83] These materials, sometimes with value added by craft production, were passed on to the imperial powers as tribute rather than via market exchange.[84] The Phoenicians obtained the materials by means of exchange with local populations, and the agreed rate of exchange must have been sufficiently advantageous to them to meet the costs of supporting the colonies and trading fleets while leaving a surplus that funded the home communities. The tribute extracted by the imperial powers did not leave the Phoenician cities impoverished. Phoenician trading activities seem to have been organized by the city states rather than by private entrepreneurs. This raises the issue of the extent to which other long-distance trade was organized privately. There is some evidence for this, texts from the Egibi family of Babylon (specifically Itti-Marduk-balatu) attest to it, and Dandamaev considers private

[78] Rowton 1976.
[79] Winter 1976; Culican 1991: 476–85; Van De Mieroop 1997: 181–93; Lipinski 2000: 531–43.
[80] Oppenheim 1967; Dandamaev 1971; Radner 1999; Joannès 1999.
[81] For an overview, see Dandamaev and Lukonin 1989: 209–19.
[82] Eph'al 1984. [83] Frankenstein 1979b; Elayi 1990. [84] Elat 1991.

individuals to have been dominant.[85] But it is likely that throughout the first millennium it was conducted by operatives acting on behalf of the state or large organizations (Babylonian temples). The volume of this trade is difficult to substantiate.

Another aspect of imperialism that demands further research is the extent to which political integration promoted trade. One might expect political integration to promote long-distance trade within the empire on the basis that contracts could be enforced, thus lowering transaction costs. Unfortunately there is little direct evidence to substantiate any increase. Regional specialization in agriculture and crafts and regional access to specific trade routes demanded inter-regional trade, although it barely appears in the documentary sources. Syria-Palestine, for example, was important to the imperial economy for four things: raw materials (such as timber) and finished speciality products (such as carved ivory, purple-dyed garments), labor, and access to trade routes to Egypt and Arabia. While certain ecologically specialized produce such as olives were of some importance, Syria-Palestine was of little importance to the imperial economy agriculturally. That central role was played by northern Mesopotamia (particularly under the Assyrians) and Babylonia (particularly under the Babylonians and Persians). Although state-directed long-distance and local trade is attested for the pre-Assyrian period, there is clear evidence of an increase in local trade in Syria-Palestine for the Assyrian through Persian periods where goods flowed between the Phoenician coastal cities and the hinterland to an extent not attested previously.[86] We should expect this to be via market exchange, although there is no direct evidence. The vexed question of markets in the Near East can only be touched on here. Market transactions certainly took place, but it was not the exclusive means of exchange; indeed, it was arguably not the main form of exchange. Reciprocity and redistribution (to use the "substantivist" terminology) continue to feature prominently in the first millennium, the latter particularly in the Babylonian temples and the Persian imperial administration. The price of labor, for example, was not determined by a market. Those working for the temples and the state were given set rations and, on occasion, silver (and note that the *hatru* was also a form of "payment" in that land was granted in the expectation that certain stipulated obligations would be met). Hired labor in Babylonia entered into a contract with an employer and for laborers compensation seems to have been tied to daily food needs. Specialized craftsmen could receive higher payments.[87] It is likely that we should understand hired labor in the context of the redistributive economy rather than the market economy. With respect to land, it could be sold if privately owned, as already noted, but there is no evidence of a speculative land market or borrowing

[85] Dandamaev 1971: 71–2. [86] Lehmann 1998. [87] Dandamaev 1987.

in order to invest in land. When the Egibi family invested the profits from completed *harranu* partnerships in agricultural land it was in order to move assets into another productive activity, not to see a further profit from the later on-selling of real estate.

As has already been mentioned, if an innovation of Persian rule was that taxes had to be paid, at least to some extent, in silver then this must have enhanced market exchanges (the issues of prices is addressed in Chapter 15). The Persepolis Fortification and Treasury texts reinforce this point since some payments were made to government retainers in silver, as well as in kind, which would then need to be exchanged for consumables in the market. This does not mean that the economy was monetized as silver was weighed rather than minted (indeed, coinage seems to have been most prevalent on the geographical margins of the empire; witness Phoenicia). Much of this market exchange would have been local and it is in this context that we can make sense of some of the activities of the Egibi and Murashû business families. The contracts they entered into for the management of large agricultural holdings and the purchase of produce should mean that they looked to sell consumables to the large urban populations of Babylonia. There is no direct evidence for this aspect of their business, but they needed to do something with their vast amounts of produce and urban inhabitants needed to eat.[88] An urban market seems a reasonable answer.

How much silver was in circulation and how did those liable for taxes gain access to it? We cannot answer the first question with any assurance, but there does not seem to have been a shortage of silver in the economy. Only a fraction of silver paid in taxes was hoarded in the satrapal and central (Susa, Persepolis, Pasargadae) treasuries, perhaps as little as 5 percent.[89] Hopkins' "taxes and trade" model might have some significance in respect to the second question.[90] In order to obtain silver with which to pay taxes, producers needed to sell their surplus, increasing the significance of the role of merchants and markets. Towns hold an important place in the system since it is non-agricultural labor, producing higher value goods and services, that consumes this surplus. The increase in the number of towns on the Levantine coast, in inland northern Syria, and in southern Mesopotamia facilitated the working of the system. In addition to the activities of the Egibis and Murashûs, mentioned above, lending support to this model, one should note that a perspective similar to Hopkins' was already adopted independently by Kippenberg regarding Persian period Judah.[91] Hopkins' model raises another issue: what was the taxation rate? Hopkins suggested

[88] Van De Mieroop 1997: 206–8.

[89] Stolper 1985: 145; Tuplin 1987: 138–9, who considers the figure to be too small. Dandamaev and Lukonin 1989: 205–6 contend for a shortage of silver.

[90] Hopkins 2002 (1995/96): 208–30. [91] Kippenberg 1981: 51–3.

10 percent for the Roman empire.[92] A similar figure has been offered for the Persian empire by Aperghis, while van Driel has suggested a much higher figure, for Babylonia at least; in the order of 33 percent.[93] However, van Driel's calculation includes not only state taxes but also local taxes, levies, and duties (on, for example, transport). Adapting Hopkins' formula "that *minimum* GDP = Population × (Minimum Subsistence plus seed)" we could estimate the minimum GDP for Mesopotamia in the Persian period as follows:[94]

(a) Population: 5.5 million,
(b) Minimum subsistence: 3 kur grain per person (1 kur = 180 liters),
(c) Average yields: 12 kur per kur of land (1 kur = 1.35 hectares)(assuming for northern Mesopotamia a seed–yield ratio of 1:10 and in Babylonia 1:14); that is, 1 kur of land could feed four people, meaning that only 1/4 kur of seed per person need be retained to grow a similar crop the next year.

This would mean that GDP was 5.5 million × 3.25 = 17, 875,000 kur grain. Accepting that 1 kur of grain was worth about 1 shekel,[95] and there were 3,600 shekels in a talent (60 shekels = 1 mina; 60 mina = 1 talent), the value of agricultural produce was 4,965 talents. Hopkins recognized that his calculations led to only a rough figure. In fact, Goldsmith's calculation of the size of the national product of the early Roman empire led him to concluded that Hopkins had underestimated the amount by about 2 1/2 times.[96] This probably holds true for the above calculations in respect to Achaemenid Babylonia, at least, where the wage of an adult laborer (free and slave) averaged 12 kur (= 12 shekels) per annum; that is, four times minimum subsistence.[97] Accepting the comparative evidence from Goldsmith that foodgrains should account for one-half to one-third of consumer expenditures,[98] this would make 12 shekels per annum a living wage when one includes dependent family members and notes that children could also be hired out.

Following Goldsmith, it could be suggested that the GDP for Mesopotamia was about 12,400 talents. According to Herodotus the Mesopotamian tax burden was 1,000 talents. This would point to a tax rate of around 8 percent. In addition, agricultural producers in Babylonia

[92] Hopkins 2002 (1995/96): 199.
[93] Aperghis 2001: 85 (10,000 talents total value of agricultural and other production and 1,000 talents paid in tax); van Driel 2002: 317–19.
[94] Hopkins 2002 (1995/96): 197–8. Syria-Palestine has been omitted from the discussion due to lack of information on prices and salaries.
[95] Dandamaev 1987: 272; Van der Spek 2000a: 294.
[96] Goldsmith 1984: 263–74 (Hopkins discussed 273 n. 51); Goldsmith 1987: 34–59.
[97] Dandamaev 1987: 272. Dandamaev cites the annual wage of an adolescent laborer as 6 shekels.
[98] Goldsmith 1984: 267–8.

had to meet the cost of tools, animals, canal maintenance, water, local payments (for example, to temples), certain sales taxes, rents, transportation, and the like, which would have added considerably to their expenditures. Even if this tax rate is suspect, it is nevertheless true to say that at the arrival of Alexander the Persian economy was not in financial crisis due to over taxation.[99] For Babylonia specifically there is evidence to show that this region was not in economic decline.[100]

VII STOCK OF KNOWLEDGE

There is evidence of intensive agriculture in southern Mesopotamia in the Neo-Babylonian and Persian periods, drawing on and improving traditional farming techniques, encouraged by regional population pressure. The increased use of iron for farming implements across the Near East in the first millennium aided agricultural production and reflects dispersed skills in iron manufacture and iron working.[101] For the Phoenicians, there is indirect evidence for improvements in the size and manufacture of shipping for long-distance trade. Concomitant with this must have been an increasing understanding of Mediterranean geography, maritime currents, and cultures, none of which is directly attested in any source. In Babylonia it is clear that slaves were equipped with a similar range of skills to free labor, since those belonging to temples are involved in the full variety of crafts. Apprenticeship contracts show how these craft skills were passed on.[102] Literacy, especially in respect to cuneiform, remained the preserve of an elite. Scribes were needed for drawing up contracts and other legal instruments, economic texts, and records, and we should expect that they were to be found throughout the region (although evidence from villages is sparse and certainly underrepresented in the extant sources). The adoption of Aramaic as the *lingua franca* of the Persian empire, a direction already recognized in the Neo-Assyrian period, demanded a scribal class trained in this language. Texts in local languages – Old Persian, Elamite, Akkadian, Phoenician, Hebrew, Demotic, Greek, etc. – continued to be produced, and scribes acting on behalf of the administration needed to be bilingual (Aramaic and the local language). Scientific knowledge is again best attested from Babylonian sources: astrology, extispicy, lexical lists, grammatical and medical texts, knowledge of Sumerian (cultural tradition).[103]

Directly relevant to economic performance in southern Mesopotamia in the Neo-Babylonian and Persian periods was the development of new forms of agricultural relations and legal instruments. *Harranu* partnerships

[99] Briant 2002: 800–13, reacting to the claim of Olmstead 1948: 289–99.
[100] van Driel 1987. [101] Moorey 1994: 289–92; Curtis et al. 1979; Curtis 1999.
[102] Dandamaev 1984: 279–307. [103] Dandamaev and Lukonin 1989: 283–9; Aaboe 1991.

were a new development in the Neo-Babylonian to Persian periods and reflect an advance in entrepreneurial activity. It permitted someone with administrative and business skills to team up with someone with capital to invest in order to increase the wealth of both parties through agricultural production. The entrepreneurial activities of the Murashûs in land management, based on the system of *hatru* land tenure arrangements, and in short-term lending also led to improved economic results. Both were incentive (profit) driven. To be sure, only a small elite was involved in this, but they represent innovations in economic organization and activity, as does the *hatru* system itself. The downside of the Murashûs' credit arrangements was the loss of control of land by individuals/families.

VIII CONCLUSION

This very general overview of the economy of the Near East in the Persian period has emphasized continuities with the preceding Neo-Assyrian and Neo-Babylonian empires, while highlighting for Babylonia certain developments in land tenure, business practices, and legal instruments. The general conditions that underpinned economic growth have been outlined, although it must be admitted that the available evidence intimates growth without a means, as far as I can see, to quantify it. Since the Near East consisted of three main regions – southern Mesopotamia, northern Mesopotamia, Syria-Palestine – each differing in levels of population, urbanism, agricultural production, and long-distance trade connections, a concerted effort needs to be made to study each of these regions individually as well as within the context of the Persian empire as a whole. It must be admitted that due to the nature of the available sources our understanding of each of these regions remains patchy at best. Over the period of the Near Eastern-based empires (Neo-Assyrian, Neo-Babylonian, Achaemenid Persian; c. 950–330) there was slow economic growth, but given the agricultural base of the economy and poor capital investment, technological improvements, and investment in human capital, it was severely limited.

PART III

CLASSICAL GREECE

CHAPTER 12

CLASSICAL GREECE: PRODUCTION

JOHN K. DAVIES

I THE NATURE OF THE EVIDENCE

More useful evidence for economic activities survives from the fifth and fourth centuries BC, the so-called "classical" period, than from earlier or later periods of Greek history. This and the two following chapters therefore paint a fuller picture, while acknowledging that the evidence remains sketchy and is heavily skewed towards Athens, a region seriously untypical in several respects. The historians' narratives, indeed, provide little directly usable information, since they focus on political and military matters; but the biographical tradition preserved in Plutarch's *Lives* and elsewhere offers some relevant vignettes. More helpful, perhaps surprisingly, are the philosophers and scholars writing in the Socratic tradition – Plato, Xenophon, Aristotle, and Theophrastus – both for the specific information they provide and for their often revealing depictions of attitudes and values. More helpful still, though perilous in so far as its context of utterance was overwhelmingly Athenian, is the surviving corpus of over 100 law-court or public speeches, ascribed (not always accurately) to the major orators and frequently offering information about economic transactions and institutions or on the size and composition of inheritances. However, the most valuable written sources are inscriptions, which proliferate as the two "classical" centuries unfold to encompass far more than the limited pre-500 repertoire of laconic gravestones and one-line dedications. Laws and decrees of state, calendars of sacrifices (often stating the prices of victims), leases of public property, records of property sold or pledged, and especially annual accounts of public financial transactions drawn up and promulgated by state or sanctuary officials, all yield invaluable insight into economic activities and systems.[1]

[1] The most important single series of such inscriptions is the so-called "Attic Stelai." In 415/14 BC, convicted of participation in various scandals (Thuc. 6.27–9; Andoc. 1.11–69; MacDowell 1962: 167–93), about fifty prominent Athenians and resident aliens had their property confiscated and sold off by the Athenian state. It was probably the most extensive such operation in Athenian history, and is certainly the best documented. It was recorded on ten inscribed stone slabs, originally set up in the Eleusinion at Athens, the sanctuary of two of the deities whose cult had allegedly been impiously treated. On these slabs the responsible officials recorded the prices they got for the crops and stores they sold off, the agricultural equipment, the slaves, the household goods and chattels, and eventually the

Such written material is complemented in two ways by physical evidence. The first is the landscape itself, more and more of which has been the subject of intensive surface survey in the last thirty years.[2] Right across the zones of Greek culture and settlement, such surveys have provided a basis for estimates of population, settlement pattern, and gainful activities at various periods from the Neolithic to the present day. Relevant to this specific group of chapters are the consistent indications that population levels peaked in the late classical period, reaching if not exceeding the estimated carrying capacity of each landscape and not being equalled or exceeded until late antiquity or even the nineteenth century. Although one further corollary of such work has been increased awareness that even within a putative "Greek culture zone" habitats and ecologies differed significantly, and that it is necessary to analyze in terms of a series of micro-regions rather than a uniform "Greek economy,"[3] it serves to keep in view the likelihood of continuing demographic pressure on land, resources, and technologies in the classical period.

The second group of physical evidence relevant to these chapters comprises the tangible objects which were created and used. These range from installations such as houses, temples, public buildings, and infrastructure, through weaponry, ceramics, coins, textiles, and the normal furnishings and equipment of a dwelling house or a farm, to the more exotic and high-value products of the sculptor or the silversmith. This material, invaluable though it is for the economic historian, has yet to yield its full potential. Partly this is because it is proving very difficult to establish the cost of an object of a given size and quality: ornate dedications or grave monuments, for example, are hard even to convert into man-days of labor, while a recent study of the documentary evidence from Olynthus in Chalcidice has concluded that urban house-prices varied not just by size or fabric but by location, in a way which will be dismally familiar to all modern householders.[4] Partly, too, scholars of coins or painted pottery or sculpture have, for good and bad reasons, been more concerned with classification, dating, images, and aesthetic values than with aggregates of production or with distribution

real estate – houses, farms, and property overseas. Together with some ancillary information (Pippin 1956), these inscriptions (*IG* 1^3 421–30: conspectus of named items in Pritchett 1956 and Amyx 1958; D. M. Lewis 1966 [= 1997: 158–72] for the sale procedures) provide an unparalleled portrait of the material circumstances of upper-class Athenian society at its apogee of prosperity. If ever we could hope to see, in detail and with prices, what was being produced by (and for) a Greek economy in the classical period, this is the occasion. Encouragingly, the picture they present is confirmed and filled out by the surviving corpus of law-court speeches from Athens, which frequently refer casually or systematically to the property-holdings of residents.

[2] Keller and Rupp 1983; Osborne 1987: 204; Alcock et al. 1994; Bintliff 1994; Cherry 1994; Whitley 2001: 47–50 and 382–91; Osborne 2004a; Osborne 2004c: 88–90.

[3] Osborne 1987: 29–34 (map of isohyets p. 32) and Rackham 1990 for the contrast between the wetter west and the drier east; Horden and Purcell 2000: 51–172.

[4] Nevett 2000; Cahill 2002: 276–81.

maps. Partly, again, especially with objects like wooden furniture or textiles which were mostly made at home and have totally perished anyway, the challenges of quantifying or of costing production are massive.

Such considerations should warn the reader that even in such a comparatively well-documented epoch as the classical period, our sources do not lend themselves to straightforward assemblage, let alone to coherent analysis. Anything we create is a precarious construct, subject to imponderable correction factors, lending itself to widely differing interpretations, and transforming itself in the light of changing scholarly agendas.

II TERMINOLOGY ANCIENT AND MODERN

The term "production" itself needs clarification, for implicit in it is the connotation of "production for a market," which the particular configuration of fifth- and fourth-century Greece might render misleading. Three uses of the term "market" need to be distinguished. In a first, aggregative sense, it includes all activities and products generated by known consumption habits and effective demand, including the so-called Domestic Mode of Production, and therefore irrespective of whether exchange takes place beyond the locus of production. In a second, behavioral sense, it encompasses the varying values, attitudes, and strategies of producers and consumers. In a third, institutional and even sometimes physical sense, it denotes a price-setting marketplace. Whether or not precursors can be detected, in Greece or the Levant,[5] markets in this third sense had unquestionably emerged as institutions by the fifth century, at least for some commodities and in some locations. Proof, if it be needed, comes both from the portrayal by the late fifth-century comic poets of well-established market activity in some localities, especially for food,[6] and from innovations in language. Clearest of the latter is the way in which Greeks extended the word *agora*, etymologically meaning "talk-place" and used in Homer only in the sense of "assembly," to embrace first the open space used for such assemblies and then the exchange activities for which such central spaces were convenient; an extension which had taken place by the middle of the fifth century and had generated a new verb *agorazo*, "I buy," alongside the older verb *agoraomai*, "I speak in assembly."[7] That this development correlates closely with the adoption of coined money by many Greek states in the generation after

[5] Silver 1995: 97–177 for an extreme view: Harris 2002: 74–80 for differentiations even within this third category.

[6] Harris 2002, with Ehrenberg 1943: 113–46. However, such market *agorai* may not have been common (only at Athens, Piraeus, and Sounion in Attica: Osborne 1987: 108), and may have been seen as peculiarly Athenian (Arist. [*Oec.*] 1.1344b31–3, with Horden and Purcell 2000: 205).

[7] For the evidence see LSJ s.vv. The complexities of the Greek words used for "buy" and "sell," and of the semantic fields of their compounds, are highly informative but cannot be explored here (cf. Chantraine 1940).

Map 12.1 Greece and Asia Minor
Source: Lewis et al. 1992: 2–3

c. 540 BC is indubitable, but its rate of spread, its range of applicability to exchange transactions, and its impact on behavior and social values are still matters of debate.[8] More important for this chapter is the corollary, that though the basic patterns of commodity production, i.e., "market" in the first sense, may have remained largely stable throughout the two centuries under review, the relations of "producers" to "markets" evolved significantly. We are therefore looking at a portfolio of production that is not merely distorted for us by the availability of evidence, but was also undergoing substantial long-term change.

There remains one further aspect, at once terminological and analytic, to do with the terms "workplace," "sector," and "industry." Of course some "workplaces" can be recognized straightforwardly, whether on the ground,[9] or in visual representations on pottery, statuary, or bas-reliefs,[10] or in language, where the normal everyday word *ergasterion* precisely translates "workplace" and can refer to workshops of upwards of thirty slaves (see below). However, other "workplaces" are more elusive, because the place of production was also the place where other activities were undertaken. This is perhaps most obvious with textile production, performed overwhelmingly by women within the house, but other commodities too were produced or processed within the household,[11] while all agrarian activity took place by definition within an area of landscape which was intrinsically an undifferentiated space. Likewise, though "sector" and "industry" are useful analytic terms, they correspond to nothing in contemporary Greek terminology or social organization. In part, of course, this was because the agrarian "sector" was so preponderant that all who were engaged in it could define themselves primarily in terms of other collectives (villages, cult-groups, etc.), while those who did identify themselves by a gainful occupation[12] failed to generate a collective presence. Conspicuously, for example, though there were identifiable potters' quarters in Athens and in Corinth[13] and a "Street of the marbleworkers" in Athens,[14] and though miners at Laurion might well make joint dedications,[15] there is no trace whatever in classical times

[8] Howgego 1995: 12–18; von Reden 1995a; Kurke 1999; Davies 2001b; Kim 2001; 2002.

[9] E.g., Melite in Athens (Young 1951), the silver-mining area at Laurion (Conophagos 1980; Osborne 1985a: 29–36; Travlos 1988: 203–10; Goette 2001: 209–19), an amphora workshop on Halonnesos (*Archaeological Reports* 1999–2000: 69–72; 2000–01: 70–2), the Pottery Quarters in Athens (Baziotopoulou-Valabani 1994; Monaco 2000) and in Corinth (Stillwell 1948: 3–62; Salmon 1984: 101–3).

[10] Useful selections in Ehrenberg 1943; Metzler 1969; Burford 1972; Ziomecki 1975; Hopper 1979: plates 40–7; and S. Lewis 2002, with Sparkes 1962 for kitchen utensils. Sadly, Francotte's two volumes (1900–1) have not a single illustration, and those in Glotz 1926 are poorly reproduced.

[11] Pesando 1987; Jameson 1990a: 183–7; Jameson 1990b: 102–3; Carr 2000; Nevett 2000; Cahill 2002: 223–88.

[12] As in the late archaic and fifth-century dedications from Attica: *IG* I^3 546 *artopol*[*is*] "breadseller," 554, 616, 905 *knapheus* "fuller," 620, 628?, 633, 824 *kerameus* "potter," 646 *skylodesph*[*os* or *es*] "tanner," 666, 754 *kitharodos* "singer to lyre," 776 *keryx* "herald," 794 *plyntria* "washerwoman," 841 *gramma*[*teus*] "secretary."

[13] See n. 9 above. [14] Burford 1972: 82, citing Shear 1969; Camp 1992: 142.

[15] Burford 1972: 171, nn. 465–6; Lauffer 1979: 172.

of associations of producers comparable to Roman *collegia* or mediaeval guilds.[16]

III LAND, LAND-USE, AND LAND-OWNERSHIP: THE UNCULTIVATED LAND

As always, for any identifiable region, production is a function either of the processing of whatever can be grown, reared, found, cut, dug, or excavated from that region's environment, or of the added value created by the transformation of raw materials imported from elsewhere. The landscape and its productive potential are therefore logically primary. This volume is fortunate in that nowhere have changing scholarly interests and agendas made a more salutary impact than in the study of landscapes and land-use, where the simple picture of Greek agrarian practices which was available thirty years ago has gained greatly in complexity and sophistication.[17] Attention has focused not only on crops and yields but also on wider questions of land-use, notably the market-oriented specialization and the integration of differing types of terrain which can both be predicated of a population which experienced significant growth in the fifth and fourth centuries BC, with all that that implies for pressure on land and on productive techniques. Production and distribution therefore both grew in scale and generated various symbioses (reflected in part by inevitable overlaps between this chapter and the next), not least in the use of terrain. For example, for most landscapes occupied by Greeks, varying depths of soil and the imminence of uncultivable mountains generate a clear distinction between cultivable and uncultivable zones. It is now evident that the importance of the latter, in all its various forms (garrigue, maquis, savanna, badland, marshland, hillside) as an essential and productive complement to the economic life of the farm cannot be overestimated, and not just because it may well have comprised "more than half of the total area of ancient Greece."[18] A brief sketch of its various productive capacities can therefore usefully begin this section.

First, it provided grazing land for sheep and goats (though arable land was also used),[19] and was a source of essential nutrients such as nuts, herbs, and honey,[20] while the flora also provided gathered foods such as wild greens, herbs for the kitchen, and the ingredients for *materia medica*, as

[16] That some of the various cult-groups that proliferated in classical Attica may have comprised such *collegia*, as they probably did in Hellenistic Rhodes (Gabrielsen 1997: 123–9), has long been admitted, but if so the absence of explicit self-identification is striking.

[17] Among the main bases of study are now Osborne 1987, the Greek papers in Whittaker 1988, Isager and Skydsgaard 1992, the papers in Wells 1992, Burford 1993, 1994, the Greek papers in Shipley and Salmon 1996, and Grove and Rackham 2001. Cf. also Dufkova and Pecirka 1970; Ampolo 1980.

[18] Forbes 1996: 71. Forbes 1996 is the basic survey, with Rackham 1983; Garnsey 1988: 53; Chaniotis 1991; Rackham 1996; Chaniotis 1999b; and Grove and Rackham 2001.

[19] See Section v below.

[20] J. E. Jones et al. 1973: 397–414 and 443–52; Burford 1993: 144–5; Forbes 1996: 92–3.

well as reeds and brushwood for baskets and house-construction.[21] Likewise, it produced essential minerals such as salt from salt-marshes and seaside saltings, stone from quarries,[22] and metals from mines, not to mention clay deposits which fed potteries. More exotically, it was the venue for ostentatious forms of hunting.[23] True, the more mundane and low-status forms – trapping, bird-catching, snaring – so far from being confined to the wilderness, were ubiquitous in cultivated terrain too, as the comic poets' lists of foodstuffs make clear,[24] and contributed significantly to the supply of protein. However, though hare, deer, and perhaps wild boar were still accessible in some domesticated mainland areas in the classical period, the pursuit of bears and lions (non-productive in economic terms anyway) needed access to the wilder mountains of Epirus and Macedonia, or to Persian game parks.[25]

There remain wood and timber, the prime products of the "waste" areas and the subject both of complex ambiguity between "wild" and "cultivated" and of much current debate. One end of the spectrum is clear enough, viz. the stands of large timber (principally fir, Greek *elate*) most prized for ship-building, located by Theophrastus in Macedon, parts of Thrace, south Italy, the south shore of the Black Sea at Sinope and Amisos, Mt. Olympos in Mysia and Mt. Ida in Troad,[26] though sadly we have no idea to what degree such stands were managed (other than by royal control on the release of material and its destination) or re-planted. Much the same range of species – fir for preference (Theophr. *Hist. pl.* 5.7.4–5), cypress, and cedar, but also beech, oak, elm, and a scatter of other woods – was used in prestige construction projects, as fourth-century building accounts from sanctuaries at Epidauros, Delphi, Eleusis, and Delos attest.[27] These timbers seem to have had more varied origins, Arcadia being a principal source (via Sicyon) for the builders at Delphi, Macedon being one for Delphi and Delos, and Corinth itself, surprisingly, being one for those at Epidauros and Eleusis. However, local sources must also be presumed, as no doubt for the more mundane but much more widespread requirements of the building industry in general, since Theophrastus admits (*Hist. pl.* 5.7.4) that most woods are usable for house-building although he also reports a preference for silver-fir, cypress, oak, and types of cedar.

[21] Foxhall and Forbes 1982: 74–5; Baumann 1993: 92–127 and Rihll 1999: 116–28 (medical uses). Forbes 1996: 81–4.

[22] Osborne 1985a: 93–110 for Attica, with further references at 238 n. 1; Korres 1995 for stone transport for the Parthenon.

[23] General survey in Lane Fox 1996, with bibliography.

[24] References most conveniently in Ehrenberg 1943: 319–21.

[25] Xenophon's *Cynegeticus* is mostly about hare-coursing (i-viii), with single chapters each for deer (9), boar (10), and exotic animals (11).

[26] Theophr. *Hist. pl.* 4.5.5, with other usable species (pine and cedar) available in Cyprus, Cilicia, and Lebanon (Meiggs 1982: 116–39).

[27] Meiggs 1982: 423–50.

Even more widespread and peremptory was the perpetual need for small wood, whether for direct use as firewood or for conversion into charcoal, but the modalities of their production are virtually untraceable. One large Athenian estate is reported to have generated 12 drachmas per day from the sale of wood ([Dem.] 42.7), but imports of firewood by Delos are well known[28] and imports from the north Aegean to Attica are now attested,[29] while even apart from domestic and cultic uses the needs of pottery kilns, smelting furnaces, and bath-houses throughout the Greek world and beyond will have been gigantic.[30] True, it has been estimated[31] that the smelting needs of the Laurion mines could have been met locally (though at the cost of using "one-seventh of their land-area as a fuel supply"), but we do not know whether they were thus met.[32] If to such considerations we subjoin the use of wild olives for grafting, the intake, by trenching or terracing, of the hill-land surrounding them, or the widespread extraction of pitch and resin from coniferous trees,[33] the impression is confirmed of uncultivable land as an essential productive resource, heavily exploited and intimately linked with the life of farm, household, and market.

IV RIVER AND SEA: THE FRUITFUL WATERS

Those words apply with equal appropriateness to the other uncultivable environment – sea, rivers, lakes, and marshes. Some products, like the eels from Lake Copais in Boeotia which were a delicacy in Athens,[34] were a matter of direct gathering, though we should not underestimate the skills required and risks incurred by divers for sponges, pearls, or coral.[35] Comparable skills and risks attended the gathering of the main harvest, the supplies of fish which made a poor diet tolerable and spawned an entire gourmet culture.[36] At least for well-placed communities, this was no marginal activity. Behind windfall catches such as those recorded on sanctuary dedications[37]

[28] *IDélos* 509, with Meiggs 1982: 452–3; Reger 1994: 127–88. [29] *SEG* XLIII 488.

[30] Meiggs 1982: 188–217 and Hannestad 1988 for Attica, and more generally Forbes 1996: 84–8. Oil (as bitumen) was known, but only as an exotic substance used for embalming rather than for heat (Diod. Sic. 19.98–9, with J. Hornblower 1981: 147–50).

[31] Rackham 1996: 29–30.

[32] Theophrastus reports the silverminers' preferences as being for holm-oak, oak, and arbutus for the first smelting, but also for pine (*Hist. pl.* 5.9.1 and 3). If any contemporary awareness of loss of timber and of ground cover does underlie Plato's notorious scenario of the antediluvian world (*Criti.* 111a–d), south Attica is indeed a likely candidate, but scepticism is in order (Rackham 1996 against Hughes 1983).

[33] Meiggs 1982: 453–4; Forbes 1996: 77–9 and 88–9; Foxhall 1996: 53–60. For pitch cf. also Hdt. 4.195 (Zacynthus).

[34] Ehrenberg 1943: 132 n. 4. [35] Flemming 1996; Rihll 1999: 112–16.

[36] Gallant 1985; Davidson 1997: *passim*. Fourth-century comedy supplies the main evidence, as Athenaeus' books 6–7 make wearisomely clear.

[37] *IG* I^3 994 (Athens, Acropolis, 500–450); Paus. 5.27.9 and 10.9.3–4 (the bull of Corcyra, dedicated c. 480 at both Delphi and Olympia to commemorate an exceptional haul of tuna, with Habicht 1985: 75–7 for confirmatory detail, and Horden and Purcell 2000: 194–5); Gallant 1985, with Horden and Purcell 2000: 576; Purcell 1995.

lay the systematic deployment of shoal-watchers,[38] the livelihood of many a well-placed coastal community,[39] and systems for transforming perishable fish into commodities which could be husbanded, harvested, preserved, stored, and transported. Prime among these was the use of the other prime maritime product, salt,[40] in order to create *tarichos*, salt-fish, a commodity produced in quantity and traded over long distances, from Spain to Corinth and from the Black Sea to Athens.[41]

V LAND AND LAND-USE: THE CULTIVABLE LAND

All the same, agrarian production was absolutely primary. Though small-scale irrigation was common,[42] dry farming was dominant, even in areas like Attica or the south Aegean islands where annual precipitation, then as now, was probably near the lower limit (300 mm.) of effective dry farming. Though the "Mediterranean triad" of grain, vine, and olive is in some respects misleading, it serves well enough as a first step in description, for they were the staples of diet, moulded most farming activity, and were sanctified, as other foodstuffs were not, by myths linking each of them to the beneficence of a major deity.[43] Of the triad, grain crops, principally wheat and barley (millet and oats were marginal),[44] were far and away the most important nutritionally, providing up to 70–75 percent of calories in the normal diet,[45] even though yields are reckoned, admittedly on very uncertain evidence, to have ranged only from 3:1 to 10:1, with high interannual variation.[46] The choice between barley and wheat depended in part on soil type and in part on rainfall, with barley predominating

[38] Ar. *Eq*. 313 (Aegean, unspecific); Strabo 5.2.6 and 5.2.8 (Populonia and Cosa in Etruria); *ibid*. 17.3.16 (Ras Kaboudia in Tunisia).

[39] E.g., Iasos (Strabo 14.2.21).

[40] Lowe 2001; Davies 2001b: 24–6. For non-maritime salt cf. the trans-Saharan route followed in Hdt. 4.181–4.

[41] For Spain, Lowe 2001: 186–7; for the Punic amphoras warehouse in Corinth, Williams 1979; 1980; for Black Sea production, Braund 1995.

[42] Cf. Burford 1993: index s.v. 'Irrigation'. Millet (Xen. *An*. 2.4.13) and sesame (Theophr. *Hist.pl*. 7.7.3) were known to do well under irrigation.

[43] Thus grain was seen as the gift of Demeter, the vine of Dionysos, and the olive of Athena, though the olive-mill and other agrarian techniques were also fathered onto Aristeas the son of Apollo and Cyrene (Amouretti 1986: 153 n. 1).

[44] For millet Burford 1993: 128, for oats Theophr. *Hist. pl*. 8.4.1 and 8.9.2. Other farinaceous products (e.g., rice) were known but not used in Greek areas (Theophr. *Hist. pl*. 8.9.2; Amouretti 1986: 33).

[45] Foxhall and Forbes 1982: 74.

[46] No reliable figures exist, either for yield per land-area or for yield-for-seed. The only attested figures, from *IG* II^2 1672, report tithes given to the goddesses at Eleusis from wheat and barley in Attica and its dependent territories for the year 329/8, but (a) their accuracy as a reflection of total real yield is debated, (b) the area under cultivation (as distinct from total surface area) cannot be ascertained, and (c) since the early 320s saw famines, the figures may well not reflect an average year's crop. See Garnsey 1988: 98–106; 1992b.

overall and especially in drier areas.[47] Since digging, ploughing (ideally three times), sowing, hoeing, weeding, reaping, threshing, winnowing, and storing were highly labor-intensive for much of the year,[48] and the normal agrarian regime is probably reflected in leases of public or cult-owned land that assume that half the land will be sown to cereals each year,[49] there is little doubt that cereal cultivation was by far the greatest user of labor in classical Greece, and its yield the largest single product by volume and by value. That remained true even during the classical period, when the cereal production of the older-established Greek communities was proving seriously inadequate, requiring regular imports from the Black Sea, Sicily, and north Africa. However, the scale of imports, the period of their emergence as a major issue, and the degree to which intensification of production was resorted to in lieu, are matters of major debate.[50]

Grapes and olives, by contrast, seem to have been produced in sufficient quantity not merely to make most Greek communities self sustaining but also to generate a surplus.[51] Such surpluses could be used for prestige cultic purposes, as the Athenians did with olives by (presumably tithing production and) offering jars filled with olive oil as prizes at the Panathenaic games.[52] However, they also singled out olive oil as the only (agrarian) product which might be exported,[53] a form of market-oriented activity which Acragas pursued on a much larger scale in the late fifth century by supplying Carthage[54] and which other Aegean states – Chios, Lesbos, and notably Thasos[55] – pursued in a systematic way via wine production and export. This is admittedly only an impression, for, in contrast to work on cereals, work on viticulture and olive production both ancient[56] and modern has

[47] Theophr. *Hist. pl.* 8.6.4. and *Caus. pl.* 3.21.1–5; Burford 1993: 127–8. Thus, the barley:wheat ratio for Attica in 329/8 was over 12:1, while that for Lemnos in the same year was almost 1:10 (*IG* II² 1672, with Garnsey 1988: 98 table 5).

[48] Amouretti 1986: 51–77; Osborne 1987: 34–52; Isager and Skydsgaard 1992: 21–6; Burford 1993: 100–29.

[49] The most specific are *IG* II² 2492, lines 14–18 (Aixone, 345/4), II² 2493, lines 7–10 (Rhamnous, 339/8), and *SIG* 963, lines 7–8. See nn. 71–2 below.

[50] Brief sketch in Davies 1992: 300–1.

[51] For vine cultivation in general, see Amouretti 1988; 1992b; Hanson 1992; Isager and Skydsgaard 1992: 26–33. For the olive, Drachmann 1932; Amouretti and Comet 1985; Amouretti 1986: 153–96; 1992b; Isager and Skydsgaard 1992: 33–40; Ault 1994; Brun 2003; 2004.

[52] Thus, the property of one of the men convicted in 415/4, probably Alcibiades, included no fewer than 82 Panathenaics (*IG* I³ 422, lines 21 and 41–60, with Amyx 1958: 178–86).

[53] Plut. *Sol.* 24.1, F 65 Ruschenbusch. Whether the law was genuinely due to Solon in the early sixth century is unresolvable. Notable, perhaps as a response to short supply in the 420s and 410s (Ar. *Vesp.* 252 with MacDowell ad loc.), is the stipulation, in a lease of cult-owned land in Athens in 418/17, that the lessee is *inter alia* "to plant shoots of olives not less than two hundred, and more if he wishes" (*IG* I³ 84, lines 33–4): since the lease was to run for twenty years (lines 37–8), there was time for both lessee and cult to benefit from the eventual produce.

[54] Diod. Sic. 13.81.4–5. [55] Texts and full discussion in Salviat 1986.

[56] The emphasis placed on viticulture and arboriculture rather than on cereal crops in Theophrastus' two agricultural treatises is explicable partly because the techniques were more intricate, especially so

tended to focus, for good reasons of practicality, on techniques of production rather than on quantification. Nonetheless, for present purposes both products, each of high economic and nutritional importance, can be regarded as long-established and stable components of the normal agrarian regime by the classical period.

The classic triad was complemented by a range of other crops. Prime among them were pulses and legumes. Those cited on the Attic Stelai are bitter vetch (*orobos*) and lentil (*phakos*), others known from classical sources and sites being chickpea (*erebinthos*), broad bean (*kuamos*), and garden pea (*pisos*).[57] They were essential crops for three reasons. First, though they produced toxins, and though the risks of favism may have lain behind the prejudice of Pythagoreans and others against broad beans,[58] they were recognized both as foods for the poor and as a valuable resource against crop failure because of their capacity to survive drought and to keep well.[59] Second, for all (not just the poor) they provided essential protein in a diet which risked otherwise being short of it.[60] Third, though the process of nitrogen-recovery via legume cultivation was not understood, and though overall calorific yield from cereal-legume rotation may have been lower than from cereal-bare fallow rotation, extant leases indicate that there was enough awareness of the benefits of "green manure" on the soil for legumes to occupy a recognized role in good practice.[61]

A second complementary group comprised fruit trees. The Attic Stelai attest only almond (*amugdale*) and fig (*sukon*) as stored crops, but a few other cultivated species – apples, pears, pomegranates, and quince – are known from Theophrastus, while for him yet others such as walnut, hazel, and chestnut, harvested and pruned but not propagable by man, straddled the boundary between cultivated and wild. Hardly surprisingly, therefore, orchards figure prominently in the literary and epigraphic record from Homer onwards, complete with injunctions about optimum densities for individual species.[62]

with vines (*Caus. pl.* 3.11–16), and partly because the greater variation of species rendered them more botanically interesting. Of the two treatises, *Enquiry into plants* (*Hist. pl.*) and *On the causes of plants* (*Caus. pl.*), *Hist. pl.* is largely about taxonomy, the identification of species, and their correlation with habitat and seasonal growth, while *Caus. pl.* focuses on the processes, both intrinsic and human-directed (such as grafting and pruning), involved in the cycle of growth and perpetuation. Throughout both works, as commentators note with frustration, Theophrastus' interest was that of a botanist, not that of an agronomist. Along with Xenophon's *Oeconomicus* they remain the main sources for agrarian production methods, but many procedures remain sadly unclear.

[57] Pritchett 1956: 188, 191; Isager and Skydsgaard 1992: 42–3; Flint-Hamilton 1999. Cf. Dem. 22.15 for vetch as a famine food.

[58] Hdt. 2.37.5; Iambl. *VP* 61, with Clark *ad loc.*; Sallares 1991: 300–3; Flint-Hamilton 1999: 373–4, 379–80.

[59] Garnsey 1988: 52–5; 1992a; Flint-Hamilton 1999: 374.

[60] Foxhall and Forbes 1982: 44 n. 10; Sarpaki 1992.

[61] Sallares 1991: 301; Burford 1993: 124–5, citing Theophr. *Hist. pl.* 8.7.2 and 8.9.1; Flint-Hamilton 1999: 374. For *IG* II^2 2493 + 2494 see n. 72 below.

[62] Theophr. *Hist. pl.* 3.2.1–6; Pritchett 1956: 182, 190; Isager and Skydsgaard 1992: 41–2; Burford 1993: 129–33.

A third group, domestic and farm animals,[63] is less straightforward, for their near-invisibility in the leases (see below) and in Xenophon's *Oeconomicus* contrasts with their indispensability on the ground, and has presented modern scholarship with an awkward problem of interpretation. At the descriptive level, to be sure, their roles in production were plain enough. Some were simple: while all yielded much-needed manure, pigs were raised for meat, poultry for meat and eggs, and equids largely for haulage and carrying, though horses were also bred for non-productive display purposes in racing and for military purposes as cavalry mounts.[64] Three other species – cattle, sheep, and goats – had more complex uses, for apart from wool and the haulage functions performed by bovids, all yielded milk *in vivo* and meat, hides, and bones (for glue) after slaughter. Their roles as sacrificial animals (especially pigs, sheep, and goats: the greater bulk and higher unit cost of bovids confined them to larger-scale occasions) gave them a role in supplementing the supply of protein for a population otherwise largely dependent on cereals and legumes, as has long been recognized (though it should not be exaggerated),[65] and helps to explain why flocks of sheep and goats are normal components of lists of property in the Athenian orators.

The task of incorporating stockrearing into an overall picture of the Greek farm has thrown up two problems. The first, more tractable, is literally that of finding grazing space in the crowded landscapes of classical Greece where cultivation seems to have encroached onto every usable area, however marginal. True, some areas are easily identifiable, such as those set aside for rearing animals for sacrifice at major sanctuaries: the Sacred Land near Delphi and the Orgas at Eleusis are the most prominent, but were certainly not unique.[66] Publicly owned common land was another usable resource,[67] especially that on the shoulders of mountain watersheds which was the goal of such limited transhumance as can be safely predicated of classical Greece.[68] So, of course, as noted above, were woodland and

[63] General descriptive surveys in Burford 1993: 144–56 and in Isager and Skydsgaard 1992: 83–107, the latter largely based on the main primary source, Aristotle's *Enquiry into animals* (*Hist. an.*), but also listing work of the 1930s on the rearing of individual species in Greek antiquity (p. 83).

[64] Bugh 1988 for Athens, and Spence 1993 for Greece at large, concentrate entirely on the military role, as also, understandably enough, do Xenophon's two essays *On horsemanship* and *Being a cavalry commander*.

[65] Jameson 1988: 105; Burford 1993: 151 for flocks in Attic texts; Chaniotis 1995 for animal husbandry on Crete.

[66] For the debate cf. Osborne 1987: 47–52; Hodkinson 1988; Skydsgaard 1988; Forbes 1994; 1996: 92. For "Sacred lands" cf. Parker 1983: 160–6; Isager 1992: 119–20; McDonald 1996. The sensitivities involved are shown by the Athenian request for guidance from Delphi whether land near Eleusis should be leased out or left "holy-idle" (*aneton*) (*IG* II^2 204, lines 51–2) and by the care which the demesmen of Piraeus take to lease only "what it is possible and holy-licit (*themiton*) to cultivate" (*IG* II^2 2498, lines 16–17).

[67] For examples cf. Burford 1993: 256 n. 147; Chaniotis 1995.

[68] Georgoudi 1974; Hodkinson 1988: 51–8; Skydsgaard 1988; Isager and Skydsgaard 1992: 99–101; Burford 1993: 153. The use of Mt. Cithaeron reflected in Soph. *OT* 1120–40 remains, disturbingly, the best-attested example.

scrubland, and perhaps marshy areas such as the plain of Marathon.[69] However, the main usable resource was probably arable land in its fallow year, all the more since the land benefited from manure, a substance much valued and always in short supply.[70]

Less tractable is the challenge of deciding how far stockrearing was integrated with agrarian land-use. Prompted in part by enhanced awareness (sketched above) of the value of legumes and pulses and in part by the high population levels suggested by survey evidence, recent scholarship has pondered how far traditional biannual fallowing was modified, at least in regions subject to significant population stress, by the interculture of widely spaced olive trees with cereals and by cropping pulses and legumes on fallow land for both human and animal consumption, thereby integrating stockrearing more closely and increasing the overall annual yield, albeit at the price of greater labor input and of enhanced risk of soil exhaustion. This is not the place to adjudicate a still open debate,[71] but simply to note the one body of direct evidence which may illustrate both this specific problem and the general panorama of agrarian production in classical Greece. This consists of lease inscriptions of agricultural land.[72] They lay down, for example, what may be assumed to be standard good practice provisions for olive and vine cultivation, or the retention of manure and chaff on the estate, while they split interestingly between enjoining either biannual fallow or the planting of pulses on half of the fallow: animals, in contrast, barely appear save in the most detailed of all, a late fourth-century document from Amorgos[73] which explicitly excludes them while otherwise specifying precisely how the tenant should manage the land.

Finally, this section needs to look beyond foodstuffs to other forms of processing basic materials. The task is of very uneven difficulty. On the one hand contemporary evidence from sites, artifacts, inscriptions, and literary texts[74] makes it easy to relate attested occupations and productive activities

[69] In general Rackham 1983; Hodkinson 1988: 48; Rackham 1996: 26 (marshland). For Marathon, Paus. 1.32.7, with Isager and Skydsgaard 1992: 14–17.

[70] Hence its supplementation by nightsoil (Owens 1983). *SIG* 963 contains the revealing provision (lines 20–6) that since the tenant was forbidden from bringing flocks onto the leased *temenos*, he had instead to bring a stated load of dung annually.

[71] It can be followed from Jameson 1977/8: 125–33 through Gallant 1982; Halstead 1987; Garnsey 1988: 93–106; Hodkinson 1988; Skydsgaard 1988; Isager and Skydsgaard 1992: 108–14 (a very sceptical summary); to Burford 1993: 156–9 (degree of economic rationality).

[72] Principal list in Osborne 1987: 42–3 (table), with discussions in Osborne 1987: 41–52; 1988. Add Behrend 1979; Jameson 1982; 1987; Behrend 1990; Burford 1993: 110–24 and *passim* (with *SEG* XLIII 1221); Arnaoutoglou 1998: 52–7 (selected translations); Petrakos 1999: 143 no. 180 (re-publication of *IG* II^2 2493 + 2494). Though the leasing of privately owned agricultural land to tenants is well attested in the Athenian orators (Davies 1981: 54 n. 30), all extant inscriptions concern land owned by deities and sanctuaries or by communities and collectives.

[73] *SIG* 963, with *SEG* XXXVIII 1944 and XLIII 1221 and Foxhall 1996: 48–51.

[74] Burford 1972 and Hopper 1979 largely supersede the older surveys of Francotte 1900–1, Glotz 1926, and Bolkestein 1958, but do not in themselves wholly supersede the basic antiquarian assemblage

to such primary materials as wood (foresters, sawyers, carpenters, furniture-makers), stone (quarrymen, stonemasons, sculptors, mosaicists, hauliers), metals (miners, blacksmiths, armorers, silversmiths, goldsmiths, coiners), clay (potters, tilers), hides (tanners, cobblers), reeds (ropers, basketmakers), herbs (healers, perfumiers), or wool (fullers, dyers, weavers). The challenge is to produce an overview of this enormous sector of production, a task which requires more attention to the technologies, procurement of materials, quantification of production, and distribution-patterns of artifacts than is currently available. Nonetheless, both the excellence of such artifacts as do survive, and the prominence given to the sector in epigraphic and literary documentation, single it out as the crucial productive complement of the agrarian economy. Nor was its importance exclusive to Athens, for though the degree of development, extreme specialization, and craftsman skills documented for Athens may not have been widespread, Corinth had been her precursor, while Rhodes and Syracuse were not far behind. Indeed, we can probably apply across Greece the characteristics noted for Athens by Harris 2002: first that the sector showed much horizontal specialization, with multiple occupations, but little vertical specialization in the form of management structures; and second that in both location and human relations (with the probable exception of labor in the silver mines) "the Athenians did not make a clear distinction between the *oikos* (household) and the business enterprise or *ergasterion*." To them can be added a third, noted and much commented on both by contemporaries and by modern scholarship, that (on public projects at least) citizen, resident alien, and slave workers often worked side-by-side, and were paid the same daily rates. As with slave bankers, so with slave ship's captains, status and function could cross-cut each other in ways which could render the citizen echelon marginal to the real life of the state.

Even so, whatever its location, the *ergasterion* staffed by slaves, owned by an entrepreneur or rentier, and run by a free, freedman, or slave overseer, had unquestionably become the typical non-agrarian productive institution, and could attain significant size. True, those depicted by vase painters tend for the sake of clarity to be small groups, while in a well-known passage Xenophon noted how the degree of craftsman specialization depended on

of Blümner 1912. Harris 2002 lists c. 170 occupations attested in classical Athens. The various *Studies in Ancient Technology* of R. J. Forbes wholly fail to differentiate areas and periods. For particular activities, and in respect of production techniques rather than connoisseurship, cf. Amyx 1958 and Lawall 1998 (amphoras); Hodge 1960 (specialized carpentry); Strong 1966 (silversmithing); R. M. Cook 1972 (potters); Bettalli 1981 (textiles); Ampolo 1981 and Osborne 1985a: 93–110 (quarrying); Mattusch 1988 and Lapatin 2001 (statuary); Billot 1992 (tanning); Williams and Ogden 1994 (goldsmithing); Treister 1996 (metallurgy); Monaghan 2000 (dyeing); Rihll 2001 and Rihll and Tucker 2002: 276–86 (mining); Reger 2005 (perfumes). A book-length survey of craftsman production in the classical period, complementary to Treister 1996 and comparable to that of Gillis et al. 1997 for premonetary Greece, is much needed.

the size of the city (*Cyr.* 8.2.5), but even aside from the huge silver-mining gangs we hear of workshops not just of 9 or 10 slaves (Aeschin. 1.97 and 101), but of 20 (Dem. 27.9), 30 (Dem. 37.4), 32 or 33 (Dem. 27.9), and even, very exceptionally, of 120 (Lys. 12.19). While on the one hand such figures must reflect a flourishing slave trade, of which we know virtually nothing, they also generate an appreciation of the scale of activity and skill required to procure raw materials, provide suitable premises, supervise a workforce, and mesh with retailers and consumers.

The task is therefore one of gaining a sense of the varying loci of such occupations and of their relationship to markets, in any of the three senses described above. Two examples illustrate the range to be encompassed. First, textiles. At one extreme, as the predominance of "spinsters" (*talasiourgoi*) among slave women recorded as gaining their freedom at Athens in the 320s makes clear, much textile production remained within the household, so that even an upper-class wife was assumed to spend much time making, supervising, and storing such produce.[75] At the other extreme, not only do records of prices reveal an established set of market mechanisms by the late fifth century, but also there was a significant flow of expensive textiles from the Near East.[76] Likewise, though classical Greece shows a new level of activity in public and private building, only in a few public projects, especially in Attica, are management frameworks visible, principally via piecework contracts with individuals or teams of craftsmen, while the modalities of private construction remain wholly undocumented.[77] We do not even know how house-production in the "new towns" of Olynthus and Piraeus was regulated or financed. Thus, though of course in one sense the markets for labor and materials were common to all participants, neither of these sectors of production shows a single pattern of production or a uniform relationship to markets, nor even a clear movement from one pattern toward another. Here as elsewhere a plural economy must be predicated.

VI LAND AND LAND-OWNERSHIP

It is time to turn from agrarian and maritime primary products to consider land as a commodity and limited good, together with the unit of

[75] 50 "spinsters" in *IG* II² 1553–78, the largest single occupational group; Xen. *Oec.* 7 *passim*. For the general issue, Bettalli 1985.

[76] Pritchett 1956: 203–8 (prices); Miller 1997: 75–81.

[77] The physical modalities, in contrast, are well attested and studied, not only for temples and other public buildings (e.g., Berve and Gruben 1963; Burford 1969; Boersma 1970; Ashmole 1972; Coulton 1974; Dinsmoor 1975; Coulton 1976; Coulton 1977; Lawrence and Tomlinson 1996; Camp 2001) and fortifications (Winter 1971; Lawrence 1979) but also for housing both urban and rural (e.g., Young 1956 [Attica]; J. E. Jones et al. 1962; J. E. Jones et al. 1973; J. E. Jones 1975 [Attica]; Travlos 1971: 392–401 [Athens]; Hoepfner and Schwandner 1994 [general]; Schuller, Hoepfner, and Schwandner 1989 [general]; Jameson 1990a and 1990b [general]; Kiderlen 1995 [large houses]; Nevett 1999 [general]; Cahill 2002 [Olynthus]).

production, the "farm," and its ownership. Most historians assume that by the fifth century BC there was little "spare" land, and that every square meter was in service. Support for this comes partly from survey data, which reveal dense networks of settlement across the entire cultivable area.[78] There were also some significant intakes in the classical period,[79] perhaps including those termed "lands at the end (or limit)" (*eschatiai*) in literary sources.[80] Partly, again, the difficulties which states encountered in protecting pasture reserved for animals destined for sacrifice at major shrines suggests land shortages.[81] More contentious, given the lack of a clearly identifiable word for "terrace" in classical Greek, is the surmise that terracing was used to extend the cultivable area.[82] Overseas colonization, especially by Athens, reflects complex social and politico-military agendas as much as land-hunger; but although circumstances were not uniform, the general assumption is safer than any alternative.

The unit of production is usually termed "farm." However, this is a modern term, with no precise ancient equivalent. Classical Greek used *agros*, which reflected land-use (field, tilled land, countryside), *oikos*, which denoted the household and its property, *kleros*, which etymologically meant "lot, assigned portion, share," or *chorion*, a general word for "place, area, space." These semantics matter, for they mirrored systems of land-ownership which themselves reflected trade-offs between agrarian practicality, military need, and community authority. Agrarian practicality favored units which could be cultivated by, or under the authority of, one nuclear family, maybe with some hired or servile help, but were large enough to sustain such a family reliably. High interannual variability of yield and what appears to have been a rule of thumb of one hectare per person, tended to generate productive units of at least 5 ha. of arable land. Military need, shaped by the ever-present threat or opportunity of invasion, exerted pressure in the contrary direction: a community's survival (or chance of

[78] E.g., Renfrew and Wagstaff 1982 [Melos], Wright et al. 1990 [Nemea valley], Cherry et al. 1991 [Keos], Jameson et al. 1994 [S. Argolid].

[79] Examples known from literary evidence are tree clearance at Philippoi and Krenides in Thrace after the Macedonian conquest of the 350s (Theophr. *Caus. pl.* 5.14.5–6), drainage of marshland before Theophrastus' time at Larisa in Thessaly (*ibid.* 5.14.2; Strabo 9.5.19, 440C), and attempted drainage at Eretria on Euboea (*IG* XII 9, 191) and of Lake Copais in Boeotia in the 320s (Strabo 9.2.18); further references in Argoud 1987 and Wilson 2000. Also, though its ascription to the classical period is disputed, a substantial intake into cultivation has been claimed for the Athenian deme of Atene, barely inhabited before 500 but later the object of substantial agrarian installations (Lohmann 1992; 1993; more cautiously, Foxhall 1996: 62–3; Whitley 2001: 377–81). Another such area may well have been on Mt. Aipos on Chios, where clear signs of classical cultivation cover an area now largely desolate (Lambrinoudakis 1986; Isager and Skydsgaard 1992: 72).

[80] Cf. D. M. Lewis 1973: 210–12 [1997: 291–3]; Lane Fox 1996: 125 n. 1, with further references.

[81] Cf. n. 65 above.

[82] The debate can be followed through Jameson 1977/8: 128 n. 32 (who canvasses the word *haimasia* [*Od.* 18.359; Men. *Dys.* 377]); Isager and Skydsgaard 1992: 81–2; Rackham and Moody 1992; Rackham 1996: 26; Foxhall 1996; Grove and Rackham 2001: 107–18.

gain) could depend on putting as many heavy-armed men into the field as possible, which encouraged division of the productive landscape into the maximum number of units of minimum viable size, each providing one such warrior. Communities, however traditional, minimal, or remote, had to devise an acceptable compromise between these opposed imperatives, and seem to have done so in two complementary ways: first, by asserting a primordial public authority over the landscape, and second by preventing excessive accumulation of property. The first expedient typically took mythic form, attributing the community's possession of its landscape to a god,[83] both so that its individual members might have (in theory or in reality) a share allotted to each (hence the use of the word *kleros*), and so that the community as a collective could feel itself entitled at need to confiscate, redistribute, or reassign land.[84] The second expedient involved favoring partible inheritance over primogeniture, ensuring at the extreme that a *kleros* did not become "empty" (*eremos*),[85] setting a limit to the size of individual estates,[86] and enveloping the acquisition of several *kleroi* in a cloud of social disapproval.[87]

Such considerations so privileged the "family farm" for both practical and ideological reasons that, assisted by rosy depictions in Aristophanes and elsewhere, it has come to be seen both as the economic norm and as the social ideal.[88] Such a view is both simplistic and misleading. In the first place, its stability through time depended on sons succeeding fathers as farmer-owners and passing *kleroi* to their own sons, and so on. Demographic reality, visible above all in the Gortyn lawcodes and in Athenian inheritance disputes, engendered a far less-stable environment, characterized by divisions of *kleroi* between sons, by losses and gains via dowry transfers or divorce, and by adoptions. Second, provisions against the concentration of property might be weak, as was calamitously the case at Sparta,[89] not least because the office-holders with the duty of enforcing them were typically drawn from an upper class in whose private economic interest it was to flout them. Third, not all productive land was in the hands of owner-farmers, for some was owned by deities, collective cult-groups, or the state and its segmental

[83] The "Great Rhetra" of Sparta (Plut. *Lyc.* 6) is the classic example.

[84] Confiscation was common enough, usually after legal process but often driven by nakedly fiscal reasons. Periodic redistribution was rare in practice, the Lipari Islands being the only known case (Diod. Sic. 5.9.4–5, with Burford 1993: 24–6 [cautious]), but was feared as a revolutionary contingency (*ges anadasmos*).

[85] Cf. *Ath. pol.* 43.4 for the procedure at Athens, and the general preoccupation with the bestowal of heiresses in marriage within the kindred (Karnezis 1972 [Athens]; Davies 2005: 317–22 [Gortyn]).

[86] Large single units in Attica go up to 300 *plethra* = 30 ha., but not beyond. Whether this was by chance or by unattested rule is unknown. Larger portfolios of property holdings existed, but comprised many scattered component parts (Davies 1981: 52–4).

[87] Isae. 11.37, with Davies 2001c: 206.

[88] A view documented but not shared by Burford Cooper 1977/8; cf. also Foxhall 2001 for Attica.

[89] Arist. *Pol.* 1270a15–b6, with Hodkinson 2000: 94–103.

parts such as demes, and was leased out, the income being used for communal or cultic purposes.[90] Though it is hard to estimate the proportion of productive land thus owned,[91] it was not negligible, and its existence provided flexibility and opportunities for tenants' energy and ambition.[92]

Further, the adoption of coinage in most Greek states except Sparta by the end of the sixth century BC had two fundamental long-term consequences that eroded the efficacy of the compromise sketched above. First, though land-ownership remained the principal determinant of status, though prohibitions of sale are reported for some regions and some categories of land,[93] and though we cannot document an institutionalized market in land,[94] nevertheless land did change hands, not least via the public sale of confiscated property, and there is evidence of land being bought as an investment, to improve and resell.[95] The second, more radical consequence was the gradual takeover of much military activity from the early fourth century onwards by professional mercenary soldiers. Paid in coin, trained by innovative condottieri, and employed only when needed, they were a more efficient solution to landward military needs than amateur hoplite militias.[96] Yet, the more such men took over mainstream military roles, the less states needed to retain systems of landholding which maximized the number of warrior smallholders.

Two salient points emerge. First, patterns of land-ownership were not, and could not be, determined purely by agrarian economic rationality. Considerations generated by that logic were indeed – and knowingly[97] – part of the picture, but coexisted with military needs, the needs of temples, cult-bodies, and local collectives for reliable income, and with the role of land-ownership as a signifier of status. Second, patterns were not static throughout the classical period: not just because demographic instability drove endless small-scale fluctuations, but also because long-term changes affected links between land-tenure, civic status, and community obligation. One such movement, to assimilate to each other the circles of those who owned land, fought, voted, held office, and had direct access to law or

[90] The estates of Apollo on Delos and Mykonos are perhaps the most prominent (Kent 1948; Reger 1994), but the system was widespread (Davies 2001b). In addition, royal land certainly existed at Cyrene (as *temene*, Hdt. 4.161.3), as it presumably also did both in the territories of the well-established national monarchies of Epirus and Macedonia and (by confiscation) in the territories of the "tyrants" of the classical period in Sicily and elsewhere.

[91] Only for Attica is any estimate possible, though Andreyev's guess of up to 10 percent (1967: 72) may have been on the high side (D. M. Lewis 1973: 199 [= 1997: 276]).

[92] Davies 1981: 54 n. 30; Osborne 1988.

[93] E.g., Herakl. Lemb. 373.12 Dilts (sale of the "ancient portion" [*archaia moira*] prohibited at Sparta), with Hodkinson 2000: 68–75.

[94] Its commodification was probably a gradual process and therefore remained unremarked as such in our sources, but was clearly a normal aspect of Athenian life by the late fifth century.

[95] Xen. *Oec.* 20.22–6. [96] Arist. [*Oec.*] 2. 24a, 1350b, for the need to pay mercenaries in coin.

[97] See n. 152 below.

distributions, tended toward the creation of a single, semi-level platform of all who "had a share in the state," and thereby impeded change in the ranks of landowners. A contrary movement, which tended toward the disaggregation of roles and statuses (as with military activity and much non-agrarian production) and toward eroding links between landholding and citizenship, gathered pace in the fourth century and broke surface, sometimes violently, thereafter.

VII LABOR

No survey of labor as a component of production in classical Greece can ignore two basic determinants. First and foremost, the multiplicity of microstates, and the differences in legal status within the "workforce" even within a single microstate, so fragmented labor markets that *ad hoc* expedients could not go far to integrate them. The second is that most people had to work very hard nearly all the time. True, a leisure class did exist, living on rents or from the direct produce of others' labor, and features so prominently in our evidence as to give an utterly misleading picture of the demands and constraints of ordinary existence. Even for most male citizens, apart from the windows of leisure provided by slack periods of the agricultural calendar, participation in community activity required buying out via public pay (*misthos*) the time which would otherwise be spent in labor; serfs, slaves, and the vast majority of the free but unenfranchized male population had no such access, while the *misthos*-system itself may not have been widespread outside Athens.[98] As for women, though there were high-status exceptions, especially for those with a visible role in cult, it is safest to make the stark assumption that most had no leisure at all.[99]

Labor in classical Greece was therefore intrinsically scarce and at a premium. There were of course the physically or mentally unemployable, but in negligible numbers. More importantly, the flexible deployment of free labor in a wage market was severely constrained, whether by the prejudice against being the private employee of another citizen,[100] or by the scarcity of coined money, or by the feebleness of the protection (divine or human) available to those who ventured beyond their own *polis* boundaries: it is no accident that the most significant wage-labor market, with the widest geographical scope, was for mercenary soldiers and rowers, recruited above all from among the landless, much in demand whenever there was a funded paymaster, and better able to protect themselves when abroad.[101]

[98] de Ste. Croix 1975 and 1981: 602 n. 24.

[99] S. Lewis 2002: chs. 2–3; Miller 1997: 192 for the paraphernalia of the leisure class.

[100] Xen. *Mem*. 2.8.1–5 – though the prejudices of a dispossessed rentier may not have been typical. A hireplace for day-laborers is attested for fifth- and fourth-century Athens (Fuks 1951 [= 1984: 303–5]). More generally Garlan 1980.

[101] I owe this perception to Vincent Gabrielsen, to whom my thanks.

In order to bypass such inflexibilities various expedients emerged. One, visible mainly in the towns most open to human migration by sea, was the creation of the status of "resident alien" (*metoikos* or *paroikos*).[102] This allowed free men to offer their labor where it was needed, to remain formally "free" (albeit with the requirement to relate to a local citizen "protector" [*prostates*]), to work and earn without formal limit, and to have some basic legal protection, while being liable to military service in the adopted microstate and being excluded *sine die* from landowning, intermarriage, and the political process. Athens at least consistently saw metics not as a threat to citizen status but as an asset, to be encouraged as long as the citizen boundary was not crossed.[103]

A second was to bring major building and some other activities directly or indirectly under state control, giving contractors a formal relationship with a civic or cultic collective, not with a private individual. Such contracts are widely attested in temple- and fortification-building accounts from all over Greece.[104] Not only do they reveal contracts being let to citizens and metics on what appear to be equal terms, but they also (especially at Delphi, Tegea, and Epidauros) show how, subject to putting up local guarantors (*enguetai*), craftsmen from elsewhere could seek and win contracts, offering thereby a regional common market of labor and expertise[105] closely comparable to that which had long allowed sculptors, musicians, silversmiths, and artists to take commissions throughout the Greek world and beyond.[106]

A third expedient, widely practiced by conquerors and invaders, was to subject an existing population to some form of serfdom. In ethnic terms it is clearest in colonies such as Syracuse and Heracleia Pontica, where Greeks exploited indigenous labor, though there is increasing evidence of gradual assimilation and acculturation as the classical period went on.[107] In terms of evidence, the modalities are clearer for those regions of old Greece whose regimes rested, in myth or in reality, on the claim of immigration and divinely chartered occupation. Thessaly with its *penestai*, Crete with its *woikeis*, and Laconia-Messenia with its helots were the leading examples, but were not unique.[108] As elsewhere with serfdom, so also in Greece the

[102] Gauthier 1972: 107–56; Whitehead 1977 [Athens]; Whitehead 1984 [general].

[103] Xen. *Vect.* 2.1–7 is the classic statement.

[104] Cf. Maier 1959–61 [fortifications]; Burford 1969 [temples].

[105] Davies 2001d: 221–3.

[106] I know of no synoptic treatment of this topic for Greek culture comparable to that of Gold 1982 for Rome; it was explicitly excluded from Wallace-Hadrill 1989. Cf. meanwhile Bowra 1964: 355–7 (Pindar as paid professional poet) and Morgan 1990: 34–41 (itinerant craftsmen).

[107] Lotze 1959; Garlan 1988: 85–118.

[108] Argos, with its post-494 "*douloi*" (Hdt. 6.83), is a complex and contentious case (Tomlinson 1972: 96–100). Nor was Athens immune, for if the local understanding of the term *hektemoroi* has substance (*Ath. Pol.* 2; for the endless debate thereon see now de Ste. Croix 2004: 109–28), pre-Solonian Attica too may have been moving towards a quasi-serf system until the custom of pledging one's body as security for debt was outlawed, traditionally by Solon. In general Finley 1959; 1962; Brockmeyer 1979; Finley 1985: 62–94; Garlan 1988; de Ste. Croix 1988; Fisher 1993.

system had three components: a population retaining its location and family structures but tied to that location and to the estate owner; a regime of agrarian sharecropping, the split of produce varying from region to region; and an upper echelon of estate-owning rentier families, likely to reside in "town" and closely brigaded together in military structures designed above all to preserve the exploitative system.

All three expedients had one crucial shortcoming: though adequate for static systems of agrarian production or for productive opportunities suitable for self-employed labor, they could not provide a labor force which could be closely controlled or could be assembled at, or moved to, the loci of such production as was innovative in method or scale. Though wage-labor did exist,[109] the most convenient solution was to extend the system of chattel slavery which had been used to staff the wealthier households for centuries. It was not a cheap solution: an adult slave (man or woman) might cost about 200 dr. in the classical period,[110] nor, given the chances of slaves escaping or dying young, was it low risk. But it had the overwhelming advantage of providing a means, via the slave trade,[111] of moving men and women efficiently (because forcibly) over long distances and if need be across cultural and ethnic boundaries, to where they could be profitably used. It is no accident that the locations and sectors of production where we are most aware of slaves in significant numbers are the silver mines of south-east Attica,[112] metal-working in Athens and Piraeus,[113] and intensive agriculture on Chios and elsewhere,[114] though the extent to which slaves were used in agriculture remains a very contentious matter.[115] Conversely, there were regions where the use of slaves seems to have been a recent development in the fourth century BC,[116] while the practice, attested above all in Athens, of slaves "living apart" from their owners, fending for

[109] Brockmeyer 1979: 105, with 289 n. 4.

[110] Average prices for slaves sold in 415–14 were 179 dr. (men) and 178 dr. (women) (Pritchett 1956: 276–81) in what may well have been a skewed market (D. M. Lewis 1966: 186 [= 1997: 169]). Fourth-century prices were somewhat higher.

[111] Garlan 1988: 53–5; Thompson 2003: 18–19.

[112] Xen. *Vect.* 4.14–17 names the owners of 300, 600, and 1,000 slaves, hired out to mining contractors in the later fifth century within a total workforce which has been estimated at anything up to 30,000 (Lauffer 1979: 140–71; further references in Osborne 1995: 31 with 40 n.18).

[113] Examples and references in Hopper 1979: 101 ff. and Treister 1996: 190–233.

[114] For Chios, Thuc. 8.40.2 and Ath. 6.265b–266f. The documentation about Thasian wine-production (Salviat 1986) focuses overwhelmingly on the product, not on the modes of production, so that the absence of allusions to slave labor is not serious negative evidence. Indeed, it is hard to suppose that the level of production evidenced by the amphora record for the main wine-producing areas (Thasos, Chios, Mende, Lesbos) could have been reached and sustained without slave labor. For Attica, the 12? agricultural slaves manumitted in Attica in the 320s (*IG* II^2 1553–78 with D. M. Lewis 1959; 1968) represent the largest single occupational group after the 50 "spinsters" (above, n. 75).

[115] Jameson 1977–8; Wood 1983; 1988; Jameson 1992; Osborne 1995: 32–4; Foxhall 1996: 54.

[116] Their use in Phocis is claimed to have started in the 350s (Timaeus, *FGrH* 566 F 11a *apud* Ath. 6.264 cd).

themselves but paying them a daily rent from their earnings,[117] shows the institution being used more to yield a rentier income than as an investment in production.

VIII CAPITAL

The role of capital in facilitating production, as distinct from distribution or consumption, is easy to underestimate. Its deployment in private hands is barely visible until the fourth century, while the public acquisition and use of capital, whether for military ends or for displays in temples and sanctuaries, followed drives and priorities which were rational enough, and had clear and far-reaching economic effects, but mostly were not investment for productive purposes. The one possible major exception to this is investment in infrastructure such as water-supply, harbors, bridges, and roads, but investment in the latter two, and in the harbor installations at Delos, seems to have been mostly for the sake of safe access to sanctuaries,[118] while the balance of investment at Piraeus between military and civil installations (quays, stoas, etc.) is wholly unclear.[119] Investment in water-supply facilities, too,[120] was primarily to meet the needs of urban agglomerations. However, at least for Thasos, a major wine-exporting state, it is likely that harbors were built in order to facilitate commercial shipping.

Also, though resources in bullion or coin did increase substantially during the period under review, they remained very limited and uneven. "Money supply" meant M1 and nothing else, for though systems of raising loans were of long standing, and created debtor–creditor relations which could become socially and politically explosive,[121] and though a rudimentary banking system emerged, the extent to which the variety of interest-bearing and interest-free lending mechanisms facilitated gainful activity (as against lubricating social obligations) before the Hellenistic period remains an unresolved and contentious matter.[122] If for simplicity's sake we leave aside less easily convertible, non-bullion modes of storing wealth such as cattle and jewelry (though neither was negligible), the money supply comprised silver and (to a far lesser degree) gold in the forms of coin held in private, civic, or royal hands, of objects of greater or lesser utility likewise in private, civic, or royal hands (tableware, etc.), and of specie lodged in

[117] Most of the retail traders listed on the Attic manumission lists will have fallen into this category.
[118] Davies 2001d: 215–16.
[119] Garland 1987: 139–70; Travlos 1988: 340–63; von Eickstedt 1991: 18–81.
[120] Cf. Rihll and Tucker 1995 (Samos) and the survey chapters in Wikander 2000 by Hodge, Jansen, and Wilson.
[121] Asheri 1969 (texts and full discussion); Millett 1991 (Athens); Davies 2005: 322–5 (Gortyn).
[122] The debate can be followed through Bogaert 1968; Humphreys 1970; Bogaert 1986; Millett 1991; Cohen 1992: 207–15; Gabrielsen 2005.

temples or sanctuary treasuries as deposits and dedications. This third category deserves more attention than it has received, for its total bulk and value was certainly substantial, and such dedications removed bullion from circulation and thereby diminished the money supply. The process had a significant adverse impact on liquidity, even if some deposits were envisaged as being recyclable without impropriety[123] or re-entered circulation via pillage.[124]

However, we can also identify ways in which the classical period saw increases in money supply. One was via plunder from warfare out of region,[125] the most substantial being the gains made at the expense of the Persian empire between 480 and 450.[126] A second source was mercenary service out of region. This was an old custom on a small scale, but grew in importance from the late fifth century when both the Persian empire and its adversaries resorted to hiring Greek soldiers.[127] A third comprised spasmodic, politically motivated consignments from non-Greek rulers, such as the payments made by Persia to one side or another for a century from the 420s till Alexander's conquest.[128]

Yet the impact of these three sources on the money supply was minor compared to new bullion from silver mines. The main sources exploited in the classical period after the flooding of the workings on Siphnos were Laurion in south-east Attica, the Pangaion range by Amphipolis on the north Aegean coast, Thasos, and the hinterland of Apollonia.[129] Unfortunately, the rate of bullion inflow into the Greek economy cannot be reliably quantified, and certainly experienced high annual variation,[130] while the routes by which it entered circulation changed during the period under review. The older pattern had been that the community claimed either a tithe of produce (as at Siphnos) or even the right to distribute all produce to its citizens (the presumption behind Themistocles' expedients in Attica in

[123] Notably the bullion lodged with Athena by the Athenian state in the fifth century (Thuc. 2.13.3–5).

[124] Classic instances are the pillage of temples in Attica and Eretria by the Persians in 480, that of the temple of Eileithuia at Caere by Dionysios I c. 384/3 (Diod. Sic.15.14.3–4, etc.), and the conversion of the dedications at Delphi into coin by the Phocian occupation in 356–346. For the complexities and quantities involved, cf. provisionally Davies 2001b: 124–6.

[125] But internal warfare *within* Greek space, though disruptive in other respects, will have had no impact on the aggregate money supply.

[126] Though exact accounting of the finances of the fifth-century Athenian empire before the late 450s is wholly out of reach, there is no way in which the accumulated reserve of 9700 tal. could have accrued wholly from tribute payments. Much of that sum must represent plunder.

[127] Parke 1933; Griffith 1935; Roy 1967; Briant 1996: 802–20, 1012–15, and 1061–5. Again, mercenary service within Greek space, notably the payment of rowers during wars in the Aegean, will have been neutral.

[128] Details in D. M. Lewis 1977 [Sparta] and Miller 1997: 3–28 [Athens].

[129] Starr 1970 [Athens, but regrettably not covering the period of maximum production]; May 1939 [Damasteion]; Gale et al. 1980 [general].

[130] Cf. de Callatay 2005a.

483/2),[131] but that did not prevent profitable rights of working from falling into private hands.[132] By the fourth century, if not earlier, at least in Attica, an elaborate leasing pattern enabled the state, the landowner, the lessee, the owner of smelting premises, and the owner of the (slave) labor force all to benefit from the workings, even if the precise routes by which silver bullion leached into private hands remain obscure.[133]

However, that said, the combined impact of a step-change in the quantity of accessible bullion and of the adoption of coinage was profound. The intellectual and ideological consequences are explored in detail elsewhere:[134] more pertinent here are the economic practicalities. At the state level, minting coinage was governed by existing weights and measures. These yielded coinages of incompatible standards, the emergence of some regional norms, and at least one attempt by an imperial power to impose a uniform system,[135] but the generally high standard of minting purity, the emergence of acceptable counterfeits, and the willingness of markets to accept specie by weight reduced barriers to common use: rare is the hoard whose coins do not represent a plurality of states and emissions.

More generally, the growing availability of coined money eased the emergence or extension of patterns of behavior, which went far to transform the Greek economy. Not all were productive: the emergence of paid employment for military purposes, for example, was productive only in the sense that it enabled first Athens in the 470s, then Corinth, Syracuse, and other states, to man warships for sustained aggression, leading to the creation of predatory overseas empires. Rather more productive was the use of coin to remunerate building workers and contractors, whether by day rates or by piece- and contract work. Its negotiability and portability allowed craftsmen from a wide geographical radius to be paid in a form which they could take away and use at home. Though such remuneration is visible in our sources only with publicly sponsored projects, it is in private building that one form of deliberate investment for profit first becomes visible. By the later fifth century urban rental property emerged, and amenities such as inns, private bath-houses, and gymnasia are attested,[136] while new-style housing units such as the multiple dwelling (*synoikia*), first

[131] Hdt. 3.57.2 (Siphnos): Hdt. 7.144, Plut. *Them.* 4.1, and *Ath. Pol.* 22.7 (Athens).

[132] Most notably Thucydides the historian, with his possession of the (rights of) working the goldmines at Skaptesyle opposite Thasos (Thuc. 4.105.1).

[133] Crosby 1950; Hopper 1953; Faraguna 1992: 289–322.

[134] E.g., Seaford 1994: 220–32; von Reden 1995a; 1997b; Kurke 1999: 6–23 and 299–331; but note also de Ste. Croix 2004: 371–420.

[135] Cf. the adoption of the Aeginetan standard in much of central Greece (Kraay 1976: 315); the Athenian attempt, via a decree now certainly to be dated in the 420s (ML 45 = *IG* I^3 1453), to impose the use of Athenian coins, weights and measures throughout the empire; and the sudden spread of Corinthian coinage in Sicily in the fourth century (Kraay 1969: 53–63).

[136] Davies 1981: 49–55 (urban rentals); Delorme 1960 (gymnasia); Ginouvès 1962 (bath-houses); Yegül 1992: 6–29, with 424–8.

attested – remarkably – in Kerkyra town in 428,[137] catered for those legally or financially barred from property ownership and provided rents to the landlord.

By that date, too, the main components of at least three monetized subsystems of capital circulation are reflected in our fragmentary evidence. The first and most straightforward concerned temples, sanctuaries, and local cult-groups which might come to possess substantial capital accumulations from the rents of land or urban property, from donations or dedications made by the pious, from fees charged in coin for access, or for the sale for sacrifice of animals reared by the shrine. In various ways, with all due piety and caution, and at orders of magnitude which ranged from 200-drachma units to the gigantic sums which Athena lent the Athenian state in the fifth century, it came to be deemed proper to lend such monies out at interest, beginning the long and complex history of the temple as quasi-bank.[138] The largest known loans, those from Athena, were exclusively for military purposes,[139] but the purposes of the smaller loans to states, such as those from Apollo on Delos,[140] or to individuals remain unknown.

Second, with only one major exception (Sparta) and irrespective of whether they themselves issued coins, the Greek micro-states themselves all became monetized fiscal systems in the fifth century. Fines and taxes were levied in coin, while the exigencies of military power – not least the vastly increased costs of naval activity engendered by trireme technology – compelled states either to pay soldiers and crews in coin or (especially within the Aegean orbit of the Athenian fifth- and fourth-century empires) to pay tribute in coin.[141] Again, though there are scattered examples of public investment in infrastructure or amenities other than temples, it was normally only plunder or other windfall gains which allowed such improvements, at least until Athenian politicians of the fourth century refined the concept and techniques of unified, managed public budgets.[142]

However, thirdly, and hardly surprisingly, far more possibilities were open to individuals. Though *misthos* on its own (see above) had little impact on an individual's accumulation, coin made the purchase of slaves easier and allowed owners either to group them in workshops[143] or to profit in coin (*apophora*, usually 1 obol per day) from the work of slaves "living

[137] Thuc. 3.74.2; Nevett 1999: 157–8. [138] Bogaert 1968: 279–304; Davies 2001b; Gabrielsen 2005.
[139] ML 72 = *IG* I³ 369. [140] Bogaert 1968: 126–53.
[141] Thuc. 1.99 for Aegean commutation to payment in coin after the 470s; Diod. Sic.14.10.2, with Hamilton 1979: 61–2 and Austin 1994: 551–2, for Sparta and the Aegean after 404; Cargill 1981: 124–7, and Austin loc.cit for the post-377 Aegean.
[142] Cf. the amenities and public works paid for by booty from Kimon's double victory over the Persians at Eurymedon in the early 460s (Judeich 1931: 73–4). For the development of a unified budget, Faraguna 1992: 171–94 and D. M. Lewis 1997: 212–29.
[143] Davies 1981: 41–9; Osborne 1995.

apart,"[144] while gains from inheritances, plunder, bribes, property rents, business or trading profits, and the sale of agrarian produce[145] all helped create a monetized sub-sector within individual property portfolios which supplemented the agrarian economy and may even, in extreme cases, have supplanted it altogether as the core of an individual's wealth.[146]

IX PRODUCTION, PRODUCTIVITY, AND THE PRODUCTIVE MENTALITY

The core question, whether the classical Greek world experienced what economists would recognize as genuine economic growth, or merely knew various types of accumulation of resources within existing parameters of yield, not least via predatory expansion, can neither be evaded nor as yet answered, in spite of the intensive debate of the last thirty years. Some, particularly Athenian, evidence does appear to point to genuine growth, but it is hard to place it in sufficient perspective to paint an overall picture, all the more since we cannot postulate uniform directions or speeds of development across a poorly articulated Greek-speaking world. This final section therefore confines itself to creating a provisional sketch out of various component parts.

If we had reliable figures for the aggregate GNP of the Greek-speaking world during the classical period, they would almost certainly show a significant increase in overall production from that of the sixth century. The salient sectors would be metal extraction and metal-working, cut stone from the innumerable quarries for construction, timber for ships, houses, and fuel, retailing, and most of the agrarian-pastoral sector. Some of this production, especially the coined silver, moved out of the Greek-speaking areas to pay for imports, especially iron from Etruria and elsewhere, grain from Egypt and the north shores of the Black Sea, papyrus and flax from Egypt, luxury items from the Levant, and so on. However, most coins stayed in Greece as payment for civic and military services. Concomitantly, at least in some localities, extra manpower is likely to have become available. Some of this reinforcement comprised forced labor, imported to be deployed as slaves in mines, workshops, or agriculture, while others as free movers constituted a significant flow of skilled labor within Greece which came to concentrate especially in urban centers like Syracuse, Corinth, and Athens.

This increase did not stem from the use of new materials, or from dramatic step-changes in the technology of production, but rather from small increments and from the wider use of existing techniques. For example, the

[144] Perotti 1974; 1976; Garlan 1988: 69–73.
[145] E.g. Plut. *Per.* 16.4; [Dem.] 43.69–70. [146] Davies 1981: 38–72.

large-scale washeries at the Laurion silver mines replicated existing techniques on a grander scale, just as the large slave workshops of classical Athens were a larger version of Corinthian workshops of the previous centuries, or as the intakes of previously uncultivated land used available techniques to yield more produce. This is not to belittle the importance of innovations such as the use of the crane for building, the acculturation of new crops such as alfalfa, the use of slaves for intensive agriculture, or – the primordial innovation – adjustments to behavior triggered by the adoption of coined money.[147] At least by the 420s, in addition to the changes sketched in Section VIII above, the latter had stimulated two further innovations. The first was the private bank, functioning in turn as money-changing locale, safe deposit, and money-lending route.[148] The second, driven by the need to assemble large sums of money (3,000 drachmas in our one surviving contract, [Dem.] 35.10–13) in order to buy, for transport to Athens or other Aegean towns, a ship's cargo of grain at an overseas port, was the development of a specific form of money-lending, the so-called bottomry loan, secured on the vessel or the cargo itself and ignoring civic or status boundaries.[149]

At the same time it would be foolish to overrate the scale or speed of change. Socially and economically, the various scattered and loosely linked regions of Greece were moving at very different speeds, the more remote or the less wealthy not catching up on the Aegean states until well into the fourth century or later.[150] Even within the economic leaders, much productive activity did not need to change, and even the adoption of coinage need not have generated a monetary economy, still less a market-oriented one, especially in those regions which coined only intermittently. Probably for much of Greece, as the Great Code of Gortyn makes brutally clear for Cretan conditions, so far from credit providing opportunities for enhancing production, its blacker downside, debt, drove men to pledge their bodies and to suffer social degradation within a static and isolated economy. Even within the comparatively prosperous Athenian context, a stream of interest-bearing loans for productive purposes has to be set against the equally widespread institution of the *eranos*, interest-free loans made for social purposes as an important component of social solidarity.[151]

All this suggests that neither the techniques of production, nor the associated attitudes and values, nor the pertinent institutions can be accommodated within any single model of interaction. The complexity emerges,

[147] Coulton 1974 (crane); Pliny, *HN* 18. 144 (alfalfa); in general Greene 2000, and works cited in n. 134.

[148] Bogaert 1968: 61–88; Millett 1991: 179–217; Cohen 1992: *passim*.

[149] Millett 1983; Cohen 1992: 111–83.

[150] Thuc. 3.94.4–5 (Aetolia in 429 BC) and n. 135 above. For other regional studies cf. Gehrke 1986, and the papers in Brock and Hodkinson 2000.

[151] Finley 1952: 85–7 and 100–6; Davies 1981: 62–3; Millett 1991: 127–59.

no doubt deliberately, from Xenophon's portrayal in his *Oeconomicus* of the techniques of household and estate management which he ascribes to a quintessential Athenian gentleman, Ischomachus. On the one hand, all is to be stable, ordered, morally honorable, even puritanical, as befits a man of inherited wealth and prominent social position whose estate is worked by slaves with a slave bailiff, and whose house is run by his wife, a housekeeper, and slave domestics. Yet, just as he followed his father's practice in buying up, improving, and selling previously uncultivated or neglected land for profit (20.22–6), so too the common goal of endeavor is repeatedly said to be "to increase the estate" (*auxai ton oikon*),[152] a goal which is to be internalized both by Ischomachus' wife (7.16) and by their (slave or freedwoman) housekeeper (9.12), and is yet also one most likely to be reached by self-control and "by just and honorable means" (7.15, tr. Pomeroy). It is hard not to detect a strong hint of a Protestant ethic.

[152] Xen. *Oec.* 1.4, 1.16, 3.15, 11.12, 21.9: an aspect not picked up by Johnstone 1994: 229–35.

CHAPTER 13

CLASSICAL GREECE: DISTRIBUTION

ASTRID MÖLLER

I INTRODUCTION

All regions bordering the Mediterranean Sea make use of the relatively easy connectivity it provides.[1] People and goods move around fairly easily, but not without the risk of wreckage or piracy. This condition allows both for the growth of refined demand and at the same time for its corollary – specialization of production. Distribution refers to the circulation and allocation of products and services, providing for both basic needs and luxuries. We consider the motors of distribution from two complementary sides: production and demand. Production is a result of environmental factors and sociopolitical forces, depending on opportunity as much as on limitations. Demand grows from need and desire, which arises when goods are known and available.[2] Social constraints and chance shape consumption; hence demand follows value-rational decisions.[3] A distribution system's success or failure in supplying needs and desires depends on institutions, the formal and informal rules a society employs. Institutions, however, result from negotiations within a society, guided by social norms and values. They are both realities and cultural creations, changing their meanings and causing conflict. Thus, a society's ability to adapt to changing outside parameters and to adjust its institutions determine the performance of its distribution system.

II OBJECTS

The image of classical Greece as an essentially self-supporting agricultural system, creating little surplus and low aggregate demand (with just a few exceptions, such as the urban agglomeration of Athens) is increasingly being questioned. The growing number of shipwrecks suggests expanding seaborne trade,[4] although in quantifying these data we must be wary of the impact of patterns of archaeological research and post-depositional transformations of the record.[5] Production of certain goods clearly exceeded local

[1] Horden and Purcell 2000. [2] Foxhall 1998: 297.
[3] Weber 1972: 44–5. [4] Horden and Purcell 2000: 371, table 5. [5] Morris 2005.

needs in some regions: Egypt, Sicily, and regions bordering the Black Sea, for instance, produced more grain than they consumed,[6] Thasos, Chios, and the Chalcidice produced more and better wines than other parts of the Mediterranean. The demand for delicacies and standards of living grew, although democratic ideology partially restrained private luxury at Athens.[7]

(a) *Foodstuffs*

Food production, especially of grain, the core element, was subject to unpredictable weather and natural catastrophes. Years of glut and severe shortage followed each other in the various micro-regions, while neighboring micro-regions might have completely different experiences. Unpredictable crop failures created sudden local demand for extra food, and *poleis* had to respond to food shortages by storage or import.

Many historians now believe that Athens depended less on regular grain imports than was previously thought, and that this dependency began later than had been assumed. They sometimes suggest that the desire for better quality wheat, not simple hunger, drove Athens' grain imports.[8] During the fifth century, the Athenians seem to have had no serious grain-supply problems, whether because home production within Attica met their needs, or because the empire supplied them. The sources contain few references to food crises until the Peloponnesian War, and there were few state grain distributions to citizens (e.g., in 445/4 BC, when the Egyptian pharaoh gave the Athenians 30,000 or 40,000 *medimnoi* of grain – well over a thousand tons).[9]

After the Peloponnesian War, however, the supply of grain ranked high on Athens' political agenda. Xenophon implies that any aspiring politician had to understand the grain supply (Xen. *Mem*. 3.6.13), and Aristotle listed the five most important subjects for political oratory as state revenues (*poroi*), war and peace, defense of the *chora*, imports and exports (i.e., concern with food supply), and legislation. The politician needed to know when grain imports were required so he could decide whether to make trade agreements with other states (Arist. *Rh*. 1359b19–1360a17). By the late 330s or the 320s, if not earlier, grain supply was a regular formal item on the assembly's agenda, along with the defense of the *chora* (Arist. [*Ath. Pol*.] 43.4). In 355 and 330 BC, Demosthenes (20.31; 18.87) reminded the Athenians of the fact that they consumed more imported grain than any other people and regarded it as every patriotic citizen's duty to take care of grain shipments to the Piraeus (18.301).

[6] Gernet 1909; Isager and Hansen 1975: 20–7.
[7] The following in part summarizes points made in Chapters 12 and 14.
[8] Particularly Sallares 1991: 73–81.
[9] Philoch. *FGrH* 328 F119 *apud* schol. V. Ar. *Vesp*. 718; Plut. *Per*. 37.

Sicily was famous for the abundance and fine quality of its grain.[10] In 481 BC, the Syracusan tyrant Gelon offered to provide grain for the whole Greek army till the end of the Persian War (Hdt. 7.158), and when Thucydides described Nicias' attempts to discourage the Athenians from going to Sicily in 415, he had Nicias tell the assembly that as well as having many horses, the Sicilians had the advantage of living on home-grown grain (Thuc. 6.20.4).

In Xenophon's time, *emporoi* found grain not only in Sicily, but in the Aegean and Black Sea (Xen. *Oec*. 20.27); and during the later fifth century, Athens attempted to control significant sources of grain within the Aegean and Hellespont, such as Euboea.[11] The Black Sea area became a really important grain source by the late fifth or early fourth century. Herodotus says that Xerxes saw ships loaded with grain sailing through the Hellespont for Aegina and the Peloponnese in 480 BC (Hdt. 7.147.2–3), but archaeological evidence does not seem to indicate a major grain trade with the Black Sea during the fifth century.[12]

Olives seem to have been produced in sufficient quantity in most regions of the Aegean, perhaps even yielding a surplus, but some areas did have to import oil. Olive trees did not grow in the Argolid, Arcadia,[13] the Macedonian plain, Chalcidice, or Southern Thrace. Oil production could be profitable, but was risky and labor intensive. It varied, however, in different parts of Greece due to climatic conditions and a good crop could only be expected every second year.

Wine was produced around much of the whole Mediterranean and in Greek colonies in the Crimea. Much of it was probably consumed locally – a quality that Athenians called *trikotylos* ("holding three *kotylai*," the amount that could be bought for one obol).[14] But shipwrecks and amphora finds from settlements and shipwrecks show that high quality wines were transported over long distances. Amphoras from famous wine-producing regions such as Chalcidice,[15] Chios,[16] Lesbos, Samos, and Thasos[17] have been found around the Mediterranean and the Black Sea during the classical period,[18] and even places with lower quality wine, like Peparethos,[19] are represented by finds and discussed in literary sources.[20] Thasos strictly controlled the quality and export of its wine.[21] Wine shipped to Egypt in

[10] Thuc. 3.86.4; 6.90.4; Soph. fr. 600 Pearson *apud* Plin. *HN* 18.65; De Angelis (2000) for Sicily's agricultural potential.

[11] Ar. *Vesp*. 715–18; Thuc. 7.28.1; 8.5. [12] Noonan 1973; Tsetskhladze 1998. [13] Roy 1999: 338.

[14] Hesych. s.v. *trikotylos oinos*. [15] Papadopoulos and Paspalas 1999.

[16] Sarikakis 1986. [17] Salviat 1986.

[18] Parker 1992: nos. 737, 539, 879, 1228, 72, 1058, 1227, Halonnesos wreck cf. Gibbins 2001: 283–4; Tektas Burnu wreck cf. Carlson 2003: 581–600.

[19] Parker 1992: nos. 879, 1058, Halonnesos wreck cf. Gibbins 2001: 283–4.

[20] Dem. 35.35 on wine transport to the Pontus; Athen. 1.29d–f, 31a–b, on the quality of different wines.

[21] *IG* XII suppl. 347.1–11 of 425–400 BC; Salviat 1986.

475 BC in exchange for natron, however, was classified not by its place of origin but by year – the current or the previous one.[22] Putting wine in amphoras sealed airtight with pitch enabled its wide transportation and made aging and storage possible. Demand for high quality wines drove transport techniques and specialization among producers.

Gourmets also craved other delicacies, like eel from Lake Copais (Ar. *Ach*. 880–94). Salted fish, on the other hand, were within reach of ordinary people and were imported to Athens and Corinth from as far as the Black Sea.[23] Megara had both fish and salt,[24] while Rhodes and Carystus were famous for their fishing grounds.[25] Pulses and legumes supplemented the diet. The first could be stored, but transport of the latter was limited to short distances. Meat consumption normally took place in ritual contexts, but sacrifices could provide large amounts of meat that was sold or stored. An amphora containing butchered animal bones in the Tektas Burnu shipwreck shows that salted meat was transported.[26] This might have been for the crew's consumption, but Hermippus describes transport of beef ribs from Thessaly to Athens.[27]

(b) *Timber, metals, minerals*

Houses, temples, and ships all needed timber. Large trees suitable for shipbuilding were available in Macedon, Chalcidice, Thrace, southern Italy, the south shore of the Black Sea, and Asia Minor. During the first half of the fifth century, Athens could probably still meet her timber needs for shipbuilding from local mountain slopes and the Boeotian border, or from neighboring Euboea. But Macedonian timber and pitch were in high demand, leading to an alliance between Amyntas III of Macedon and the Chalcidians at the beginning of the fourth century.[28] Building accounts from fourth-century sanctuaries tell us that Delphi was supplied by Arcadia and Macedon, Eleusis by Thourii, Corinth, the west coast of Turkey, Syria, and Lebanon.[29] The demand for firewood was normally met locally, but toward the end of the classical period there is evidence that even this could be transported long distances. A letter of 350–325 BC from Torone mentions seven talents of firewood to be transported from Chalcidice to Athens.[30]

Metals were scarce and had to be shipped. Sometimes this happened in bullion, as seen in shipwrecks, but often it had already been worked into vessels or coins.[31]

[22] Briant and Descat 1998: 66–72. [23] Salmon 1984: 128; Braund 1995. [24] Ar. *Ach*. 521, 760.
[25] Ael. *VH* 1.28; Lynceus *apud* Athen. 8.360d; Archestratus fr. 165 *Suppl. Hell. apud* Athen. 7.301f–302a, fr. 181 *Suppl. Hell. apud* Athen. 7.304d.
[26] Carlson 2003. [27] Hermippus 63 *PCG apud* Athen. 1.27e.
[28] Rhodes and Osborne 2003: no. 12, 390s–380s BC.
[29] Meiggs 1982. [30] *SEG* 43.488 with Davies 2001a: 23. [31] Treister 1996.

Minerals were important commodities in high demand. Salt, needed for food preservation, was produced in shallow coastal basins and moved long distances inland. Without alum, dyeing or bleaching of textiles and tanning skins were impossible. Apart from deposits mentioned in later sources, in classical times it came from Egypt and possibly from Phocaea.[32] The Elephantine papyrus palimpsest, a customs account of 475 BC from an unknown port in the Egyptian delta, provides excellent evidence about the shipping of mineral soda (natron) from its major source in Egypt.[33] Ionian Greeks and Phoenicians engaged in this specialized high-value trade, using relatively small ships and carrying extremely mixed cargoes to Egypt.

(c) *Craft products*

Most textiles were probably produced within the household, but some *poleis* were known for particular wools or clothes: Megara produced a famous working outfit for slaves,[34] while Miletus specialized in higher-value goods.[35]

Linen, like hemp, was needed mainly for shipbuilding, and linen clothes were quite exotic.[36] Linen was produced in Egypt, the Near East, northern Europe, and Colchis,[37] while hemp is reported from Thrace.[38]

Textiles rarely leave traces in the archaeological record, but pottery has high archaeological visibility. Archaeologists frequently warn historians not to take the distribution of painted pottery as direct evidence for the amount of trade in other goods or for large-scale production.[39] Some archaeologists suggest that the shipment of fine Athenian pottery "piggy-backed" on other commodities, or was merely "profitable ballast,"[40] but ballast seems to be the wrong concept, considering the mixed loads of shipwrecks. Some scholars see a regular network of direct trading links in the distribution of Athenian and Corinthian pottery, arguing that production and distribution aimed at or exploited specific markets.[41] Taking the shipwreck evidence, however, much trade was cabotage in rather muddled movements and most pottery moved as a by-product to agricultural products. Even if bigger loads of painted or glazed pottery were found, they never made up the whole or a major amount of the cargo.[42] This does not, however, generally argue against direction in carrying the freight, as the traders and producers might have well known where consumers were eagerly awaiting certain commodities.

[32] Nenci 1982. [33] Porten and Yardeni 1993: 82–195; Briant and Descat 1998.
[34] Ar. *Ach.* 519; *Pax* 1002; *Vesp.* 444; Xen. *Mem.* 2.7.6; *IG* II² 1672.103, 1673.45–6.
[35] Alexis of Samos *FGrH* 539 F2; Klytos of Miletus *FGrH* 490 F2; Timaeus *FGrH* 566 F50.1–3.
[36] Hdt. 2.37. [37] Hdt. 2.105, 3.47. [38] Hdt. 4.74. [39] Cook 1959.
[40] Gill 1991; 1994; for objections, see Boardman 1988a; 1988b; Johnston 1990; Lawall 1998.
[41] Osborne 1996b; Salmon 2000; cf. Lawall 1998. [42] Parker 1992: no. 1058; Carlson 2003.

Transport containers are clearly witnesses of the trade in oil and wine, but they were also filled with olives, honey, almonds, pistachios, fish sauce, pitch, or salted beef. Amphoras in themselves do not tell us their content. Herodotus reports that the wine amphoras which were annually exported to Egypt by Greeks and Phoenicians and which could very well be those mentioned in the Elephantine palimpsest were reused for bringing water into the desert – certainly not the only occasion for reuse.[43]

(d) *Slaves*

The distribution of slaves does not leave physical traces, but large numbers of imported chattel slaves labored in the silver mines of Laurion and in agriculture on Chios and Corcyra.[44] Most of these slaves were probably imported from outside Greece.[45]

III CONDITIONS

(a) *Transport by land and sea*

The Aegean connected people and the goods they needed. But seaborne trade had its challenges, including wreckage or pirates. There was little sailing in the Aegean during winter, but the Elephantine palimpsest informs us that ships came to Egypt all year, except January and February. The evidence from shipwrecks suggests that most of the seaborne traffic in the Mediterranean was over short distances, using small boats with extremely mixed cargoes. Athenian trade looks rather more sophisticated, but this may be the result of Athens' empire and long experience with maritime law.

Transport was much easier by sea than overland. Moving goods by road required negotiations, protection money, and was impeded by deliberate obstructions, and outright violence.[46] Nevertheless, goods did move by land within micro-regions. Thucydides (1.13.5) claims that Corinth gained her wealth and significance as a node both of land and of sea communication. Boeotia was well known for land routes supplying southern Greece with metals since the eighth century BC, and the passes around Delphi were used both for transhumance and the exchange of resources.[47] Thucydides (7.28.1) mentions an important land route between Oropos and Athens, saying that transport by land was quicker than costly shipping around Cape

[43] Hdt. 3.6.
[44] Thuc. 8.40.2; Theopomp. *FGrH* 115 F122 *apud* Athen. 6.265b–c; Thuc. 3.73.
[45] See Reed 2003: 21–3 on the external slave trade.
[46] Horden and Purcell 2000: 377; for bandits see Van Hooff 1988.
[47] Szemler 1989; Kase and Szemler 1991; Morgan 1988: 313–38; Wagner-Hasel 2000: 266–77; cf. Jameson 1989: 12–14.

Sounion. Recent research on land routes has revealed diverse networks in the Laconian mountain ranges and the deme of Atene in southern Attica.[48] At Athens, special officials (*hodopoioi*) were responsible for maintaining streets and roads.[49]

To facilitate shipping, *poleis* had to invest in harbor installations. Not all harbors were primarily intended for commercial dealings, and even Athens' port, Piraeus, had a military aspect. Delos' investment in harbor facilities probably provided safer access to its sanctuary.

As well as securing harbor infrastructure, *poleis* instituted *emporia*, places where exchange could be supervised, and taxes and duties collected. The word e*mporion* evades simple translations. We might distinguish two different but related meanings.[50] On the one hand, there were *emporia* on the periphery of the Greek world, isolated places like Naucratis in Egypt in archaic times or Pistiros in Thrace in the fourth century BC, characterized by an array of traders from different *poleis* and regions, and by exchange with non-Greeks.[51] But the word also refers to the harbor or a district of it within a *polis* but separated from the *polis* proper where external exchange took place. The best known example of this kind of *emporion* lay in Piraeus.

Piraeus, a focus of commercial activities where produce not readily available elsewhere could be obtained (Isoc. *Paneg.* 42), was conceived particularly by conservative authors as a "world apart." Clear indications of a real separation between the town and the *emporion* are lacking, but the rhetoric of otherness emphasized a division between the civic *polis* and the commercial dealings of metics (resident aliens) and foreigners. The "Piraeus economy" developed its own values, both material and moral, and some tension arose between the Piraeus and the city.[52] Piraeus in some ways constituted a unique administrative unit within the Athenian state. Here, the world of commerce prevailed. Seen from a less rhetorical perspective, however, the two worlds do not seem so far apart, and citizens and non-citizens collaborated on many levels.[53]

(b) *The knowledgeable trader*

Johannes Hasebroek's picture of the Greek trader as poor, foreign, and illiterate can no longer be maintained;[54] the lead letters found since Hasebroek wrote show that traders wrote business contracts. Archaic and early classical trade was more sophisticated and better organized than Hasebroek and Finley thought, and the activities of the associates of Cleomenes of

[48] Christien 1989: 18–44; Armstrong et al. 1992: 293–310; Lohmann 1993: 235–9.
[49] Arist. [*Ath. Pol.*] 54.1. [50] Bresson and Rouillard 1993; Hansen 1997; cf. Möller 2001.
[51] Chankowski and Domaradzka 1999; Loukopoulo 1999; Möller 2000.
[52] Von Reden 1995b; Cartledge 1998: 28; Roy 1998.
[53] Velissaropoulos 1977; Mossé 1983; Garland 1987. [54] Hasebroek 1928; Wilson 1997–8.

Naucratis, who sent letters to inform each other about prevailing prices, show that communication among merchants was quite highly developed in the fourth century.[55] This kind of business correspondence tells something about how information was used for profit but does not give evidence of private book-keeping, or of more sophisticated accounting techniques.[56] Surviving accounts such as the Elephantine palimpsest come from contexts of Near Eastern state administration and nothing similar has yet been discovered from Greece. Some scholars believe that there must have been some private accounting, presumably on perishable materials like papyrus. Bresson suggests that an *emporos* would have had business correspondence on lead, wooden tablets, *ostraka*, or papyrus on board his ship.[57] Xenophon (*An.* 7.5.14) reports finding bits of papyrus covered with writing (*bibloi gegrammenai*) among the flotsam of shipwrecks on the Black Sea coast. *Emporoi* apparently carried written contracts on board (Dem. 32.16), and strangers of all kinds needed documents for identification. An Athenian decree of the mid-fourth century provides for the manufacture of such a *symbolon* for a messenger sent to Sidon, and Aristophanes alludes to its function (*Av.* 1212–15).[58]

Hasebroek not only held that Greek traders were illiterate, but also that at Athens metics and foreigners exercised trade while Athenians financed it. This seems equally problematic. Not only were some Athenian citizens known by name actively involved in trade,[59] but also Xenophon's Socrates (*Mem.* 3.7.6) describes the assembly as including *emporoi* (long-distance traders) along with peasants, craftsmen, and market dealers. We have no reliable statistics on numbers of metics and citizens among financiers, as our sources are forensic speeches that remain vague about people's status and origin.[60] Money-lending in this risky business required inside knowledge, so there were many former traders among the lenders, whereas *emporoi* and *naukleroi*, the shipowners, were probably not all as poor as is sometimes suggested.[61] Honorary decrees show that not everyone in the business was a foreigner of modest means. Yet even if Athenian citizens can be detected among the traders, sea-borne trade was international in its personnel.[62] Greek trade was a private initiative and private money went into it, although

[55] Dem. 56.8–10; cf. Arist. [*Oec.*] 1352a16–23, b15–20; cf. Migeotte 1997: 38 with n. 24; Bresson 2000: 183–206.

[56] Macve 1985. [57] Bresson 2000: 141–6.

[58] *IG* II² 141; *Syll.*³ 185; cf. Gauthier 1972: 75, 81–2, 119; Velissaropoulos 1980: 282–301; Herman 1987: 62–9.

[59] Mossé 1983.

[60] Reed 2003: 39–40, however, has two Athenians out of six definite lenders of maritime loans.

[61] Isager and Hansen 1975: 71–2 n. 78, 73 n. 81; Velissaropoulos 1980: 48–51; Hansen 1984: 72; Montgomery 1986; Engen 2001: 188–94; but for Reed (2003: 34–42), they were far from being a "merchant aristocracy."

[62] Reed 2003: 27–33.

sometimes (as in the case of grain) magistrates supervised it closely. As a rule, however, Greek states did not maintain merchant fleets or a trading policy.[63]

The ancient sources treat *kapeloi* (retail sellers, including shop- and tavern-keepers [Ar. *Thesm*. 347]) with suspicion because of their need to buy cheap and sell dear (Xen. *Mem*. 3.7.6). Aristocratic authors assumed that men acting outside the norms of friendship (*philia*) were inclined towards deceit. The *kapelos* represented the typical figure in the *agora*, practicing his profession in the *ergasterion*, both workshop and shop, as opposed to the *emporos* who traded between *poleis* (Pl. *Resp*. 317d).[64] Harris' list of occupations suggests that there were as many different sellers as there were commodities,[65] although we should be wary of taking these as evidence for a complex division of labor.

IV MEANS

In classical Greece, many goods circulated through reciprocity, the mutual exchange between social equals. Friendship reduced transaction costs: the dangers of deceit, excessive pricing, or violence were minimized. Athens, as head of an empire, fostered redistribution, or rather "mobilization," as Neil Smelser called it, subdividing Karl Polanyi's redistribution into mobilization and redistribution proper.[66] While in a redistributive system economic resources move toward a center and then back out to support producers, mobilization serves the rulers' interests and wealth. By directing the movement of goods and money toward herself, Athens decided on their redistribution. In the Funeral Oration, Thucydides has Pericles describe Athens as self-sufficient both for war and peace, having the power to receive goods from all over the world, harvesting home grown and imported products alike.[67] At the same time, Athens also stimulated market exchange by developing monetary institutions. This market, however, does not so much correspond to the notional construct of economists who use it to mark out the domain within which a theoretically balanced price is established. Business in the marketplace of ancient *poleis* did not stop to be guided by values and norms which could result in rather unequal pricing according to social proximity or distance. Market exchange remained one "pattern of integration" or "mode of transaction" among several employed by Greeks to distribute goods.[68] All in all, the Greeks were quite successful in developing institutions that reduced transaction costs and fostered exchange.

[63] de Ste. Croix 1972: 393–6. [64] Knorringa 1926; Hasebroek 1928: 1–5.
[65] Harris 2002: 88–97. [66] Smelser 1959. [67] Thuc. 2.36.3, 38.2.
[68] Polanyi 1968: 149, 151; Dalton 1975: 92; Bohannan and Dalton 1962: 1.

(a) *Reciprocity*

One way to guarantee peaceful exchange was to offer strangers protection through *xenia*, "ritualized friendship," which created hereditary obligations. The official institution of *proxenia* made a *proxenos* the collective *xenos* of all members of a particular foreign *polis* coming to his *polis*. *Symbola*, permanent bilateral treaty relationships between *poleis*, regulated litigation between their nationals and gave both sides the protection of *asylia*. *Xenia* was already important in the Homeric poems, and remained significant as other institutions developed.[69]

(b) *Marketplaces*

Although all *poleis* had marketplaces in their midst, their workings in the classical period are best known from the Athenian *agora*. We must be careful about applying Athenian conditions to other *poleis*, since the details of Athenian democratic ideology may not have applied everywhere. The Athenian *agora* provided the stage for civic life, politics, litigation, and commerce. At this central place people constantly reassessed and readjusted their relationships by public speech and behavior. Their haggling and negotiating for status, including deception and denigration of political opponents, has been called "competitive reciprocity."[70] Neither spatial nor linguistic boundaries separated commercial from political activities. The *agora* was a site of exchange where citizens gained *time*, a term referring both to the status of people and to the price of objects.[71]

In the Athenian *agora*, both home-grown products from the *chora* and those imported via Piraeus were available, each commodity in its own corner (Xen. *Oec.* 8.22). Even if most landowners likely consumed their own products, people needed essentials they could not produce themselves, including those offered by specialized craftsmen. There is no evidence for further *agorai* in Attica outside the city of Athens, Piraeus, and the mining district of Laurion, which may mean that the country folk distributed goods through exchanges with neighbors rather than via marketplaces. On the occasion of religious festivals, however, temporary markets took place at the sanctuaries.[72]

The central marketplace at Athens gained in importance as rich landowners started using it to make money by selling their products. Plutarch (*Per.* 16.4) says that Pericles sold the yearly produce of his estates in bulk and bought what was needed from the *agora*. Buying food in the *agora* came to

[69] Gauthier 1972: 17–18. [70] Millett 1998: 220.

[71] Von Reden 1995a; de Ste. Croix 1972: 267–9 and Harris 2002: 76, however, distinguish between commerce and politics.

[72] De Ligt and De Neeve 1988.

be considered more democratic than self-sufficiency, as moral value came to be assessed by behavior in the *agora*, not by agrarian achievements.[73] Surface surveys seem to reveal that a new pattern of landholding emerged from the late sixth century onward, implying maximizing strategies oriented more toward production for markets than toward subsistence. This prompted Ian Morris to see the outline of a "New Model" of classical agriculture.[74] The tendency to produce for the market grew even stronger during the fourth century, when lease documents suggest increasing demand for public land to lease and rich men eagerly rented even small plots.[75] The need for extra cash, in particular to meet the demand for *eisphora* (contributions to military funds), may lie behind this. *Eisphora* and other taxes on the rich required a high degree of liquidity; this, and the large scale of pay for public service, suggest that monetization was quite high.[76] State pay presupposed and encouraged a cash-based market.[77]

Not all Athenians accepted the role of the *agora* as a marketplace. The concept of idealized equality among citizens encouraged alienation of market exchange as far as possible beyond the tight bonds of the civic community, transferring it preferably onto marginal groups without citizenship.[78] Aristotle's ideal *polis* separated the "free *agora*" below the sanctuaries – free because no commercial transaction was to take place there and no craftsman or farmer would be allowed to enter – and the commodity market, the latter occupying a site which could be reached by land and sea equally easily (Arist. *Pol.* 7.1331a30–b4).

Aristophanes' comedies include several bargaining scenes (e.g., Ar. *Pax* 1197–1264; *Ach.* 867–958), naturally making fun of one or both negotiating partners. Their haggling is displayed as a kind of public competition, the audience applauding both the comic actor in the theater and the successful negotiator in the *agora*. Although Aristophanes surely presents the liveliest possible picture from the Athenian *agora*, comic inversion makes its interpretation a subtle matter. A scene from Middle Comedy exhibits a trick still practiced by market traders today, placing ripe figs on top of a basket, masking the bad ones underneath (Alexis *PCG* 133 *apud* Athen. 3.76d). Only personal relationships could reduce transaction costs in this case.[79] The negative image of fishmongers is made clear in a scene from New Comedy where a particularly despicable example of this species, hiding the servile brand on his forehead under long hair, takes payment in the heavy coins of one state and gives change in the lighter coins of another (Diphilos *PCG* 67 *apud* Athen. 6.225a–b).

Commodity prices fluctuated. Variations in grain price were, not surprisingly, a topic of discussion in the *agora*. Dikaiopolis, having set up his

[73] Von Reden 1995a: 106–11. [74] Morris 1994b: 364. [75] Osborne 1988. [76] Osborne 1991a. [77] Howgego 1995: 19. [78] Morris 1994c. [79] Cf. North's orange example (1981: 34–7).

own *agora* in Aristophanes' *Acharnians*, asks the Megarian who comes to trade about news from Megara: "What else at Megara? How's the price of grain?" The Megarian answers: "Where we are it's mighty high (*polytimatos*), like the gods."[80] The famous Athenian blockade of Megara accounts for the high prices in this case, but the pun on *polytimatos* – "highly honored" for gods, "very costly" for commodities – clearly indicates scarcity driving up prices. When Theophrastus' "Rustic Man" approaches the city he inquires about the price of hides and salt-fish (*Char*. 4.15). Plato (*Leg*. 917b–c) accepts day-to-day price fluctuations in response to supply and demand in his near-ideal market, but forbids haggling and "praising up" commodities. A collection of prices from classical sources, however, tells us very little, since the data are inadequate for statistical analysis. In their proper context, prices reveal their role by a complex of factors, including personal relationships and ideology.

While grain was in the hands of the *emporos*, he could ask a price that seemed appropriate to him. Thus Xenophon (*Oec*. 20.27–8) could claim that the *emporoi* are *philositoi* (fond of grain), buying grain where they heard that it grew in abundance, and selling it not wherever they were without thinking, but wherever grain had the highest value. Some *poleis* seem to have bought grain from the *emporoi* at a "just price," i.e., one acceptable to the residents and leaving a margin of profit to the merchants. Exceptionally high prices for grain were subject to attempts at price fixing, albeit within the *polis* at resale, as there is no hint that anyone ever tried to regulate the wholesale price. The aim of the "official price" was stabilization, escaping unpredictable oscillations and, most frequently, preventing speculation and unjustified profits.[81]

(c) *Administrative personnel*

Nearly all *poleis* must have had supervisors of marketplaces and grain supply, but information is fullest for Athens. Because of its importance for Athens' naval power and grain supply, Piraeus received special attention. Ten *epimeletai tou emporiou* (overseers of the *emporion*) appointed by lot took responsibility for supervising exchange. Our only information on their duties concerns grain: they had to compel incoming ships to convey two-thirds of their grain to the market in the city (Arist. [*Ath. Pol*.] 51.4) and to enforce a law forbidding transport of grain to destinations outside Athens (Dem. 35.51).

Like the *emporion*, the *agora* was supervised by state officials. Five *agoranomoi* (market magistrates) were allotted for Piraeus and five for the city. They were legally responsible for ensuring that what was sold was in good

[80] Ar. *Ach*. 758–9, translation J. Henderson (Loeb). [81] Bresson 2000: 183–206.

condition and genuine (Arist. [*Ath. Pol.*] 51.1). Possibly they fixed maximum prices on some products, though price fixing was clearly exceptional (apart from grain).[82] They fined anyone lying in the *agora* and collected market taxes and the special fee for alien traders.[83] Similar officials are attested at several *poleis* from the fourth century on.[84] Athens also had a special board of ten *metronomoi* (measure magistrates), again with five for the Piraeus and five for the city. They were responsible for all weights and measures and for ensuring that salesmen used honest standards (Arist. [*Ath. Pol.*] 51.2).

The grain trade had its own special officials, called *sitophylakes* at Athens. They controlled the price of unground grain, ensuring that millers sold flour in accordance with the price paid for barleycorns, and that bread-sellers sold loaves in accordance with the price paid for flour. They prescribed the weight of loaves (Arist. [*Ath. Pol*]. 51.3), which may mean that the weight varied according to the price of wheat.[85] They were responsible for enforcing the rules of the grain trade and overseeing bidding for grain. They initiated and presided over trials for refusal to accept valid coinage up to ten drachmas in the grain market, and they kept records of the amounts and origins of imported grain.[86] There were originally five *sitophylakes* for the city and five for Piraeus, but later, probably during the difficult 320s BC, this was increased to twenty for the city and fifteen for Piraeus (Arist. [*Ath. Pol.*] 51.3). *Sitophylakes* are rarely attested outside Athens, and even then, only much later; but other *poleis* probably had similar officials, such as the *sitometrai* whom Aristotle (*Pol.* 4.1299a23) says were common economic officials.[87]

(d) *Legislation and jurisdiction*

Even if coins were minted as a powerful way to demonstrate sovereignty, their effectiveness in reducing transaction costs cannot be denied.[88] The Athenian Coinage Decree, of perhaps c. 420 BC, was most likely a political statement, denying allied cities the right to mint coins in order to assert Athenian domination,[89] but recent interpretations have also recognized its economic significance.[90] The decree probably simplified the collection of tribute and promoted the grain trade.[91]

[82] Millett 1990: 192; Migeotte 1997: 37–8.
[83] Dem. 20.9; Hyp. *Athenog.* 14; Ar. *Ach.* 896; Dem. 57.34.
[84] Oehler 1893. [85] Migeotte 1997: 35.
[86] Lys. 22.8, 16; Dem. 20.32; *Agora* I 7180.18–9. 22–4, cf. Stroud 1974: 179–80.
[87] Gauthier 1981: 17–18; Migeotte 1998: 231–5.
[88] Finley 1973a: 166–9; Martin 1985; Howgego 1995: 39–44; Trevett 2001.
[89] ML 45; Finley 1965a: 23–4.
[90] Lewis 1987; Figueira 1998; von Reden 2002b. [91] Martin 1985: 206.

In 375/4 BC Athens issued a law on the acceptance and testing of silver coinage, be it Athenian or foreign.[92] Good coins had to be accepted in the *agora* and *emporion*. One public slave called the *demosios dokimastes* (public validator) was appointed for Piraeus and another for Athens to control the quality of Athenian coins. Usually Athenian coins were much sought after for their high quality, so this law might reflect financial difficulties. It also illustrates Athens' efforts to be attractive to foreign traders in the fourth century by regulating private business and reducing transaction costs.

To ensure smooth commercial transactions and encourage traders to enter her port, Athens also established a special legal procedure called *dikai emporikai* (private cases involving maritime traders). The evidence for special maritime courts is weak.[93] The cases under the jurisdiction of the *thesmothetai* (statute-setters)[94] were introduced around 350 BC and gave foreigners the same procedural rights as citizens for certain types of dispute. Scholars long believed that the word *emmenos* (Arist. [*Ath. Pol.*] 52.2) meant that trials had to be resolved within one month, but Cohen has argued that it means they were monthly opportunities to initiate such cases.[95] There is also disagreement over when the trials took place. Some accept the manuscript reading of Dem. 33.23 and conclude that they took place during the winter months,[96] while others think it more likely that they were held during the busy sailing season.[97]

V PUBLIC REVENUES AND THEIR REDISTRIBUTION

A *polis* was the association of its citizens and from some perspectives there was no clear distinction between public and private matters. On the revenue side, the interests of the citizens and the *polis* corresponded: both needed *prosodoi*, revenues or income. In his mid-fourth-century treatise the *Poroi* (usually translated *Ways and Means*), Xenophon recommends measures increasing Athens' *prosodoi* after losing the Social War against her former allies which often strike modern readers as more characteristic of a private household than the public sphere.[98] Public interventions were carried out by the people for the people, and notions of the economy as a separate field of action were weakly developed.

Athenian democratic discourse represented the citizens essentially as shareholders in a company – as "those who have a share of the polity" (Arist. *Pol.* 5.1302b26). The members shared goods such as grain distributions and power, but also obligations and disasters. Even payments to jurors

[92] Stroud 1974; Buttrey 1979; 1981; Stumpf 1986; Dreher 1995: 90–106; Figueira 1998: 536–47.
[93] Todd 1993: 334–6; Cohen 1973, with MacDowell 1976: 84.
[94] Arist. [*Ath. Pol.*] 59.5. [95] Cohen 1973: 23–7.
[96] Cohen 1973: 42–59; MacDowell 1978: 232; Rhodes 1981: 583. [97] Todd 1993: 335.
[98] Descat 1998; Bresson 2000: 257–60; cf Harris 2001 for critical remarks.

or magistrates could be seen as the redistribution to shareholders of some of the income from community activity.[99] The use of mass political power to counterbalance the unequal distribution of wealth has been seen as a key feature of Athenian democracy.[100] Wealth inequality, however, was not considered inherently undemocratic, but Athenians expected the rich to use their resources to ensure communal security and the general benefit of the citizenry.[101]

But there was one resource that the Athenians did not redistribute: silver. In the late sixth century the citizens of Siphnos shared out the revenue from gold and silver mining, but when the Athenians enjoyed a spectacular silver strike in 483/2 BC, Themistocles persuaded them to invest their windfall in building warships.[102] Together with public building programs and pay for office, jury duty, and assembly attendance, the decision to build and then man and maintain a great fleet created the concept of independent public-sphere spending.[103]

When the Spartans considered going to war against Athens in 432/1 BC, their king Archidamus indicated their weaknesses in pointing out that compared to Athens, the Spartans had no money in a common treasury, and lacked the capacity to raise it from private individuals. To him, Athens' strength lay in her *prosodoi* (incomes), while the Spartans did not ask their allies to pay tribute.[104] Although the Spartans had the largest territory of any Greek state, a large workforce of helots, and much silver and gold treasure, they failed to make this wealth serve public purposes. Their investment in a few excellently trained hoplites proved less successful than Athenian investment in ships and masses of trained rowers maintained by direct pay. Athens spread her assets, while Sparta's were concentrated into fewer and fewer hands. Finally, Sparta was hit by bankruptcy during the Corinthian War (394–390 BC), and this became permanent after the Battle of Leuctra in 371.[105]

As long as Athens controlled the Aegean, she profited from monitoring the flow of goods, securing her import needs, and accumulating reserves on an unprecedented scale. By mobilizing from the subject cities tribute, customs duties, taxes, and land for Athenian settlers, Athens experienced great prosperity. Under Pericles, state revenues were no less than 1,000 talents a year (roughly 600 from the allies, and 400 from Athenian sources). At its height (probably in the early 430s BC), Athens had a reserve of 9,700 talents of coined silver, deposited on the Acropolis.[106] The Second

[99] Manville 1990: 7, 35; Davies 1992: 304; Cartledge 1998: 19.
[100] de Ste. Croix 1981: 96–7; Finley 1983: 139–40.
[101] Ober 1989: 199–205. [102] Hdt. 3.57.2; 7.144. [103] Kallet-Marx 1993; 1994; Kurke 2002: 95.
[104] See, however, the Spartan inscription listing contributions by friends of the Lacedaimonians of c. 427 BC (Loomis 1992).
[105] Thuc. 1.80–1, cf. 1.19; Polyb. 6.49.8–10; Plut. *Lyc.* 9; Pl. *Alc.* 122d–123a; Austin 1994: 542–3.
[106] Thuc. 2.13.3; Xen. *An.* 7.1.27; *IG* 1^3 259–90.

Athenian League (378/7–338/7 BC) explicitly promised not to levy a *phoros*, the detested tribute raised by the fifth-century empire. *Syntaxeis*, more neutral "contributions," are first attested in 373, but generated far smaller amounts than the fifth-century *phoros*.[107]

Fourth-century Athens needed new revenues. During the crisis after the Social War of 357–355 BC, Eubulus created or reorganized a fund called the *theorikon* with the object of covering the costs for citizens to attend major theatrical festivals. But soon it was being claimed that the theoric official in fact controlled the whole administration.[108] Silver production picked up again, trade flourished (as seen in forensic speeches), and the revenues increased to 400 talents in 347/6 (Dem. 10.37–8). Under Lycurgus' guidance (338/7–324 BC), Athens' state revenues rose to about 1,200 talents, all from regular internal sources.[109] Public building programs reached a scale unknown since Pericles' day, and the fleet was modernized and enlarged.[110]

Although riches flowed into the city in the fifth century, Athenians continued to believe that the wealth of the rich should be available for the citizenry's general benefit. Most Greeks viewed direct taxation as tyrannical and degrading.[111] Voluntary contributions, rewarded by prestige and political influence, could probably mobilize adequate resources in older times, but by the fourth century these "contributions," known as *leitourgiai* (liturgies), were assigned on a regular basis and legally enforced. What remained was the rhetoric of *charis* ("gratitude" and "benefaction"): liturgies performed in the right spirit earned the donor gratitude from the people.[112] Xenophon has Socrates describe to Critobulos the obligations of the wealthy: making sacrifices, entertaining *proxenoi* and friends, and accepting liturgies. These included keeping a public horse, funding a group of plays or performances at state festivals (the *choregia*), supporting the *gymnasium* and athletes exercising there (the *gymnasiarchia*), and holding offices. Wartime liturgies included the *trierarchia*, equipping and commanding a warship, and the *eisphora*, an emergency levy on capital wealth. Xenophon felt that the Athenians would punish anyone who performed these duties poorly as they would punish a robber of their own property (Xen. *Oec.* 2.5–6).

There were at least 60 liturgies each year, more likely 97; and the Panathenaic festival every fourth year raised their number to over 118. Some liturgies were sought after, but military liturgies (for which lists were kept and exemptions were not allowed) were highly unpopular.[113] Between 300

[107] *IG* II^2 43; *Syll.*^{3} 147; Dem. 49.49; Theopomp. *FGrH* 115 F98; Plut. *Sol.* 15.2–3; Austin 1994: 551–2.
[108] Aeschin. *In Ctes.* 25.
[109] Plut. *Lyc.* 842F. At 841B–C, the author says Lycurgus was in charge of 14,000 or even 18,650 talents.
[110] Rhodes 1979/80: 312–14. [111] Dem. 22.54–5; Boeckh 1886: vol., I, 366–7.
[112] Wagner-Hasel 2000: 152–65; Ober 1989: 226–30; Kallet 1998: 54–8.
[113] Dem. 4.35–6; 20.18, 21, 26; Arist. *Pol.* 5.1309a17–21; Davies 1967.

and 1,200 men were liable to liturgies at Athens (most scholars lean toward the higher number).[114] The wealth required to belong to this group was between three and four talents.[115] We have most information on this institution from Athens, but there were also *choregiai* at Siphnos and trierarchs at Sparta.[116]

The *eisphora* was probably first levied in 428/7 BC, although Thucydides' wording is ambiguous. In the fourth century it gradually became a more systematic and regular levy on a group of perhaps 3,000–3,500 citizens (roughly 10 percent of the citizen body).[117] The *eisphora* remained, however, irregular and unpredictable. Between 378/7 and 355 only a little over 300 talents were raised in *eisphorai* (Dem. 22.44). It was usually levied at a flat rate of 1 or 2 percent on capital wealth, and those with property under a certain figure, perhaps 2,500 drachmas,[118] were exempt. When the Athenians reorganized financial management in 378/7, they assessed the taxable wealth of all citizens and metics in Attica at a value of 5,750 talents (Polyb. 2.62.7). Demosthenes (14.19, 30) mentioned a sum of 6,000 talents for 354 BC, which could represent a rounded figure or a new assessment. The sum does not represent all Athenian wealth, since the assessment only covered declared wealth (movable and immovable, cash, personal belongings, slaves, land, houses, whereas mining concessions could have been exempted). There was no register of landed property and no available bureaucracy, so the assessment depended on the citizens' honesty. Only sykophants and a procedure called the *antidosis* (a challenge to exchange property) could reduce tax evasion. In addition to the contributions of the wealthy, Athens had other sources of revenue, detailed in Pseudo-Aristotle's *Constitution of Athens*:[119] customs and excise payments, court fines, sale of confiscated property, rents from public and sacred land, royalties on silver mining concessions.

At Athens there were no income taxes, and only metics paid a poll tax (the *metoikion*) at a rate of twelve drachmas per year for men and six drachmas for women who had no son paying the tax.[120] But Greek states made wide use of indirect taxes, because they found it difficult to tax income from landed property on a regular basis.[121] Harbor and market dues, taxes on sales and auctions, and all imports and exports were taxed, levied at a flat rate *ad valorem*, with no distinction made between citizen or non-citizen, or free or slave. The value of a shipload arriving at the Piraeus was probably estimated at a conventional price, not the prevailing market price, since this

[114] Jones 1957: 85–6 (1,200); Davies 1981: 15–28 (300); Rhodes 1982 [1985]: 5; Hansen 1990: 353; Austin 1994: 548.
[115] Gabrielsen 1994: 52. [116] Isoc. 19.36; Thuc. 4.11.4; cf. Xen. *Hell.* 7.1.12.
[117] Thuc. 3.19.1; Hansen 1990: 353. [118] Austin 1994: 547.
[119] Arist. [*Ath. Pol.*] 47.2–48.2; cf. Ar. *Vesp.* 658–9. [120] Boeckh 1886: 400.
[121] Migeotte (2003) has collected instances for direct taxation from the fifth century onward without generally changing the picture.

would surely have led to litigation, but no trace survives in the sources.[122] The motivation behind import duties seems to have been purely fiscal; there is no sign that Greeks thought in terms of protective customs barriers. A typical tax was one-fiftieth (*pentekoste*). This sum was levied at Piraeus on all goods imported or exported through the harbor, no matter their origin or nature, but not on goods in transit. It was payable when the goods were released (Dem. 35.29–30).

Athenian administrators did distinguish between the *pentekoste* on grain and that on other goods, farming the two taxes out separately (Dem. 59.27). The collection of taxes was normally auctioned to private contractors who provided sureties and paid a lump sum to the state, recouping themselves by making a profit on the collection. Probably in 402/1 BC, the *pentekoste* was auctioned for thirty talents to Agyrrhios, who proposed the Grain Tax Law in 374/3, and some friends. The next year, Andocides and his friends leased it for thirty-six talents (Andoc. 1.133–4). This implies a turnover of commodities worth at least 2,000 talents. Harbor dues at ports in the Thracian Chersonese earned some 200 talents annually (Dem. 23.110). Taxes of this kind were potentially a major revenue source for *poleis*,[123] though the yield varied according to economic activity. Tax farming meant a loss of income to the states, but relieved them of the costs of collection and administration, and guaranteed a predictable revenue stream.

Much of this revenue was directly or indirectly redistributed to the citizens. For fifth-century Athens, Lisa Kallet estimates the cost of running the democracy at 75 talents and Athens' total costs at over 300 talents, not including the cost of operating the fleet in wartime and other extraordinary expenditures.[124] Mogens Hansen estimates the cost of the democracy at 100 talents in the fourth century.[125] Athens spent most of the tribute she received from her fifth-century subject cities on the fleet, which gave pay to the many Athenians serving on the triremes, and also spent some of the tribute on adorning the city. According to Plutarch, Pericles justified the policy of spending the allies' money on the architecture of the acropolis by saying that Athens repaid their favor, i.e. the contributions, by making war on the enemy. Once Athens was sufficiently equipped, she should show her abundance by such works bringing her everlasting glory and putting "the whole city under public pay" (*emmisthos polis*) (Plut. *Per.* 12.3–4). Plutarch may not mean a full employment policy so much as an effort to distribute a monetary surplus among the citizens in pursuit of a normally unproductive public purpose.

Athens introduced military pay no later than 441, and possibly as early as the 450s or even 460s. From the mid-fifth century on, public officials were

[122] Rosivach 2000: 48. [123] Xen. *Hell.* 5.2.16 on Olynthus; Dem. 1.22 on Thessaly.
[124] Kallet 1998: 46. [125] Hansen 1991: 315–16.

paid. Pseudo-Aristotle ([*Ath. Pol.*] 24.3) says that tribute and taxes supported more than 20,000 men, including 6,000 jurors, 1,600 archers, 1,200 cavalry, 500 councilmen, 500 guards of the dockyards, 50 guards on the acropolis, and about 700 domestic and 700 overseas officials. In 431 BC, Athens also had 2,500 hoplites and 2,000 men appointed by lot in 20 guardships and various other ships collecting the tribute. The *prytaneion*, orphans, and the guards of prisoners were all publicly financed too. The *Athenaion Politeia* is not clear whether fourth-century officials still received public pay or were merely fed by the state.[126] Pseudo-Aristotle also mentions the following payments: 1.5 drachmas (= 9 obols) for the Principal Assembly each month, 1 drachma for other assemblies, half a drachma for jury courts, five obols per day for members of the Council of 500, and an additional obol for food for the 50 *prytaneis* (members of the council's presiding committee) on duty each month. The nine archons got four obols per day for maintenance, but had to keep a herald and a flute-player. The archon for Salamis got a drachma per day. The directors of games could dine in the *prytaneion* for one month of the year, ambassadors sent to Delos got one drachma per day from Delos, and officials sent to cleruchies got money for food.[127]

Assembly pay was introduced in 403, and by 393 had reached 3 obols per session for the first 6,000 citizens entering the meeting.[128] Between 409 and 407 BC skilled workers at the Erechtheion earned one drachma per day, and unskilled workers 3 obols, the same as soldiers and sailors in these years. Pericles introduced jury pay, perhaps in the early 450s. The rate was at first 2 obols, then 3, but did not rise again till the 320s.[129] The significance of the *diobelia* ("two obol pay") instituted by Cleophon and attested by inscriptions between 410 and 406/5, is controversial, but it may have supported citizens incapacitated during the Peloponnesian War.[130]

VI SECURING THE GRAIN SUPPLY

The mechanisms of the grain supply are best known from Athens.[131] During the second half of the fifth century, Athens not only obtained her own supply by directed trade under the rules of her empire, but also controlled grain distribution in much of the Aegean. A decree of 426/5 BC[132] grants Methone the right to export a fixed amount of grain per year from Byzantium without further payment for ships carrying the grain. How many *medimnoi* Methone took home is not preserved, but we can estimate the

[126] Hansen 1979; Gabrielsen 1981. [127] Arist. [*Ath. Pol.*] 62.2.
[128] Ar. *Eccl.* 186–8, 289–310; Arist. [*Ath. Pol.*] 41.3.
[129] See Rhodes 1981: 691–7 on all kinds of pay.
[130] Xen. *Hell.* 1.7.2; Arist. [*Ath. Pol.*] 49.4; 28,3; Buchanan 1962: 35–48.
[131] Teos also enacted a law to secure her grain supply, c. 475–450 BC (ML 30.6–12).
[132] *IG* I^3 61; ML 65.

amount in comparison with Aphytis in Chalcidice, which won a similar privilege two years earlier. The Aphytians were granted up to ten thousand *medimnoi* a year[133] – approximately 400 tons. The Methonians had to notify the tax officials called *hellespontophylakes* (guardians of the Hellespont). The guardians were not allowed to impede the Methonians, and had to prevent anyone else from doing so. This is the only clear evidence for officials controlling shipping through the Hellespont. Their responsibilities probably involved collecting the duty to which the inscription alludes.[134] When in 410 BC the Athenians asked for a *dekate*, one-tenth of the cargo of all ships sailing through these straits,[135] this does not seem to have been a new measure. This tax could have been farmed out, like the renewed *dekate* at Byzantium in 390 (Xen. *Hell.* 4.8.27). The Black Sea grain route through the Hellespont was crucial to Athens; its loss was a constant fear (Xen. *Hell.* 5.1.28–9).

Imperial Athens created a network of institutions and administrators, but few *poleis* had such administrative means to secure their grain supply. In food shortages they relied on the generosity of foreign rulers or rich individuals, well attested by honorific decrees from 350 BC on.[136] They might also have public reserves, as Athens did in the stoas around the *agora* or the *emporion*,[137] or the possibility of taking private stocks into public hands, as the Four Hundred oligarchs attempted to do at Athens in 411 BC, or the Selymbrians who sold off privately stored grain to the public at a fixed price to raise funds.[138]

After losing their empire, the Athenian diplomacy established special trading privileges with the Bosporan kingdom north of the Black Sea. Athenians were exempted from the duty of 3.3 percent (*triakoste*) which the kings charged on all grain exports (Dem. 20.32; 34.36). Demosthenes (20.31–2) estimated that this benefaction was worth 13,000 *medimnoi* – 500 tons – of grain to Athens each year. Leucon, king of the Cimmerian Bosporus (393–353 BC), provided Athens with 400,000 *medimnoi* of wheat annually, but in the year of the great famine (357 BC), he sent so much grain that Athens made a profit of fifteen talents on its sale (Dem. 20.33). Bresson suggests that Leucon's grain was sold the same way as the tax grain mentioned in the Grain Tax Law of 374/3 BC, at a reasonable price.[139] The Athenians rewarded Leucon as benefactor of their *polis* with citizenship without being liable for liturgies (Dem. 20.30). In 346, his sons were honored with the same rights and golden crowns for renewing the old Athenian privileges (*Syll.*[3] 206). The Athenians treated the relationship

[133] *IG* I[3] 62; *ATL* II D 21. [134] Rubel 2001. [135] Xen. *Hell.* 1.1.22; Polyb. 4.44.3–4.
[136] Garnsey 1988: 82–5; Migeotte 1997: 43–4 for *emporoi* selling at low prices.
[137] Schol. Ar. *Ach.* 548a–c Wilson; Dem. 34.37.
[138] Thuc. 8.90.5; Arist. [*Oec.*] 2.2.17, 1348b33–1349a3. [139] Bresson 2000: 208–10.

between the benefactors, acting as private persons, and themselves, acting as a corporate body, in terms of personal friendship and reciprocal gifts.[140]

Without the possibility of relying on imperial power, fourth-century Athens could only hope to be an attractive destination. After the Social War, Xenophon felt the need to suggest ways to draw foreign traders back to Athens,[141] and Athens passed several laws to secure a sufficient supply of grain. One prohibited persons resident in Athens from shipping grain to harbors other than the Piraeus.[142] Any ship harbored in Piraeus was required by law to unload two-thirds of its cargo and bring it to the city (Arist. [*Ath. Pol.*] 51.4). What happened to the last third is the object of debate, but it may have been sold at Piraeus.[143] Importers who were neither Athenians, nor metics, nor aliens who had borrowed money in Athens, but sailed into Piraeus to see if grain was selling high, were under no obligation to sell. The Athenians had the option of seizing a trader's ship and its cargo (*katagein*), with the assumption that the state would pay for the grain it confiscated, but this would have discouraged traders from coming to Athens at all.[144]

It was forbidden for Athenian residents to extend a maritime loan to a ship unless it agreed to import grain to Athens (Dem. 35.51), but several legal speeches describe violations of this law. One trader and his partner took out a maritime loan at Athens for the round trip Athens–Egypt–Athens, but after picking up grain in Egypt, unloaded it at Rhodes upon hearing that prices had fallen at Athens (Dem. 56.5–6).

Once the grain arrived in Piraeus, the grain sellers (*sitopolai*) put it up for sale. Lysias' speech "Against the *sitopolai*" gives some glimpses of their activities. In this case, the traders were metics who were accused of breaking the law by buying more than 50 *phormoi* ("baskets") of grain. The nature of their offense is debated: the *sitopolai* may have violated a law against hoarding, or one against operating a cartel and collaborating in buying.[145] The intention of the *sitopolai* is obscured by the rhetorical use of the verbs *synoneisthai* and *sympriasthai*, meaning almost interchangeably in different contexts throughout the speech "to accumulate by buying," "to buy in a single transaction," "to buy to hoard," and "to buy in association with others." In addition to buying too much grain, the *sitopolai* were accused of manipulating the price, either by exceeding the legal mark-up of one obol or by fraudulently changing the price by claiming that each sale came from a separate stock. We cannot be sure whether the margin of one obol was in relation to the drachma (resulting in a profit of 16.7 percent) or to the *medimnos* (resulting in a tiny profit).[146] Either way, taking one drachma

[140] Mitchell 1997: 40. [141] Xen. *Vect.* 3.2–5, 12–14; 4.40; cf. Isoc. 8.20–1.
[142] Dem. 34.37; Dem. 35.50–1; Lycurg. 27. [143] Gauthier 1981. [144] Garnsey 1988: 140.
[145] Kohns 1964; Seager 1966; Figueira 1986; Tuplin 1986. [146] Migeotte 1997: 36.

more the same day sounds like a good profit, and turned the jurors against the accused.[147]

In 374/3 BC, the Athenians enacted a law taxing the three cleruchies at Lemnos, Imbros, and Scyros[148] with a *dodekate* (one-twelfth) on the grain harvest. The tax was to be farmed out and collected in kind, not cash, to secure the public grain supply. Individuals and groups of six (*symmoriai*) were allowed to bid in fixed shares of 500 *medimnoi* (100 *medimnoi* of wheat, 400 of barley) for the right to collect one-twelfth of the grain harvest. The Athenians ordered the tax farmers to convey to Piraeus the wheat and barley produced by this tax at a specific time and at their own risk. From there it was to be brought up to the city, stored in the Aiakeion, and sold in the *agora* by public officials. They were newly appointed to supervise the tax farmers' correct delivery of the grain, its weighing according to written instructions, and its sale in the *agora* in spring when home-grown supplies abated, at a price set by the assembly. They had to account for their sales and to assign the proceeds to the *stratiotika*, the military fund.

From the 350s, *sitonai* (grain-buyers) were commissioned to buy up grain with public money supplemented by private donations to procure food in crises. The orator Demosthenes was – at least to us – one of the most famous *sitonai*.[149] Pooling money by subscribing to funds like this became quite common in Hellenistic times.[150]

VII CONCLUSIONS

In classical Greece, distribution had grown to such an extent that an urban elite had no difficulties in consuming delicacies like fine wines from famous vineyards or eels from Lake Copais. But not only a happy few benefited from larger movements of people and goods. Most *poleis* buffered the risk of famine by increased import of staples. The volume of transport grew. There were no major technological developments during the classical period, but communication improved, and effective desire for finer foods and cultivated living expanded. Athens in particular benefited from her power to mobilize resources. Some were invested in unproductive splendor, but others were redistributed for the citizens' general benefit. Local, interregional, and long-distance trade increased: urban demand fostered local and interregional trade of products which had to be consumed quickly. Staples, timber, minerals, and fine wines were transported all around the Mediterranean. Although markets were not well developed, the institutional and organizational structures of distribution worked well. Administrators struggled to

[147] Todd 1993: 316–20.

[148] *Agora* I 7557; Stroud 1998 with Osborne 2000; Faraguna 1999; Harris 1999; Engels 2000; Rhodes and Osborne 2003: no. 26.

[149] Dem. 18.248; Plut. *Mor.* 845F; cf. Din. 1.43.

[150] Migeotte 1992: 341–3; Engels 2000: 119–24.

keep grain prices low and to assure supplies. Numerous public officials were employed to supervise the workings of the marketplace. Where administration and the undeveloped market failed, cities had recourse to friendship, securing grain from benefactors. The persistence of cultural norms and values can be seen in the representation of commercial dealings in the *agora* and Piraeus. Although a fair amount of disembedded exchange took place among citizens and non-citizens alike, ideology nourished the notion of perfect friendship and beneficence.

CHAPTER 14

CLASSICAL GREECE: CONSUMPTION

SITTA VON REDEN

1 INTRODUCTION

This chapter describes patterns of consumption as affected by regional productive capacities, inter-regional distribution, a range of social and geographical biases, as well as ideology and taste. Consumption is a highly symbolic activity at all social levels and due respect will be paid to interrelations between the economics and culture of consumption.[1] I shall try, as far as it is possible, to give some quantitative assessment of standards of living in comparison to earlier and later periods. Finally, since markets and exchange supplied only a certain amount of domestic consumption, I shall ask under what conditions consumption turned into demand that affected the economy more generally.

Every analysis of consumption must face the conflict between the profligacy of social or political elites and the struggle of the poor to meet basic needs. As was argued in the previous chapters, monetization, increasing contact with the non-hellenic world, changing politics in Greek cities, and the Athenian empire had strong impacts on production and exchange after the Persian Wars. Under these circumstances, both aristocratic and peasant ways of life changed and became subject to public debates about how to live the life of a good citizen.[2] How did these changes affect patterns of consumption both among the elite and the peasantry, and how did changes in civic ideology change the relationship between elite and peasant consumption in the fifth and fourth centuries?

Elite and peasant consumption are normally studied as two different subjects in classical scholarship. Whereas the former has attracted much research on the culture of the symposium and its consumption

[1] Consumption has received extensive theoretical attention from cultural historians and anthropologists; see especially Douglas and Isherwood 1980; Leopold and Fine 1993, Bocock 1993; and Foxhall 1998.

[2] Evidence is overwhelmingly Athenian, but Athenian political, cultural, and economic influence affected other *poleis*. This can be seen in both the spread of their coinage (Wartenberg 1995; Figueira 1998), and in cultural emulation or resistance (see most recently Morris 2005). I focus here mostly on the *polis*, leaving aside other political structures (*ethne*).

rituals, analyses of the latter tend to concentrate on human nutritional requirements and strategies of satisfying them under normal or exceptional conditions.[3] While historians of the symposium exploit above all literary and visual material, emphasizing cultural approaches to meaning, studies of the ancient peasantry are dominated by ethnoarchaeological and anthropological approaches emphasizing cross-cultural comparisons.[4] But it is misleading to assume that peasant consumption of necessities lacks symbolic significance, or that there are no economics to conspicuous consumption by a political elite.[5] The divergence of scholarship can partly be explained by the nature of the evidence and the almost complete absence of direct information about consumption outside urban contexts and the literate elite. Literary sources describe the habits and tastes of peers, physical remains such as houses and graves are biased towards the conspicuous and lasting, and even the remains of human bones tell us more about the relatively well off than about those who died unnoticed or were buried adjacent to a small farm.[6] Yet as well as being aware of biases in the evidence, we have to integrate what is absent into a general model of consumption. Because of a particular relationship between city and countryside and a civic ideology that emphasized equality, there was a particularly close relationship between forms of consumption among different social groups.[7]

The relationship between private and public consumption is another peculiarity of the classical period. One of the most striking characteristics of the classical city is an ideologically forced concern with the adornment of public buildings and temples, rather than with private houses or palaces.[8] The economy of the classical *polis* was very different from its Hellenistic and Roman counterparts in that the display of private wealth was considered inappropriate and a potential threat to the collective. Civic ideology set limits to private consumption, at least in the fifth century, while earlier and later, it is precisely the consumption of luxury goods and exotic materials that is thought to have stimulated production and inter-regional exchange.[9]

Alongside private households and the state, temples represented a third sector of consumption. Temples belonged to the gods, but their priests

[3] Elite consumption: Murray 1990; Wilkins et al. 1995; Dalby 1996; Davidson 1997. Peasant consumption: Garnsey 1988; 1998; Halstead and O'Shea 1989; Gallant 1991; Sallares 1991. Garnsey 1999 attempts a more integrated approach.

[4] Morris 1994b; Cartledge 1998. [5] For the latter see above all Horden and Purcell 2000: 209–20.

[6] De Angelis 2000 for Sicily; Osborne 1987: 115 for Athens; for the distribution of Geometric to archaic burial sites in Attica see Morris 1987: 229f.

[7] Ober 1989, and Foxhall 2001 for the discrepancy between egalitarian ideology and economic reality.

[8] Osborne 1987: 81–92; Cartledge 1998; Morris 1998a.

[9] See Rostovtzeff 1953 on how Hellenistic courts and Greek immigrants in the Hellenistic empires stimulated trade; Hopkins 1995/6 on how the city of Rome contributed to stimulating trade in the Roman empire.

were recruited from local families who sometimes had hereditary rights to the administration of a particular cult. The relationship between *polis*, citizens, and temples formed three poles of a complex system of interdependence and competition. Temples were financed by yields from sacred property, voluntary or compulsory dedications by worshipers, and above all by public reserves.[10] Income was applied to cult, salaries, and buildings. Consumption was controlled by piety and the publication of expenditures, which were regularly audited. Treasurers struggled to strike the right balance between managing the gods' property according to norms of self-restraint and making visible the piety of the citizens by demonstrative expenditure. The temples' economic role as units of consumption must be sought in the fluctuating political and economic ability of the collective citizen body and wealthy individuals to express their piety and power in financial munificence.

Athens is the best-documented example of how a certain institutional framework influenced forms and levels of consumption. First, the relationship between the urban center and its hinterland, combined with pressures for all citizens to participate in politics and ritual, and on the wealthy elite to make financial contributions to the community, reduced cultural and economic divisions between city and country.[11] Second, public wages and monetary liturgies stimulated monetization, which in turn stimulated exchange rather than consumption of home-produced goods. A new focus on the *agora* as a space for both political and economic exchange underpinned these developments ideologically.[12] Third, the *polis* as a collective was a consumer itself. Since classical *poleis* increasingly taxed in money not in kind, and did not maintain state industries, public herds, or directly cultivated public land, they generally bought what they needed.[13] This fueled commodity production and the distribution of goods through exchange. Finally, democracy created an egalitarian ideology that homogenized public displays and opened a formerly exclusive culture to a wider social range of people. Athens was exceptional in financial resources, degree of democracy, and power in the fifth century, but the effects these factors seem to have had on private and public consumption can be noticed in other *poleis* as well.[14]

[10] Linders 1987; Osborne 1987.

[11] Osborne 1985a; and Osborne 1991a; Osborne's model of the interdependence of rural and urban financial and commercial interests has qualified Finley's influential description of ancient urban centers as consumer cities in the sense of Max Weber (Finley 1981: 13–19; 1985: 123–49; see also the collection of articles in *Ktema* 28 [1998]).

[12] See above, Chapter 13, and von Reden 1995a.

[13] Mines, though state owned were not state industries, since they were not worked directly, but leased out to private entrepreneurs; Conophagos 1980; Osborne 1985a. Public and sacred land was normally leased for a cash income, not cultivated directly.

[14] Morris 1998a.

II NUTRITION

(a) *Nutritional standards*

Basic information about ancient nutrition can be gained from the remains of human bones. Although studies of skeletal remains from classical antiquity are still few, and we need a broader range of samples to draw a general picture of dietary conditions, the extant material offers some noteworthy insights.[15] Diet affects health and stature especially during childhood and youth. Bones contain information about major components of the diet, levels of nutrition, and incidence of chronic or infectious diseases, while teeth can help to determine whether there were periods of nutritional stress during childhood.

An individual's growth potential is genetically fixed, but environmental factors and dietary habits influence actual height. Table 14.1 summarizes average height for classical Greek skeletons, together with some comparative material.

Table 14.1 *Average height of male and female skeletons in cm**

	Men	Women
BRONZE AGE		
Mycenae (n=22)	171.5	159.1
Lerna (Argolid)	166.3	154.2
EARLY IRON AGE		
Pydna (mountain village) (n=15)	168.8	152.8
CLASSICAL		
Greece	169.8	156.3
Athens (Late classical)	171.3	159.2
Acanthos	169.2	157.1
Metapontum	166.6	157.5
HELLENISTIC		
Greece	171.8	156.6
Athens	171.1	155.5
MODERN		
Crete (1960s)	164.0	156.3
Cyprus (1949)	165.1	N/A
Greece (1963)	170.5	N/A
UK (1993)	176.0	164.0

* Data from Tzedakis and Martlew 1999; Angel 1971; 1972; Morris (above, Chapter 8); Henneberg and Henneberg 1998; Bisel 1990; Jones et al. 1993; see also Gallant 1991: 69. Skeleton size not age corrected; sample size is given in cases in which $n < 50$.

[15] For discussions of the historical interpretation of skeletal remains, see Morris 1992: 70–102; Gallant 1991: 68–75; Garnsey 1999: 43–61; and Garnsey 1989a.

The data show some consistency in their development from the Bronze Age to the Hellenistic period, but their evaluation is controversial. Average height changed little from the Bronze Age to the classical period, and possibly increased slightly for men thereafter. The discrepancy between Mycenae and Lerna may indicate a class difference, with the ruling families at Mycenae consuming a diet richer in protein than that of the rural population of Lerna.[16] Yet we should also note that average heights were similar to those in 1960s Greece. Compared to growth-charts for modern Britain, the height of classical Greeks was between the ninth and twenty-fifth percentiles, within the range regarded as normal.[17] But Henneberg and Henneberg argue that living conditions in late archaic to late classical Metapontum must have been seriously unsatisfactory to have produced such short adults, and Morris (above, Chapter 8) suggests that in male populations averaging under 168 cm. some will have been so poorly nourished that they were unable to work.

Chemical analysis of trace elements in the bones also offers insights into the composition of diets. Strontium is deposited in bones through consumption of plants and zinc via animal foods (meat, eggs, and dairy products). Seafood also increases the strontium levels, while cereal products with a high fiber content further decrease zinc levels.[18] Unsurprisingly, the amount of strontium in classical Greek bones is high, even by comparison with Bronze Age samples. The fact that plant and fish food rather than animal products dominated the classical diet is uncontroversial, but given that it is above all the consumption of iron-rich red meat and other high-protein foods which makes people reach their growth potential, the high strontium level can also explain why the classical Greeks were relatively short without necessarily being under-nourished. Low zinc values in bones from late classical Athens have been taken as signs of regular consumption of high-quality refined wheat flour.[19] At face value the bones suggests that nutrition was on the whole not bad, though not conducive to high stature.

Teeth, however, qualify this picture, as do the pathologies of bones, and some general considerations. Stress lines on teeth, so-called enamel hypoplasia, indicate hardship during childhood, leading to temporary growth arrest. In Angel and Bisel's analysis of 890 skeletons, 37 percent of teeth were affected by hypoplasia in the sample from the Bronze Age to classical times. Problems apparently declined in Hellenistic times, when only 18 percent of the sample shows the abnormality.[20] At Metapontum 78 percent of teeth are hypoplastic, though this may be due to the high fluoride content of

[16] Angel 1971: 85; Bisel and Angel 1985; Tzedakis and Martlew 1999: 223ff.

[17] According to the US National Center for Health Statistics [1977], average height below 167 cm. lies below the norm; Henneberg and Henneberg 1998: 520.

[18] Garnsey 1989b; Morris 1992. [19] Bisel 1990. [20] Bisel and Angel 1985; Morris 1992.

local water, not poor living conditions.[21] Metapontum apart, the relative frequency of hypoplastic rings suggests uneven nutritional conditions during individual lifetimes. Moreover traces of, or genetic reactions against, disease in the bone material draw attention to the high incidence of serious infections which drained the body of essential minerals, especially iron.[22] A diet that may have been quite adequate for normal conditions was insufficient in periods of recovery from illness. Children are among those most vulnerable to infectious disease and at the same time require more essential nutrients, as do pregnant and lactating women. Soldiers and manual workers were often particularly well fed to keep them fit, but those whose dietary requirements were less well recognized – children, childbearing women, and convalescents – were most likely to have suffered from malnutrition.[23]

(b) *The Mediterranean triad*

Literary and comparative material can help to understand how nutritional standards were achieved and maintained. Between 60 and 75 percent of the caloric intake of a typical Greek free person probably came from cereals, principally barley, but preferably wheat.[24] This would have put cereal consumption above that of many Third World countries, which rely on rice, maize, yams, or sweet potatoes. Wheat and barley are good sources of carbohydrates and, for plant foods, have relatively high protein contents. Cereals contain a range of essential nutrients and can be adequate sources for calcium and iron. If consumed in quantity, and in the right form, they can provide most of what people need (see Table 14.2).[25]

Yet not everyone had access to high quality wheat. Bread that is full of bran or unleavened may cause iron deficiency, anaemia, rickets, or growth abnormalities. Athenaeus, a major source on foods and recipes in the classical world, lists seventy-two types of bread made of different kinds of and differently processed flour, many being local varieties (Athen. 3. 108–15).[26] Ancient doctors, moreover, knew some effects of bread on digestion and health (Hipp. *Acut.* 40–5; 82), but wealth, regional preferences, and taste, rather than nutritional recommendation, guided choices. Aristophanes linked dishes prepared from un-milled, high-bran barley (so-called *chidra*) with country life and an undesirable degree of boorishness (*Pax* 1ff.; *Nub*. 1358; *Vesp*. 1304). Barley bread was given to slaves only (Athen. 7.34). Local cultural and social factors made the high-cereal diet a very variable nutritional source.

[21] Henneberg and Henneberg 1998.
[22] Scrimshaw 1975; Henneberg and Henneberg 1998; Angel 1971; Garnsey 1999; Morris 1992.
[23] Garnsey 1989a; 1999; against Corvisier 1985.
[24] Foxhall and Forbes 1982; Sallares 1991; Garnsey 1999: 19; Gallant 1991: 68.
[25] Again, Garnsey 1999. [26] Amouretti 1986.

Table 14.2 *Protein content of some staple foods**

Cereal or root crop	Protein (gr. of protein/100 gr.)
durum wheat	13.8
barley	11.0
bread wheat	10.5
millet	10.3
maize	9.5
rice	7.5
yams	3.5
potato	1.7

* After Garnsey 1989a; cf. 1999: 20.

Olive oil and wine are also major components of the Mediterranean diet.[27] They are somewhat comparable in their economic and cultural significance. On the one hand their cultivation is more labor intensive and risk-laden than cereals, but on the other, they were marketed and consumed in extraordinary quantity throughout antiquity without any obvious environmental reasons. Olives and vines can be successfully cultivated in regions where they have not dominated the diet. Their preeminence in the Greek symbolic system and their emergence as important Greek commodities thus needs some explanation.[28] Three factors have been emphasized: the cultural importance of wine-drinking brought about by the tradition of the aristocratic symposium; the general availability of excess labor that reduced the high costs of vine and olive cultivation; and the profits from trading in them, combined with monetary demands on the elite (see esp. Arist. *Pol.* 1.1259a).[29] In other words, wine and olive oil were consumed in prodigious quantities not so much because they were widely available, but because they were made widely available.

Olive cultivation varied widely in Greece. According to the First Fruit inscription (*IG* II² 1672), olive production on Lemnos was almost negligible, despite the fact that the cultivated area was larger than that of Attica, allowing in principle more scope for a high-risk crop.[30] Olive cultivation needs a dry season in which the fruit develops its oil content, and a cool but not frosty winter to rest. Olive trees are not found in substantial areas of Greece, and do not grow well above 800 m. Thus local conditions could strongly affect availability of olives and olive oil, which had to be imported

[27] For other plant products supplementing the cereal diet see Chapter 12 above; for the extraordinary role of figs see Horden and Purcell 2000: 209ff.; for emergency foods, Gallant 1991: 115–19 with Clark 1976.

[28] Horden and Purcell 2000: 209ff.

[29] Ibid.; Osborne 1991a for the economic pressures of rich Athenian citizens in terms of public funding.

[30] Sallares 1991: 478; Kayser and Thompson 1964: 319–20.

in many places (see above, Chapter 13).[31] Further, the olive tree's biological rhythm only produces a good crop every second year. Regular oil consumption requires storage and/or provision through exchange. Combining oleoculture and cereal agriculture, moreover, requires planning and the balancing of comparative advantage. While olive trees can grow on soils too dry for cereals, good olive yields require good soil. Theophrastus tells us that in the plains best suited for olives, figs, and vines, these crops competed with cereals (*Hist. pl.* 2.5.7). His recommendation – to use the best soil for cereal cultivation and the second best for olives (*Caus. pl.* 1.18.1–2) – was guided by his opinions about the relatively safety of cereal cultivation and the greater profits but higher risks and labor requirements of olives. Market-oriented farms might use some of the best soil for olives. Newly reclaimed land, moreover, was normally devoted to olives.[32]

Olive cultivation yields higher caloric returns per hectare and unit of labor input than any cereal.[33] Rising per capita consumption of oil can therefore indicate higher standards of living, because a larger amount of a calorific food is consumed at home rather than sold. In Greece, however, the dynamics were different. According to the literary tradition, in the sixth century Solon and Pisistratus barred all agricultural exports from Attica except olive oil (Plut. *Sol.* 23–4; Dio Chrys. 25.3). This happened when population was growing in Attica, and may have been a response to food shortages and the somewhat insulated character of the Greek economy (see further, below). Solon apparently tried to keep cereals and wine within Attica, while allowing export of the most nutritious and profitable produce. State intervention in production and trade of export goods is known from other Greek cities.[34] Solon probably wanted above all to maintain Athens' status as an exporter of olive oil, but he also met the commercial interests of surplus producers.

Increased attention to the olive industry is again noticeable in the fourth century, another period of population growth (see above, Chapter 3). In the small deme of Atene the cultivated area was extended by 40 percent by terracing marginal land for olive cultivation.[35] Again, increased production did not just benefit home consumers, although some of Atene's production was clearly designed for local consumption. Yet the marketability of olive oil

[31] Garnsey 1999: 14ff.; Sallares 1991: 304–90; Amouretti 1986; Kayser and Thompson 1964.

[32] Lohmann 1995. For the balancing of risk and profitability on Athenian large estates, again Osborne 1991a.

[33] Gallant 1991: 72–84, especially 79.

[34] A series of inscriptions from Thasos, an exporter of quality wine, show intense intervention in the wine trade and the quality of wine to benefit both consumers and exporters; Salviat 1986; Osborne 1987: 105–6; Davidson 1997: 43.

[35] Lohmann 1993; 1995. The case of the deme Atene may not be applicable to Attica as a whole. The deme was settled very late, probably mostly for agricultural purposes, and its proximity to Laurion made cash-cropping here more prominent than elsewhere.

around the northern Aegean and Black Seas also made it an ideal cash crop traded in return for wheat. Though in principle increased oil consumption could have substituted for deficient cereal resources in a local subsistence economy, the commercial interests of the elite were stronger than the ideology of self-sufficiency.[36] Oil production generated wheat for the local market. The power relationships within the classical *polis*, combined with a particular interest of ancient states to identify themselves with export goods, are likely to have reinforced high levels of cereal consumption rather than reducing its dominance in ancient diets.

The economic roles of oil and wine overlap, but wine's link with symposium culture makes it a special case. The consumption of wine (in opposition to beer) was a marker of Hellenism, although over-consumption of wine was not only socially castigated but could also be seen as a chance for foreign merchants to exploit their commercial partners, and was thus part of a wider discourse about freedom and subordination.[37]

Despite restrictions put on individuals, per capita consumption of wine was probably significantly higher than, for example, in mediaeval times.[38] To judge from the numbers of drinking cups and transport amphoras found in excavations, the consumption and trade of wine reached an unprecedented scale in the late archaic and early classical period.[39] Most wine was marketed and consumed locally, but for connoisseurs it was shipped over long distances (see above, Chapter 13).[40] Two explanations have been proposed for the increase in consumption. The first is that increasing democratization changed the symposium from an exclusive aristocratic gathering to a form of hospitality practiced by a wider group of citizens. Painted pottery replaced silver and gold containers, and its mass production in Athens in the late sixth and fifth centuries reflected the opening of the symposium and gymnasium to poorer people who emulated the former elite's symbolic behavior.[41] The second is that the symposium remained largely aristocratic, while ordinary people frequented public taverns (*kapeleia*) that seem to have

[36] As Osborne 1991a argues, members of the liturgical class were forced into production for the market not least in order to meet the financial obligations forced upon them by the *polis*. Up to a point the contributions of the rich paid the citizenry, who could then purchase imported grain. One may wonder, however, whether the alleged Solonian policy was more effective in increasing the nutritional standard of living of the citizenry as a whole.

[37] For this discourse and the place of drinking in it, see above all Davidson 1997; Murray 1990. For the status of wine in Sparta, Fisher 1989.

[38] Vandermersch 1994; Davidson 1997: 40ff.; Horden and Purcell 2000: 214ff.; see also Unwin 1991 for the larger historical perspective.

[39] Most explicitly argued by Vandermersch 1994: 123ff. for Magna Graecia; the argument is more implicit in arguments of the social widening of the drinking culture in the course of democratization.

[40] Information about quality wines comes from a combination of literary, epigraphic, and archaeological testimonies. For the literary tradition see Davidson 1997, especially 321; Salviat 1986; Meijer and van Nijf 1992: 110–13; Vandermersch 1994.

[41] Vickers 1984; 1985; cf. Bazant 1985. The argument is not generally accepted; see for example Boardman 1988a; 1991.

been abundant in cities and villages.[42] Whatever theory is more valid, by the fifth century there was an extensive drinking culture supplied by shops, local markets, and foreign trade. It is worth noting that ordinary wine was called after the measure in which it was sold, so it was largely regarded as a commodity rather than a subsistence food.[43]

The exceptionally high consumption of wine can be explained by the demand of the sympotic culture and its derivatives that directly or indirectly affected all social classes in the classical period. But the opposite case has also been made, that the amount of excess labor that was available through population growth as well as slavery fostered labor-intensive vine cultivation and thereby increased and maintained wine consumption, especially the part that was supplied via local and external markets.[44]

(c) *Meat consumption and the fishy extras*

Greeks regarded themselves as farmers who worked their land, harvested crops, and ate grain. Other people, barbarians and especially nomads, were marked by a lack of productive labor and consumption of wild animals eaten raw. Herodotus describes the tribes of the North African coast as "pastoralists whose drink is milk and whose food is flesh of wild animals" (Hdt. 4.186). Aristotle designed an entire evolutionary order starting with the pastoral nomad and culminating in sedentary farming (Arist. *Pol.* 1.1256a29–30). In both Herodotus' and Aristotle's schemes, modes of consumption are linked to forms of labor and settlement, providing an index of human civilization.[45]

Despite their categorization of flesh-eaters and milk-drinkers, most Greeks consumed animal products.[46] Yet Greek meat dishes, apart from some game, came from domesticated rather than wild animals, were cooked rather than raw, and were not part of daily sustenance. Milk and cheese, like wool, hair, and leather, were regular by-products of the animal husbandry that was practiced in most rural households.[47] But it was unprofitable to keep animals for slaughter. Meat came to private households almost exclusively via sacrifices. Sheep and goats were the commonest victims, but cattle were burned at grander sacrifices, especially of states.[48] Some cults required

[42] For this model see above all Murray 1990 and Davidson 1997; taverns, of course, were not just frequented by those who did not participate in the sympotic culture; a high-class tavern, to judge from the pottery remains, was excavated in the Athenian *agora* (Shear 1975: 357–8); and the reproach of squandering one's patrimony in taverns is a *topos* of intra-elite diatribe; e.g., Isoc. *Areop.* 49; *Antid.* 286.

[43] Davidson 1997: 41 with Hesych. s.v. *trikotylos*; above, Chapter 13.

[44] Horden and Purcell 2000: 213–20.

[45] Shaw 1982/3.

[46] For ideologically motivated vegetarianism see C. Osborne 1995.

[47] Hodkinson 1988; Horden and Purcell 2000: 197–204.

[48] Analysis of sacrificial bones of the sanctuary of Artemis at Ephesus revealed that alongside the typical animals, dogs, horses, donkeys, deer, gazelle, hare, and even lion and red fox had been sacrificed. At the internal altar of a Protogeometric to Hellenistic temple at Kommos on Crete, large amounts of

special animals. Pigs were common victims for Demeter, and goats for Artemis.[49] Sacrifices were held at all levels, from households through cult associations and demes to states. States and temples did not have public herds but supplied their needs through purchase.[50]

In the early Iron Age cattle were the most common animals for sacrifice. Yet cattle competed with agriculture for good land, and their husbandry diminished as population grew (see above, Chapter 8). The proportion of cattle to other animals in Dark Age settlements is likely to have been higher than in the more populous periods that followed. It has been estimated that at Dark Age Nichoria cattle constituted 63 percent by weight of protein in the diet, compared to 40 percent average for all other periods. The mean age at slaughter dropped from 10 to 5.5 years, which indicates greater demand for meat production rather than milk.[51] Cattle sacrifice remained an important symbolic statement, especially in state and larger inter-regional sacrifices, but their number dropped as the human population and the use of cattle for work in the field and for haulage increased.

In classical Greece the word *hieron*, "sacrificial victim," when used without further specification referred to sheep. The ratio of cattle to sheep and goats varied from region to region, depending on local availability and the use of local stocks for more distant demands. According to Xenophon, the fourth-century Thessalian leader Jason of Pherae made a levy for a festival of Apollo of 1,000 oxen and over 10,000 sheep, goats, and pigs (Xen. *Hell.* 6.4.29). In lists of sales of confiscated property at the end of the fifth century one farm had two work oxen, six further cattle, followed by 84 sheep and 117 goats, not counting their young.[52] Private and local consumption of cattle must have been limited, while cattle for state sacrifices and inter-regional games probably came from herds specially reared for that market.

How much did sacrifice contribute to the diet of individuals? It has been calculated that the meat produced by the official sacrificial calendar of Erchia, a moderately sized deme of Attica (c. 700–800 adult citizens), amounted to 796 kg. per year.[53] There will have been other local festivals, sacrifices for cult associations, and private individuals, but these at most tripled that figure. The sacrifice of cattle at state festivals, especially in imperial Athens, provided further occasions to eat meat. If 2,000 head at 100 kg. each are taken as a minimum number for consumption at a large state cult, this would have made 200,000 kg. of beef available for distribution.[54] Though massive in aggregate terms, this would have provided just 1 kg. per adult per year, if we assume an adult population of 120,000–250,000

fish and birds were also found. See Hägg 1998 for the most recent osteological analyses of sacrificial remains on sites in Greece and Asia Minor.

[49] At the Demeter sanctuary at Knossos pig bones become predominant in the classical and Hellenistic period only (Hägg 1998); according to Hägg specialization of rituals was a post-archaic development.

[50] Jameson 1988. [51] Sloan and Duncan 1978. [52] Pritchett 1953: 272 (VI. 68–73); 1956: 255–60.

[53] Jameson 1988: 105; population size is based on the bouleutic quota of Erchia. [54] Ibid. 105f.

in the fourth century. This is marginal compared to the calories provided by cereals, or compared to modern meat consumption. Meat was for most people an irregular, seasonal extra consumed in rituals and not part of the regular diet. Whether children and adolescents were given any meat at all is a further question.[55]

Public sacrificial banquets offered a wider group of citizens participation in a culture of consumption otherwise reserved for an exclusive elite. For the duration of the festival, banquets broke down boundaries between different cultures of consumption defined by differential wealth and differential access to commodities distributed via the market. For the elite, in turn, meat was excluded from competitive consumption. They turned to fresh fish, game, and other relishes to demonstrate their distinction with food.[56] Fish did not fill this role everywhere, and not in all respects. Salted or preserved fish, imported in quantities from Byzantium and the Attic coasts, was quite a cheap supplement to the poor man's diet.[57] Around the coasts, in Megara, and the Aegean islands, most notably at Rhodes and Karystos, fresh fish played an important role, although it is unlikely that fish was more important than cereals as a staple anywhere.[58] In the city of Athens, fresh fish (particularly delicate species) were prestigious supplements for those who could afford them. Again, there were restrictions on luxury consumption. Those who mistook the *opson* (supplement) for a staple, in other words those who were seen wasting their money on expensive food, could be blamed for *opsophagia* (gourmandise). *Opsophagia* was the dietary part of a profligate life, which by peers was associated with lack of self-control and by the public with the subversion of equality and peace.[59] Although the Athenian empire created ample opportunity for supplying delicacies from all over the world (Thuc. 2.38.2; Xen. [*Ath.Pol.*] 2.4, 7–8), their consumption in large quantities was unacceptable. Their different attitudes toward luxury (*truphe*) mark an important difference between the classical and Hellenistic Greeks.

III STANDARDS OF LIVING

Clothing, housing, and heating take up a much smaller proportion of the living costs of a pre-industrial household than nutrition, but given that they

[55] Most meat was eaten within the sanctuary during the festival at which males, female adults or both were admitted. Some meat, however, was taken home (Hägg 1998), or perhaps sold in the market (Jameson 1988). Citizen youths did not participate in cult before initiation, which happened variably either at puberty or entry into adulthood at the age of eighteen.

[56] Davidson 1997: 15–16; cf. Davidson 1993; 1995.

[57] Davidson 1997; Garnsey 1989b; cf. 1999: 7 with Ar. *Wasps* 491; fish from Byzantium: Braund 1995.

[58] Gehrke 1986: 136–50 for the importance of fishing in Megara, Rhodes, and Karystos; Gallant 1985 for their insufficiency as a staple, since the ratio of labor input : caloric output is much lower than in cereal production.

[59] Davidson 1993; 1995; 1997: 20–5, with Xen. *Mem.* 3.14.

are more income elastic, they are a particularly good guide to standards of living.[60] Burial is a further occasion for consumption and, to an extent, comparable to housing. Both can reveal change over relatively short periods of time.[61]

(a) *Textiles*

Temple inventories list a bewildering variety of dresses and textiles.[62] They not only give us the names, functions, and forms of textiles, but also remind us of the extraordinary symbolic significance attached to clothing. Through the dedication of textiles, status, age, and gender were symbolically controlled and affirmed. As offerings from and by women, they had similar status as armor, shields, and weapons for men.[63]

Material for clothing can be divided into two categories, animal fibers (wool, silk, and hair) and those with a plant origin (flax, cotton, *byssos*, hemp, and mallow).[64] Of these, wool (*erion*) was the most popular, produced and processed at home as part of the mixed farming/animal husbandry system characteristic of the Greek economy.[65] As with barley meal, woolen clothes came to be the quintessential attribute of the moderate, rural citizen in Athens (Ar. *Vesp*. 1132ff). Wool was distinguished according to fineness, color, strength, and length, and sheep producing fine wool (*eria malaka*), white wool (*eria lampra*), or coarser varieties (*eria sklera*) were distinguished accordingly. Athens, Megara, and Miletus were regarded as producers of high-quality wool, which was imported by those who could afford it (Athen. 12.57d; Diog. Laert. 6.41).

Silk, by contrast, was not produced in Greece. It came to the Greeks as plunder or via trade routes from China, either as cloth or ready made. Aristotle mentions a variety of wild silk produced on Cos (Arist. *Hist. An*. 5.551b), but silk remained an imported luxury. At the other end of the

[60] Scholars of pre-industrial Europe have discussed intensely how best to measure standards of living. Diet, mortality rates, patterns of health and sickness, age-specific height, and the amount people spent working have all been considered (Morris 2004; 2005). All these factors imply their own problems as measures of standards of living, while combining them might lead to double-counting (Floud et al. 1990). For the income elasticity of housing, clothing, and heating costs, which are therefore good measures of short-term changes, see Fine and Leopold 1993: 49. For their proportion in an eighteenth-century working-class household, see Braudel 1979 (27.5 percent of the total budget); in the countryside, the proportion of food in the total (non-monetary) budget was even higher (ibid). Hopkins 1995/6 takes the proportion of clothing, heat, and housing in the Roman empire as on average very small (less than 20 percent).

[61] Morris 1998a; 2005. It should be noted that burial is differently charged than the living space. Changes may occur here as a result of changing attitudes to death and the after-life, which may occur independently from changes in standards of living.

[62] Dedication of clothing was connected in particular with cults of Artemis, cf. at Thebes (*IG* VII 2421), Tanagra (*REG* 12/1899: 74ff.); Delos (*ID* 1440A); for inventories from Sparta (Artemis Orthia) and Athens (Brauron and Acropolis) see Linders 1972.

[63] Foxhall and Stears 2000: 3.

[64] Pekridou-Gorecki 1989: 13ff.

[65] Osborne 1987; Hodkinson 1988; Horden and Purcell 2000.

scale, textiles could be produced from goat hair woven into a coarse fabric (*sakkos*), while goatskins (*diphthera*) provided tunics for slaves (*IG* II² 1672, 104 (329/8 BC); Ar. *Nub.* 72), and were regarded as unfit for civilized people (Thgn. 53–60).[66]

Of the fibers of non-animal origin, flax, from which linen is made, was the most important. But in the classical period it was used in significant quantities in shipbuilding, not the household. Flax was cultivated in northern Europe and the Near East, but its most important country of origin was Egypt, whence it was imported to Greece. Some flax also seems to have been cultivated in the Peloponnese. In Homer, men and women commonly wore a linen garment (*pharhos*) over their woolen *chlainos* or *peplos*,[67] and words for flax and its processing into linen are known in Linear B.[68] But for Herodotus, linen clothes were exotic things worn by the Egyptian priests (Hdt. 2.37; 3.47). In Hellenistic times *byssos*, the finest and most expensive linen, was still made and used in Egyptian temples to clothe statues and as mummy wrappings for sacred animals and the very rich.[69] Hemp was used above all for ropes and nets, while Herodotus notes that Thracian women made clothes from it (4.74). Pausanias says that in Greece it was cultivated only in Elis (together with flax and cotton) and that in his own time the women of Patrai earned a living by making kerchiefs and dresses from Elean textiles (5.5.2; 6.26.6; 7.21.14).

Value and prices of garments varied. Because of their widespread use as pledges, moreover, there was a flourishing second-hand market. In Greek Egypt a used cloak (*himation*) could be bought for as little as 1½ to 6 drachmas (*P. Cair. Zen.* 59507; *P. Köln* VIII 346).[70] New ones fetched 14, 15, and 25 drachmas, and even more than 100 drachmas (eg. *P. Cair. Zen.* 59477; *P. Cair Zen.* 59319; *P. Köln* VIII 346). The *chiton*, worn under the cloak and normally made of linen or wool, was a little more expensive. The person who spent 25 drachmas on a cloak bought tunics for 40 and 60 drachmas at the same time (*P. Cair. Zen.* 59319). However an embroidered tunic, made of silk, could cost as much as 1,270 drachmas (*P. Lugd. Bat.* XX 62). Since coats were pledged so frequently, it can be assumed that many people owned more than one. On the other hand, to pawn one's (only) coat was an indication of utter destitution. Permanent laborers, moreover, received in Egypt an annual clothing allowance of around 10 drachmas, while employees in leading positions received 30 drachmas per year (*P. Cair. Zen.* 59825). Neither will have sufficed for more than replacing one set every other year, in the latter case at a slightly better quality than in the former. However, within the domestic economy where sheep provided

[66] Bieber 1928. [67] LSJ s.v. [68] Richter 1968: 117. [69] Otto 1905; Thompson 1988: 50.
[70] Absolute prices are not directly applicable to the classical period as both wages and the price of wheat in the Egyptian *chora* were substantially lower than in the cities of the classical period.

wool and women labor, the constraints of consumption were related less to quantifiable wealth than to the human (female) resources of a household, and to different strategies putting either storage, display, or small-scale exchange into the foreground.[71]

Because of the symbolic significance of clothing and textiles, rituals of consumption emphasized them. Temple inventories record textiles dedicated by wealthy families or foreign potentates, including purple or colorful and ornamental fabrics, with gold and silver threads or gold decoration. But quantity counted as much as quality. Sumptuary laws from Solonian Athens stipulated that no more than three garments could be interred at a funeral.[72] A similar law from Keos says no more than three garments, worth no more than 100 drachmas, should be given to the dead.[73] In Sparta, the *homoioi* (peer citizens) were allowed no more than their warrior's coat in their graves.[74] Another law from Athens restricted the garments in a woman's trousseau (*pherna*) to no more than three. Zaleucus' law code at Locri Epizephyrii and Periander's at Corinth also contained such laws.[75] Legislation of this kind reflects widespread concern to control demonstrative displays and destruction of textiles in rites of passage. The diversity and sophistication of clothes dedicated at temples shows that competitive display of clothing was not confined to the elite but was a way to mark boundaries at all levels of society. It suggests, moreover, that clothes, even in poorer circumstances, were not kept just to keep out the cold but were exchanged and dedicated, creating a wide spectrum of demand supplied by local and long-distance trade as much as by home-production and gifts.

(b) *Housing and burial*

There is some indication that at the beginning of the fifth century standards of living became more egalitarian, and also began to rise on average. Housing and burial, involving materials not normally supplied by domestic production, demonstrate this better than clothing. Although data from the archaic and classical periods are not fully comparable, mean and median house sizes increased markedly between the eighth and the fourth century (Table 14.3). The increase in size, moreover, coincides with the use of more solid building materials, as well as better roofs, drains and hearths.[76]

The single-entrance courtyard house is typical of the mid-fifth through mid-fourth century. It put particular emphasis on control of space,

[71] Horden and Purcell 2000: 352–62 with Schneider 1987.

[72] Plut. *Sol.* 20.5; 21.5; Ruschenbusch 1966; Seaford 1994: 74–106 for the political and ritual significance of this legislation.

[73] Sokolowski 1969: 137–8, 152–3. [74] Hodkinson 2000.

[75] Diod. Sic. 12.21; Müller *FHG* II, 213 (Periander) [Corinth]; Athen. 12.521b; Mühl 1929.

[76] Morris 2005; Lang 1996: 108–17.

Table 14.3 *Mean and median house sizes 800–300 BC in square meters**

Period	Mean	Median
800–700	53	51
c. 700	69	56
700–600	53	45
600–500	92	67
500–400	122	106
400–300	325	240

* Table from Morris 2005 who also discusses the problems of these data. Among the most obvious are the fact that floor plans do not always reflect house sizes since some houses had second floors. In this table it is assumed that 10 percent of the eighth-century houses had second floors, 25 percent of those between the seventh and sixth, and 50 percent in the fifth and fourth.

separating private from public through its fully enclosed open courtyard, and male from female through the organization of individual rooms and floors.[77] Fifth-century single-entrance courtyard houses were relatively uniform in size, clustering tightly around a median of 140–170 square meters.[78] The increased control over space corresponds well with the concerns of fifth-century texts, and helps explain housing as a reflection of civic concerns beyond egalitarianism. Interestingly, such concerns can be observed not just in Athens, where we are best informed about civic ideology, but throughout the Greek world.[79]

The single-entrance courtyard house is distinct from the housing both before 450 and after 350 BC. Late archaic houses were generally smaller and allowed for less separation of tasks, gender, and public and private life. In the second half of the fourth century, on the other hand, exceptionally large and lavishly decorated houses appeared. The median size of fourth-century houses ranges between 210 and 250 square meters, an increase of as much as 50 percent over the fifth century.[80] Moreover, grand fourth-century houses coexisted with more traditional dwellings, suggesting a degree of differentiation not apparent in the previous hundred years. Grander houses are characterized by two courtyards, one apparently for private use, the other for use with guests. In some cases the language of public building was adopted, most obviously in the use of columns in large peristyle courts and sumptuous decoration. The private house of the late fourth century

[77] Nevett 1999: 158ff.; also for the following.
[78] Morris 1998b; 2005. [79] Hoepfner and Schwandner 1994; Morris 1998b.
[80] The data from Olynthos that might be biased by archaeological circumstances (Nevett 1999) are now paralleled by finds from Halieis, Ano Voula, and Stylida; Morris 1998b; 2005.

displayed status in a way that would have been unthinkable in previous centuries.[81] The change reflects ideology as well as economics. While in the archaic period housing was simply smaller and poorer, in the fifth century general standards as well as size increased together with a focus on equality between all citizens. In the fourth century this focus on equality declined, producing some truly sumptuous buildings. The sensitivity of contemporaries to extravagant houses (e.g., Dem. *Olynthiacs* 25–6; *Against Aristocrates* 207–8) suggests, however, that the appearance and costs of houses remained subjects of public debate.

Correspondingly, farms in the Athenian countryside, as much as in the hinterland of the Greek colonies in Sicily, varied considerably in size and elaboration, reflecting in the fourth century not only economic differences but also deliberate displays of wealth.[82] Arguably, however, the average size of an Attic farm sufficed for a relatively prosperous life.[83] It has been calculated that a family farm with a cultivable area of about six hectares afforded, even under a system of bare fallow, subsistence for a family of five.[84] In Lohmann's survey of Atene, farms of this size are among the smallest. Here most farms had significantly more than six hectares of land, and there is no evidence of farms operating below subsistence level.[85] In the second half of the fourth century there seems to have been a noticeable increase in elaborate farms, possibly reflecting concentration of land in the hands of fewer, richer citizens.[86]

Burial, finally, confirms the picture of greater economic homogeneity in the fifth century and increased differentiation during the fourth. By 500 BC burials were noticeably poorer and more homogenous than in the late archaic period.[87] There was a limited range of grave types, and their contents rarely comprised metal or decorated pots. After 425 BC grave types become more varied again, and by the fourth century about 20 percent of known graves from the Kerameikos in Athens contained some metal objects. All over Attica large *peribolos* tombs with sculpted monuments reappear in the late fifth century, forming about 10 percent of known fourth-century burials. According to Lysias (32.21), a certain Diogeiton had to spend 5,000 drachmas on the tomb of his brother in 409 BC. By 349 BC one Athenian was

[81] Nevett 1999: 162.

[82] Thus Lohmann 1995; for Sicily, see Nevett 1999: 151–2. For fourth-century housing, see also Walter-Karydi 1994; 1996; Lang 1996; and Mussche 1974.

[83] This is controversial. While Lohmann 1995 suggests a relatively optimistic picture of prosperity in Athens, Osborne 1992, and Foxhall 1992; 2001 are more skeptical.

[84] Gallant 1991: 86.

[85] Lohmann 1993; see, however, Osborne 1997 for some comments on the exceptional character of that deme. It was founded after Cleisthenes, and offered because of its proximity to the Laurion district exceptionally good commercial opportunities.

[86] de Ste Croix 1981: 294ff.; see also Mussche 1974 for a changing housing pattern in Thorikos; against the argument of increased economic inequality in the fourth century, see Davies 1981: 36–7.

[87] For this and the following Morris 1998a.

claimed to have spent more than two talents on the tomb of his mistress. Although both figures may be somewhat inflated, they must have been in the range of the believable. By the fourth century, Athenians spent a lot on burial, and from the second half of the century onwards some displayed their wealth in quite extravagant graves. Again, the turn towards greater homogeneity of burial in the fifth century and its corrosion in the fourth was not confined to Athens.[88]

The relative prosperity of rural and urban households represented by the archaeological record of the classical period may, of course, be misleading. As with skeletal remains, there are biases in our housing samples. We know little, for example, of mountain regions above 400 meters or the borders of *poleis*. Temporary huts and poorer farmyards may be underrepresented. Some cities had irregular areas with smaller houses outside the main street plan. Some rooms may have been separated by hangings, while front doors, incidentally a distinctive feature in the houses of the rich, were replaced by simple curtains.[89] The number of such dwellings relative to prosperous houses is difficult to determine. It may be that the homes of craftsmen and shopkeepers, living above their workshops and stores, were poor.[90]

IV FROM CONSUMPTION TO DEMAND

Davies (above, Chapter 12) points out the very uneven nature of our knowledge of economic development in classical Greece, and his final sketch of the development of production applies to consumption too. Aggregate consumption certainly increased after the sixth century, as population increased and standards of living rose.[91] Foreign imports also increased, especially from Egypt, the Black Sea, and Etruria. An increase in the labor supply meant that more labor-intensive goods could be produced and consumed, and the supply of coinage – which only reached significant levels after 480 BC[92] – facilitated payment for public labor and civic or military service, in turn providing individuals with a means of exchange for purchasing commodities.

A certain, albeit slow, increase in consumption in the classical period must be uncontroversial.[93] Arguably the most important question is how

[88] Morris 1998a provides examples from Argos and Macedonia.

[89] Nevett 1999: 157; Meiggs 1982: 204, 208–9.

[90] Nevett 1999 commenting on the notes of the excavations on the South Hill of Olynthus; cf. Robinson 1946.

[91] Malthusian theory assumes a decline in standards of living when population increases because of declining marginal returns to labor. However, the supply of goods, especially food, may also improve with population increase, as economies of scale reduce production and transportation costs, and investments in innovation increase (Simon 1985).

[92] Rutter 1980.

[93] See for the pace of economic development in comparison to some states in the early modern period Saller 2002: 257–8; Morris 2005; and below, Chapter 22.

increased aggregate desire was translated into effective demand.[94] In Athens, the growing need for grain was met by regular imports from the fifth century onward. Moreover, a wider range of people participated in the consumption habits through which the elite had formerly distinguished itself. And finally, states needed increasing amounts of building materials and supplies for public ritual. However, the effect of this expansion of needs on the operation of interdependent market exchange was limited. In no case can it be shown that it was regular, widespread, or sustained enough to be supplied effectively by the market without state interference.

(a) *Cereals again*

The importance of local and long-distance trade for meeting the demand for oil, wine, and luxury textiles, as well as the private and public interests in keeping up their trade, has been pointed out above. For cereals the evidence is less clear. It is generally agreed that the degree of urbanization and division of labor that was achieved in the classical period was possible only on the basis of regular markets for flour and bread in the cities. Furthermore, many states were self-sufficient in grain. Others, above all some Greek cities in Sicily, were exporters of grain, while Athens in particular became more or less dependent on foreign imports by the fifth century (see above, Chapter 13).[95]

Several ancient sources suggest that one *choinix* of wheat per day was a typical daily food ration for an adult male soldier. Depending on the weight/volume conversion that is adopted for the ancient *choinix* of wheat, this represents c. 630 grams of wheat per day, or 230 kilograms per year.[96] Translated into calories, this means about 2,100 calories of wheat per day, close to the daily consumption rate of modern Greek peasants, if the grain rations represented about 75 percent of soldiers' diets.[97] Soldiers presumably ate better than the average man at home, and a larger proportion of their diet may have consisted of cereals; and women and children, constituting three quarters of the population, needed less than an adult male in peacetime. An average annual per capita consumption between 150 and 230 kilograms across social, age, and gender groups seems a reasonable assumption.[98]

[94] Simon 1985; Fine and Leopold 1993; Bocock 1993; Foxhall 1998.

[95] For a general perspective see Gehrke 1986. For large-scale grain exports in Sicily from the archaic period onwards, de Angelis 2000; for Athens Garnsey 1988; Sallares 1991; Rosivach 2000; and below.

[96] Foxhall and Forbes (1982) calculate the *choinix* of wheat at 772 grams per liter, and 1 *choinix* (= 1.08 liters) at 839 grams. According to a more recent inscription (Agora inv. I 7557; Rhodes and Osborne 2003: no. 26), there were 5/6th *medimnoi* of wheat to the *talent* (= 25.86 kilograms), meaning that 1 *choinix* (1/48th of a *medimnos*) equaled 628 grams. See Rosivach 2000.

[97] Gallant 1991.

[98] Garnsey 1988: 102, takes 175 kilograms per year as a likely average of consumption across age and gender; Sallares 1991 assumes c. 200 kilograms of wheat and 166 kilograms of barley as the annual needs of an adult male; Rosivach's 2000 assessment of 240 kilograms/year on average is likely to be too generous.

Consumption of barley will have been in the same range, given that barley is lighter than wheat by volume, but higher in nutritional value.[99]

Answering the question of how far needs could be met by local resources depends on estimates of population size, carrying capacity of the land, and the proportion of people who lived off agrarian resources elsewhere.[100] For Athens, population estimates vary, while the quantitative impact of cleruchies (agrarian possessions outside Attica) is virtually unknown. If we accept a population estimate toward the higher end of the plausible range, Athens had to import grain most years in the fifth century, and regularly thereafter.[101] If we accept a lower figure, fifth-century Athens needed to import grain in times of emergency only, but with the loss of its empire became dependent on regular imports in the fourth century.[102]

Athenian grain imports, however, did not simply supply crops that could not be grown at home, but allowed Athenians to eat wheat bread instead of barley. Most grain cultivated in Attica was barley, and remained so during the fourth century. Athenians grew wheat in smaller quantities, and in a variety that was not suitable for bread. Durum wheat (*triticum durum*) was eaten mainly in the form of flat unleavened cakes. Soft wheat (*triticum aestivum*), from which bread is made, did not grow well in Greece.[103] It grows better in wetter transitional climates like southern Russia, the northern Balkans, north Italy, Gaul, and Britain. Its yields are more variable than durum wheat's and therefore more risky if arable land is limited.[104] The written and archaeological evidence seems to indicate a lively grain trade between the Black Sea and the Greek mainland from the early classical period onward;[105] this may have been undertaken for the sake of a particular variety of wheat, a semi-luxury consumed by those who participated in the money economy and turned to imports for staples. At first, the rural population had no access to this kind of wheat, but by the late fifth century, with an expanding urban culture, burgeoning civic ideology, the imperial experience of massive food imports, and a general increase of standards of living, attitudes to and practice of cereal consumption probably changed. The large grain imports while the Spartans occupied Attica had shown that Athens could live on imported grain alone. As a wider social range of Athenians had become accustomed to higher-quality bread made from imported grain, they started preferring it to unleavened cakes, made from domestic grains and associated with rural boorishness. Pressure on food resources

[99] Foxhall and Forbes 1982. [100] Sallares 1991 for the most complex calculation of these factors.
[101] Beloch 1886; Gomme 1933 and Hansen 1985 for a population of c. 350,000 residents in Attica and its cleruchies before the Peloponnesian War, and c. 250,000 thereafter.
[102] Garnsey 1985; cf. 1988: 88–91.
[103] Sallares 1991: 313–61; Garnsey 1999; Horden and Purcell 2000.
[104] Garnsey 1999: 120–1; Sallares 1991: 351–2. [105] Noonan 1973.

were severe, but the economic and cultural development of Athens, too, contributed to transforming wheat into a commodity.

(b) *The city as consumer*

The significance of state consumption lies in the strategies adopted for meeting requirements, the degree of monetization it caused, and the symbolic significance its economic behavior had for the citizen body. Public and private consumption, moreover, were interdependent in so far as public pay (salaries for office and military service, public maintenance of orphans, etc.) stimulated commodity consumption to levels that would not have been reached otherwise. Fifth-century Athenian state expenditure was exceptional, but as Athens purchased resources and labor from all over the Mediterranean and paid wages in cash, it stimulated monetization, exchange, and commodity consumption all over Greece.

The most important areas of state consumption were warfare, building (especially of temples), sacrifices, and festivals.[106] Classical Athens was exceptional but probably not unique in making all public payments – wages, reward for political office, ration payments to soldiers, maintenance of cavalry horses – in cash not kind, meaning that recipients had to provide for themselves via the market.[107] Athenian management of food crises was confined to organizing emergency imports and regulating prices, rather than making free grain handouts.[108] The Athenian state's own need for grain was therefore limited to public rituals and the feeding of the personnel in the Prytaneion.[109]

Democratic ideology perhaps also encouraged a turn to the market, the *agora*, for open debate and open exchange. This is nowhere clearer than in the story that Pericles, the icon of democracy, sold all his annual produce and bought his daily needs in the market (Plut. *Per*. 16.3; see also above, Chapter 13). This he did in contrast to Cimon, his rival, who gave gifts to friends, neighbors, and clients from his private property in hope of political support. In many respects the institutional context of democracy improved the conditions for market-oriented commodity consumption. But even in Athens where these conditions were most strongly developed, markets did not work without interference.

The greatest problem was the variations in demand. Periods of extensive state expenditure, occasioned by warfare and building projects, alternated

[106] Andreades 1933; Boersma 1970; Pritchett 1971–90: vol. 1; Cavanaugh 1996; Samons 2000; Salmon 2001; Davies 2001d.

[107] Pritchett 1971–90: vol. 1; Loomis 1998; Davies 1998b; 2001d; Cavanaugh 1996; Burford 1969.

[108] Garnsey 1988.

[109] Boeckh (1842: 246) estimated that the *sitesis eis prytaneion* cost Athens 2–3 talents per year, which would have bought 2,000–3,000 *medimnoi* of wheat (at 6 drachmas per *medimnos*), or fed up to 100 people for one year.

with periods of little need or lack of money for continuing a particular project. Public works and temple building could extend over years, depending mainly on the funds available, but the resources required for a large project outstripped material and labor available under normal conditions. Cults and festivals, moreover, took place at intervals, and not necessarily every year. Similarly, the need for imported grain varied from year to year with periods of extraordinary demand at times of food crisis. The seasonality of demand put high pressure on administration and planning, and could not be satisfied by regular markets. In the case of the four-yearly Panathenaic festival, for example, one of the highest Athenian officials was made responsible for purchasing the oil and cattle required for prizes and sacrifice.[110] At the time of the *Anthesteria*, an annual festival in honor of Dionysus, a special market was organized for the supply of *choes*, special cups for the competition on the ceremony's second day (Skylax *Periplous* 112). Athens appointed official grain commissioners (*sitonai*) by the second half of the fourth century, and other cities by the Hellenistic period, to assess yields and organize imports. The office of grain commissioner was important enough to be either hereditary (as in Sparta) or given to top-rank politicians (such as Demosthenes, who served as *sitones* in 338/7 BC). According to Pseudo-Aristotle ([*Rh.*] 1.4.7, 11), not only *sitonai* but politicians more generally had to develop expert knowledge on food production at home and the possibilities of imports, so as to make "contracts and agreements with those who can furnish them."[111] Despite favorable institutional conditions (elites that set a model for commodity consumption, public payment that stimulated monetization, and strong state insistence on money and market exchange), and despite some products (most notably oil and wine) being marketed effectively so as to increase consumption, even in Athens production and consumption were not articulated enough to be balanced against each other and to be regulated by the price mechanism over any period of time.

[110] 300 cattle could be slaughtered at such an occasion, and the first prize for the chariot race alone was worth 140 amphoras of oil, which is roughly equal to 500 liters; Scheibler 1983: 141–4.

[111] Garnsey 1988: 15–16, 73, 144.

PART IV

THE HELLENISTIC STATES

CHAPTER 15

THE HELLENISTIC NEAR EAST

ROBARTUS J. VAN DER SPEK

1 INTRODUCTION

Between 334 and 323 BC Alexander the Great conquered an empire stretching from Macedonia and Egypt to the Indus. Alexander died young without heirs, but Macedonian dynasties dominated the Near East for two or three centuries, encouraging Greek and Macedonian immigration and founding new cities with Greek citizens and political institutions. After Alexander's death his feeble-minded brother Philip III and posthumously born son Alexander IV maintained the fiction of kingship (323–317 and 317–?310, respectively), while his generals (particularly Antigonus the One-eyed, *strategos* of Asia; Seleucus, satrap [governor] of Babylonia; Lysimachus, satrap of Thrace; and Ptolemy, satrap of Egypt) warred over his empire.

The two kings were murdered and three new states emerged. The Seleucid empire occupied the greater part of Asia (hence the empire is often called Asia in contemporary sources), from Turkey to Afghanistan. Ptolemy founded the Ptolemaic empire in Egypt and Syria-Palestine. Descendants of Antigonus came to rule Macedonia, with political hegemony over Greece. All these states succumbed to Rome: Macedonia in 148 BC, the Seleucids in 64 BC, and Egypt in 30 BC. The imperial boundaries were never stable, and war was almost continuous. Smaller new kingdoms emerged, like the Attalid state of Pergamum on the west coast of Asia Minor in the second half of the third century and the Jewish kingdom of the Maccabees around 150. Antiochus III conquered Syria-Palestine from the Ptolemies in 200 BC, but lost Asia Minor to Pergamum and Rhodes after being defeated by Rome in 189 BC. Antiochus IV invaded Egypt in 169 and 168, the Romans forced him to retreat. The loss of Mesopotamia in 141 to the new Parthian empire of Iran was another severe blow for the Seleucids. Overall, this was a time of instability by comparison with the Persian empire's rule of the Near East between 550 and 330 BC.

Alexander's accomplishment deeply impressed later generations, including modern historians. Most modern textbooks on the ancient Near East stop with Alexander's conquest; but this periodization obscures the fact that this event probably meant little more to most inhabitants of the Near

East than did earlier invasions.[1] The Babylonians, for instance, "welcomed" Alexander as they had done Cyrus of Persia in 539 BC and Sargon of Assyria in 710 BC.[2] They probably had mixed feelings about a new king who more or less respected their traditions but wore a simple string of cloth rather than a tiara, a miniskirt in place of a royal robe, and was beardless, which was the mark of a eunuch. Greek civilization will not have impressed the Babylonians. Some learned Greek and took Greek names for political reasons, but in religion, architecture, science, and literature they maintained their own traditions throughout Hellenistic times.[3] The Greeks, however, learned the essentials of astronomy from the Babylonians (Alexander's conquest is indeed a caesura in the history of astronomy), and could have learned a lot (but did not) from Babylonian agricultural practices, including the use of the seeder plough (see below).

If all this is so, why separate the Hellenistic period from what came before? Largely because in the "Hellenistic" period (a concept first elaborated by Johann Gustav Droysen in the nineteenth century), Greek and Near Eastern traditions came into closer contact than before, increasing the cohabitation of Greeks and non-Greeks (sometimes leading to fusion, more often to segregation), which stimulated adaptations of cultural phenomena and new trends in religion, philosophy, and other fields. These contacts and developments were not entirely new – Greeks had borrowed from the Near East throughout their history – but their intensification merits treating the Hellenistic period as a distinct phase, while recognizing its continuity with the periods before and after. This underscores the error of ending books on the ancient Near East right at the moment that Mesopotamian and Egyptian civilizations came in close contact with "western" Greek civilization.[4]

But even if the Hellenistic period is significant for scholars of religion, art, science, and philosophy, should economic historians also treat it as distinctive? The answer, again, is yes. Before the Hellenistic period there were marked differences between the economic structures of the Aegean, western Asia, and Egypt. Did one of these systems prevail, or did something new emerge, when Greco-Macedonian dynasties were to rule the Near East and Egypt for two to three centuries? The Hellenistic period saw increases in scale in many dimensions; is this also true of economic performance?

The question has been treated repeatedly and from varied viewpoints. Many Marxists define an "Asiatic Mode of Production" in which the state owned the land, and its subjects were tenants, and contrast this with a "Slave Mode of Production" in classical Greece and Rome, in which free citizens owned land and other factors of production, with privately owned slaves as the labor force.[5] Karl Polanyi's view on the Near Eastern economies as

[1] Kuhrt 1995a: 8–9. [2] Kuhrt 1990. [3] Van der Spek 1987; 2003.
[4] For an elaborate study of the history of the concept of Hellenism, see Bichler 1983.
[5] Kreissig 1978.

marketless has been influential indeed (cf. above, Chapter 11). These ideal types have heuristic value, but are misleading in important ways. It is simply not true that kings owned all cultivable land in the Near East or that the Near East was not subject to market mechanisms; but on the other hand, temples and palaces had great economic power, and markets functioned differently in Asia and Egypt than in classical Greece or Rome.[6] Slavery existed in both worlds, but the functions of dependent labor nevertheless differed.

This chapter focuses on the Seleucid empire, since it was the main heir of the earlier Persian empire. The vast Seleucid realm encompassed highly varied geography, climates, and cultures. There were mountains in Iran and Afghanistan, lowland river plains in Iraq, and steppes and desert in Syria. Iranian Indo-European speakers in the east, mostly Aramaic speakers in the west, and Greek-speakers in Asia Minor mingled with groups who preserved local languages, such as Lycian. The empire contained high civilizations with their own ancient histories: Babylonians, Persians, Greeks, Phoenicians, Jews, and half-Hellenized states in Asia Minor. Some historians argue that this diversity doomed the Seleucid Empire to rapid decline, but the Achaemenid Persian Empire survived with the same features for two hundred years. The Near East only disintegrated into small political units in 1918, when western powers dismembered the Ottoman empire.

I focus on the issues raised in this volume's introduction, above all the economy's performance and structure.[7] Prior to the Industrial Revolution, sustained growth was limited, and periods of improvement were followed by stagnation and decline.[8] I therefore ask how the Seleucid economy performed relative to earlier and later periods.

II AGRICULTURE

(a) *Agricultural production*

Everywhere in antiquity, agriculture was the main means of subsistence. Agricultural conditions, however, varied greatly. Bedford's description of Near Eastern ecology (above, Chapter 11) applies to the Hellenistic Near East. There were major differences between irrigated agriculture in south Iraq and rain-fed agriculture elsewhere. Yields from the former far outstripped those from the latter. Dry-farming areas in Asia Minor and Syria-Palestine, lying barely above the 250-millimeter isohyet required for

[6] Cf. Manning and Morris 2005.

[7] For more extensive treatments, see Rostovtzeff 1953; Heichelheim 1970; Préaux 1978: 358–88, 474–524; Kreissig 1978; Briant 1982; Musti 1984: 193–204; Davies 1984; Van der Spek 1981; 1986; 1993; 1998a; 1998b; Green 1990: 362–81; Schuler 1998; Shipley 2000: 86–107, 272–86; Archibald et al. 2001; 2005; Aperghis 2004.

[8] Saller 2002; Van Driel 2002: vol. 1, 318, 327.

successful harvests, were vulnerable to crop failures. I therefore treat each region separately.

(a.1) Babylonia

Thanks to its rich water supply, easily spread over vast flat alluviate plains, Babylonia was an agricultural paradise. Neo-Babylonian and Persian Babylonia saw returns of circa 15:1 at seeding rates of 133 liters per hectare, yielding 2,000 liters per hectare (see above, Chapter 11). These apply to Hellenistic Babylonia too. High outputs demanded good organization of irrigation, and Jacobsen has argued that political stability was also essential.[9] Productivity went up and down with political stability, creating growth (aggregate as well as per capita) whenever stable government was established.

Temples, palaces, and large landowners had driven the economy since the Bronze Age. The Hellenistic situation was not very different, although we cannot calculate the size of royal and temple domains. Private smallholders (or families) are also attested, owning tracts within cities' territories, and leasing temple properties. The kings favored the temples; they donated land to them, and allowed them to collect tithes.[10] On the other hand, the kings also drew income from temple property, including 50 percent of the harvest of the Shamash temple in Sippar (or Larsa) in an emergency in 309 BC.[11] In times of need they also took ("robbed") from the temple treasuries.[12]

The Achaemenid kings had created colonies of soldiers, who received land for military service and who paid taxes in peacetime.[13] The Seleucid kings also created military colonies and continued the system of "bow fiefs" in Babylonia.[14]

As well as food production, Babylonians bred cattle and sheep, with the temples owning large flocks of sheep.

If we accept Ester Boserup's argument that population growth stimulates agricultural advances (intensification; crop rotation; new products; improvement of irrigation), Greek immigration and the founding of Seleucia on the Tigris around 300 BC[15] must have triggered agricultural expansion. Food prices did not rise at Babylon, just sixty kilometers from Seleucia, suggesting that food supply increased. Archaeological research in the Diyala region northeast of Seleucia shows marked agricultural development (see below). Even if Seleucia reached Pliny the Elder's estimate (*HN* 6.122) of

[9] Jacobsen 1982; but cf. Powell 1985.

[10] Van der Spek 1986; Jursa 1998. [11] Van der Spek 1995: 238–41 = Text 9.

[12] Van der Spek 1994. [13] Stolper 1985; above, Chapter 11.

[14] Colonies: Cohen 1978. Fiefs: Van der Spek 1986: 104–8, in Uruk; 183–7, Text 1 (*UET* IV 43: 8), a document from January 317 BC mentioning the receipt of 12 shekels of silver by a lessor of one fifth of a tract of land "subject to service of the king" in an archive with leases of other bow fiefs from the late Achaemenid period. It may have been the payment of the taxes assessed at one mina (= 60 shekel = c. 120 drachms) on a complete bow fief.

[15] Cf. Invernizzi 1993.

600,000 inhabitants (which is hardly believable; with a surface area of 550 hectares, this would require 1,100 people per hectare), it could have been fed by the irrigated land of the Diyala region alone.[16]

It is hard to know whether there were technical inventions. Hellenistic writers reveal increasing interest in agricultural innovation, but it is less clear how new the Hellenistic agronomists' insights were (since their treatises are almost completely lost) or how widespread innovations and new crops were in Babylonia.[17] Hellenistic authors show little concern with Mesopotamian agriculture (apart from regular references to its high yields), and cuneiform tablets mainly concern prices and rations of agricultural products or sales and leases of (arable) land, so we have little information on technological change. However, even if there was no technological progress, Babylonian agriculture had for centuries been more advanced than Mediterranean techniques. Babylonian farmers did not waste seed by broadcast sowing, but used the seeding plough, which carefully deposited seeds in furrows cut at regular intervals.[18] When the seeding plough was introduced in Britain in the nineteenth century it produced an estimated 50 percent saving on wasted seed as compared to broadcast sowing by hand over a ploughed field.[19] The temples and palaces used teams of four oxen and iron ploughshares,[20] with gains in efficiency as compared to smallholders, who could not dispose of plough teams.

Other ways of raising (or restoring) production included extension of the canal system, improvement of drainage, reclaiming unused land, introducing new crops, intensification, and crop rotation. There are some indications that the kings exploited these possibilities. Alexander improved the canal system,[21] and archaeological surveys in the Diyala and Middle Euphrates regions indicate state-initiated schemes of urbanization and agricultural expansion.[22] Antiochus III issued a royal edict (*diagramma*) concerning the exploitation of date groves by temples.[23] That Antiochus and his predecessors were interested in income from temples in other areas too is clear from a Greek inscription from Pamukçu in Mysia (Asia Minor) about the appointment of Nikanor as "high-priest of the sanctuaries,"[24] who would "also be in charge of the sanctuaries, and that their revenues and the other matters should be administered by him, just as was done under our grandfather by Dion" (lines 38–41). It is rarely clear how far economic, military, or fiscal motives were behind these steps.[25]

[16] Van der Spek forthcoming, a.
[17] Cf. Hodges 1970; Lloyd 1973; 1984; Thompson 1984; Greene 2000.
[18] Jacobsen 1982: 57–67; Potts 1997: 80–2.
[19] Potts 1997: 80, quoting Halstead 1990: 87.
[20] Cocquerillat 1968: 28, 38–45; Stolper 1985: 129; Van Driel 2002: 166–70, 208.
[21] Arr. *Anab*. 7.21.6; Boiy and Verhoeven 1998; but cf. Briant 1986a.
[22] Adams 1981: 179.
[23] Van der Spek 2000b: 31–2.
[24] *archiereus ton hieron*, *SEG* 37, 1010; cf. Ma 1999: 288–92, line 31.
[25] Van der Spek 2000b; 2005a.

Finally, new crops. Barley and dates formed the core of the Babylonian diet. Cuneiform documents give no information on new crops. The astronomical diaries stick to their traditional five crops plus wool, but a degree of conservatism (the diaries' goal was astrological research) may be expected. Many products known from Achaemenid documents (e.g., onions, garlic, flax) do not feature in the list.[26] The classical sources also mention other crops: Strabo (15.3.11) speaks of wine and rice, probably in the lowlands around Susa, and Diodorus' account of Eumenes' march through Babylonia and Susiana confirms this (19.13.6). Seleucid kings were reportedly interested in acclimatizing European and Indian plants.[27]

(a.2) Asia Minor and Syria

Conditions were quite different in Asia Minor and Syria. In Syria and northern Mesopotamia irrigation agriculture is seldom possible and rainfall only barely adequate. It rarely exceeded 250 millimeters per year. Central Anatolia received up to 500 millimeters, but winter temperatures could be very low, going down to −20 °C. Many areas are mountainous and unsuited to cereals.[28] In Syria, the boundary between arable land and steppe was fluid. The best area was the coast west of the Lebanon Mountains, but in many regions even a slight reduction in rainfall could be devastating for farmers. Overall, returns were much lower than in the river valleys of Egypt and Mesopotamia, ranging between 4:1 and 8:1, as elsewhere around the Mediterranean. As in Greece and the Aegean islands, people had to reckon with regular harvest failures, making storage and trade important.[29]

Agricultural land was managed differently in each region. Cities lived in the first place off their own city territory (*chora politike*), tilled by citizen landowners. The city's land could be extensive, with villages on it. Not all inhabitants of these cities and villages were citizens. Other people of lower status are attested, with titles such as *paroikoi*, "co-inhabitants," and *pedioi*, "inhabitants of the plain." Their position is unclear, but some may have been indigenous people tilling the land for citizen-landlords.[30] Most of these plots must have been small, designed for subsistence agriculture. These city peasants did not have much margin for coping with bad harvests, and grain shortages were a main concern for city authorities. A magistrate (*agoranomos*, "market official") was entrusted with the grain trade, and rich citizens set up funds to overcome shortages. Many inscriptions honor citizens for selling cheap grain in lean years.[31]

[26] Cf. the lease contract BE IX 29 from the Murashu archive, dated to 433 BC, concerning barley, wheat, emmer, chickpeas, lentils, millet, sesame, mustard/cuscuta, garlic, and shallots (translation: Augapfel 1917: 70).

[27] Rostovtzeff 1953: 164–6.

[28] Mitchell 1993: 143–7; Shipley 2000: 272–81. [29] Wilkinson 2003.

[30] Blavatskaja et al. 1972; Briant 1973; 1978; 1982; Papazoglou 1997; Schuler 1998: 195–215.

[31] Shipley 2000: 98.

In the territories outside the cities (*chora*, "the land," in Greek texts) the situation was more complex. In central Anatolia there were several temple states, where the land belonged to the gods and where servile populations tilled the land as *hierodouloi*, "holy slaves." There were also royal domains (*chora basilike*, "royal land"), where serf-like peasants, here called *laoi basilikoi*, "king's people," also tilled the land. The revenues (*prosodoi*), mainly rents paid by the farmers, belonged to the king. We also find here large estates of royal favorites (*doreai*, "gifts"). The king gave this land in precarious possession as land for service, and could take it back.[32] In two cases (Antiochus I's land grant to Aristodicides of Assus and Antiochus II's sale of land to his divorced wife Laodice), the grantees had the right to assign their grants to a city, which apparently was considered as a favor to the city in question as well.[33] The grantee could consider his estate as private property, whatever that meant in an autocratic state. The Aristodicides inscription explicitly says that the estate was formerly "royal land"; otherwise it had to be taken from "the land," of which the king was technically not the owner, but which in a political sense belonged to him as king. He could exact tribute and it was therefore "tributary land" (*chora phorologoumene*). This land was dotted with villages, which had some local autonomy and were obliged to pay fixed tribute.[34]

The Seleucids founded military colonies for veterans. We rarely know whether these were established on royal domains, tributary land, or land expropriated from great or small landowners. Unoccupied land was preferred, so its reclamation was a collateral advantage.[35] Since these lands were more thinly populated than city lands, they could produce surpluses, which could be sold to cities or used for the army.

A letter from Antigonus I to the people of Teos clarifies the relationship between "tributary land" and the cities. Antigonus forbade the Teians from setting up a fund to buy grain, "for the tributary [land] (*chora phorologoumene*) is near [and if a need] of grain arose, we think there could easily be brought from [there whatever] one wished."[36] The text also shows that despite Antigonus' slogans about "freedom and autonomy," he had no scruples about moving the entire population of Lebedos to Teos and interfering in local affairs like food provisioning. Antigonus clearly intended to make the new city dependent on a royal food supply and to create an outlet for grain from the neighboring land, thereby generating taxes in money.[37]

[32] The classic text is the Mnesimachus Inscription: *Sardis* VII, no. 1. *Editio princeps*: Buckler 1932: no. 1. For discussions see *inter alia* Briant 1978: 94, 120; Atkinson 1972; Kreissig 1978: 41–5, with Van der Spek 1981: 213–17; Debord 1982: 244–51; Descat 1985; Dignas 2002: 70–3; 279–87; Aperghis 2004: 137–9, 145, 278–9, 320–3.

[33] Two cases: Welles 1934: 10–12, 18–20. On land grants see Bringmann and von Steuben 1995.

[34] *phoros*: Bikerman 1938: 106–32. [35] Cf. Joseph. *AJ* 12.138–53; Cohen 1978; Billows 1995.

[36] Welles 1934: 3, § 10, 83–5. [37] Briant 1994: 75.

These conditions differ little from those under the Persian monarchy. Population probably grew (see below), which will have affected agricultural output (Boserup). New land may have been reclaimed, and the foundation of cities suggests more surplus. But the average inhabitant's standard of living may not have improved. The *laoi* and *paroikoi* were perhaps exploited more heavily than before; numerous wars were fought in Anatolia and Syria, and royal and tributary land given to the kings' favorites could have been pressed harder, because the king often continued to tax these estates, even as the new owner exacted his share (see below).[38]

(b) *Money and prices*

In smoothly functioning markets, the relationship between supply and demand sets price levels. Prices were expressed in money terms in the Seleucid empire. Mesopotamians had expressed products' exchange value in weights of silver since the third millennium BC, and the shekel (8.33 grams) remained the key measure.[39] However, the economy was not fully monetized. Barter (the exchange value could be measured in shekels without actually using silver) and payments and taxes in kind were common. Salaries were paid as rations of food and cloth.[40] There are other complicating factors. Alongside silver, gold and (in Hellenistic times) bronze served as money. Even grain functioned as money, and was very useful as small change. Further, all these substances were commodities as well as being "money." Silver had its own price, expressed in other commodities, such as grain. Scarcity of silver drove up the metal's value, while moderate prices of grain and abundant silver had the opposite effect: inflation.[41]

Alexander the Great coined about 5,000 tons of silver and gold (close to the weight of the gold reserve in Fort Knox) from the Persian treasuries.[42] Many historians assume that this created a monetized economy, and that the introduction of the Attic standard fostered trade.[43]

But this theory has problems. First, Alexander did not create a monetized economy. Money in the form of silver had existed for millennia in the Near East. Weight and quality were carefully controlled, and the fact that money was weighed rather than counted facilitated exchange. The introduction of coinage was hardly advantageous: the abundance of currencies increased transaction costs. After Alexander the Attic standard prevailed in

[38] Briant 1978. On royal land, see Van der Spek 1986; 1993; 1995; 1998b; Schuler 1998; Mileta 2002; differently, Capdetrey 2005.

[39] Powell 1996. [40] Van de Mieroop 1997: ch. 7.

[41] Powell 1996; Müller 1996. Vargyas 2001: 8–51 argues that the value of silver was more or less stable.

[42] Cf. De Callataÿ 1989.

[43] Rostovtzeff 1953: 129–35; Heichelheim 1970: 10; Golenko 1993; Le Rider 2003.

the Seleucid empire, but was not adopted everywhere. The Ptolemies used a lighter drachma and forbade other coinages within their empire, much to the detriment of trade. Further, most coins were tetradrachmas, weighing 17.2 grams, which was far too heavy for use in daily trade. Coins could be subdivided by cutting,[44] but this was not a common practice. Babylonian shekels could be divided into units as small as 1/98th of a shekel, and so coins were still weighed in Babylonia. Cuneiform transactions continued to reckon in shekels, even when they stipulated that the shekels should be paid in staters. The main innovation was the introduction of bronze coinage, new in that it was fiduciary money. It was useful for small exchange, but plays no part in official documents. Silver remained the standard in the Greek and Babylonian worlds, but functioned differently in Egypt (cf. below, Chapter 16).

Monetization did increase in Hellenistic times, but the process had begun in the tax reforms of Darius I (521–486 BC), who apparently wanted taxes paid in silver. This meant that farmers had to sell products to get silver (cf. above, Chapter 11). The Seleucids continued this policy, and cuneiform texts suggest that payment in silver became increasingly important.[45]

Second, bringing large amounts of bullion into circulation may not contribute to production and growth in itself. If production does not grow to keep pace with the increase in money in circulation, inflation results. We see just this in Babylonia in and after the 320s BC. Prices of the main commodities rise so sharply that it must have had a devastating effect on the economy.[46] However, after c. 300 BC, prices returned to lower levels, and there was no long-term inflation until c. 150 BC. The comparatively peaceful period Babylonia experienced with consequent good agricultural management and scarcity of silver may both have played a part.[47]

The Seleucid kings may not have had conscious monetary policies. They issued coinage primarily to facilitate payments of soldiers and other royal expenses, and Aperghis argues that the Seleucid kings pursued a deliberate policy of issuing just enough coinage to cover tax revenues and restore loss and wear.[48] Shortage of silver, rather than monetary policy, may explain why not too much silver came into circulation in the first place. Silver remained a scarce product, found in southeast Asia Minor and probably Bactria, but not in Mesopotamia. It could be earned by selling exports, and the Phoenician seaports (in Ptolemaic hands in the third century) and the new Greek ports Laodicea and Seleucia-on-the-Sea will have played a role.

[44] Cf. Reade 1986. [45] Van der Spek 1998a; 2005a.

[46] In addition to the devastations Alexander and his successors wrought with their armies: see Grainger 1999b; Van der Spek 2000a; Temin 2002.

[47] On the Babylonian prices see Slotsky 1997; Vargyas 1997; 2001; but cf. Van der Spek and Mandemakers 2003; Temin 2002.

[48] De Callataÿ 2000b. Aperghis 2001: 93–6, 2004: ch. 11.

Success in war could bring in bullion, such as the plunder that Antiochus IV brought back from Egypt in 168.[49] On the other hand, money also flowed out of the country. Greek mercenary soldiers brought money home to Greece, and Antiochus IV and other kings spent heavily on buildings in the old Greek cities. Antiochus III had to pay 15,000 talents of silver to the Romans in 188 BC (Polyb. 21.42.19).[50] But despite the scarcity of silver, the Seleucid kings maintained high standards in their coinage until the mid-second century BC.[51] All this prevented inflation.[52]

As noted above, bronze coinage circulated as fiduciary money.[53] The Babylonian Astronomical diary (AD 1, p. 345, No. -273 B 'Rev. 33' and Upper edge 2) comments for the year 38 SE (= 274/3 BC) that "purchases in Babylon and the other cities were made with Greek bronze coins," apparently because the satrap had withdrawn so much silver for Antiochus' campaign against Egypt in the first Syrian war. This seemed strange to the Babylonians; but they were not unused to paper money, or better clay money. *CT* 49, 173, a record of deposit from circa 274 BC is a fine example.[54] It concerns a deposit of "12 shekels of refined silver, elephant staters in fine condition, wrapped up and under seal" and stipulates: "Any authorized person who holds the document may collect that 12 shekels of silver, that is, that deposit, according to the royal decree (*data* – Iranian word!)." In two other examples from the Arsacid period (125 BC and 93 BC) the word *tahsistu* seems to mean something like "security note" or "bank note."[55] It is hard to assess the phenomenon's economic significance.

Hopkins' taxes and trade model may make sense of the Seleucid empire as well as the Roman.[56] Near Eastern empires extracted large sums of money as taxes, tribute, and plunder, and spent it mainly in the capitals, but also on armies garrisoned around their territories. Subsistence farmers had to sell part of their surplus on the market to get money to pay the taxes, furthering monetization. Kippenberg describes this process for the Achaemenid empire.[57] Some people suffered from it, like the small farmers who sold their children to pay their taxes in Judah;[58] others set up companies to convert taxes in kind into silver for a price, like the Murashu firm in Nippur.[59] This process must have continued under the Seleucids.

[49] Polyb. 31.6; cf. Aperghis 2004: 8.8.

[50] Le Rider 1992; 1993; 2001 argues that indemnities were not a major problem for the Seleucid treasury.

[51] Mørkholm et al. 1991; Houghton and Lorber 2002.

[52] De Callataÿ 2004 argues that the Seleucids had enough silver, but doubts whether there was a deliberate Seleucid policy concerning the scale of silver coinage issues. Cf. Houghton 2005.

[53] Houghton and Lorber 2002: vol. II, 1–36. [54] Edited and discussed by Stolper 1993: 25–8, 60.

[55] Van der Spek 1998a: texts 1 and 32. [56] Hopkins 1980; 2002. [57] Kippenberg 1978: 49–53.

[58] Nehemiah 5:4; cf. Babylonia in 274 BC: AD 1 p. 347, No. -273 B Upper edge 1.

[59] Stolper 1985; Van Driel 2002: 314–22, ch. 12; above, Chapter 11.

From the prices as recorded in the Babylonian Astronomical Diaries (Fig. 15.1(a)) we may deduce some conclusions about agricultural development. I suggest that low prices indicate increasing agricultural output. Low prices might be a sign of stagnation, but that fits better a modern expanding economy. In a relatively stable economy low food prices indicate a sufficient supply of food, contributing to people's well-being. The effect of low prices is reduced only if wages are low as well.

Warfare at home was disastrous. This can be inferred from the development of prices. I referred above to the extremely high prices between about 325 and 300 BC while the Wars of the Successors ravaged Babylonia. Prices were again high in 274, when Antiochus I raised an army for the First Syrian War, and were high in 257 and 256 (Second Syrian War). Prices were generally very low under Antiochus III and IV, but rose after the latter's death in 164, when two contenders fought over the regency of the minor Antiochus V. These years also saw local strife between the recently established Greek colony in Babylon and the Babylonians.[60] The Parthian period ushered in constant warfare, causing high grain prices. All these wars must have harmed the upkeep of the canals, regular sowing and harvesting, storage, etc. I conclude that peace at home brought low prices, and war brought high prices.[61]

While we may conclude that the Seleucid period saw relatively low prices, it is less clear whether the average Babylonian could buy food and be dressed and housed properly, because we have very little information on incomes. In 321 BC wages for simple work amounted to 4 shekels (8 drachmas) a month, and around 93 BC wages for simple work varied from 0.67 to 2 shekels (1 dr. 2 obols to 4 drachmas). If Seleucid wages were similar (say 2 shekels per month), the lower classes could be fed in 60 percent of the period (294–141 BC) but probably more, since we may assume that most people had additional income from gardens, food rations, and extra jobs. Famine occurred when the prices of barley reached 25 shekels (50 drachmas) per 1,000 liters.[62]

If Babylonia typically had high agricultural yields, we might imagine that these were exported to poorer regions, such as newly urbanized Syria. But this may not have been the case. Ships could be pulled against the current of the Euphrates up to Thapsacus and then overland to Antioch, but that was probably too difficult for bulk goods. The reverse trade route, from Phoenicia to Babylonia, is better documented.[63] Overland transportation was practically impossible. The absence of evidence on grain shipments

[60] Van der Spek 2005b. [61] Van der Spek 2000a.
[62] 40 shekels (80 drachmas) per ton; Van der Spek 2006: 295.
[63] Hdt. 1.194; Diod. Sic. 14.81.4; Arr. *Anab*. 7.20.4; Oppenheim 1967; Briant 2002: 377–83.

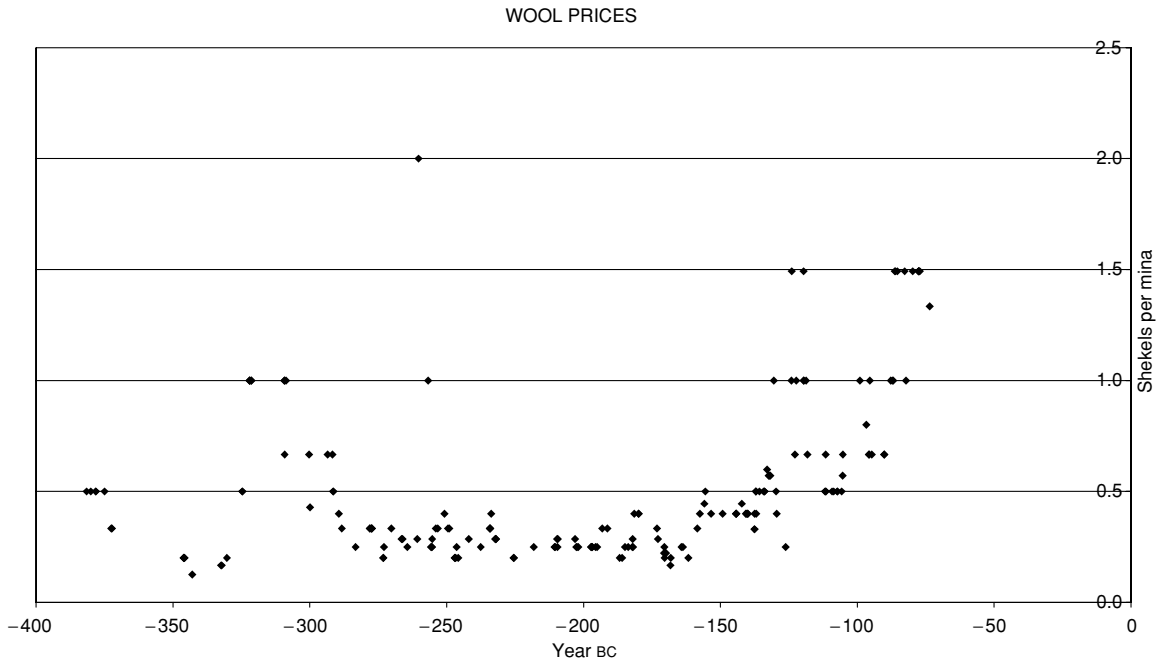


Figure 15.1(a) Wool prices in Babylon in shekels (= 8.33 gr. silver = c. 2 drachmas) per mina (= 500 gr.)
Collection of data: R. J. van der Spek; graph: G. G. Aperghis

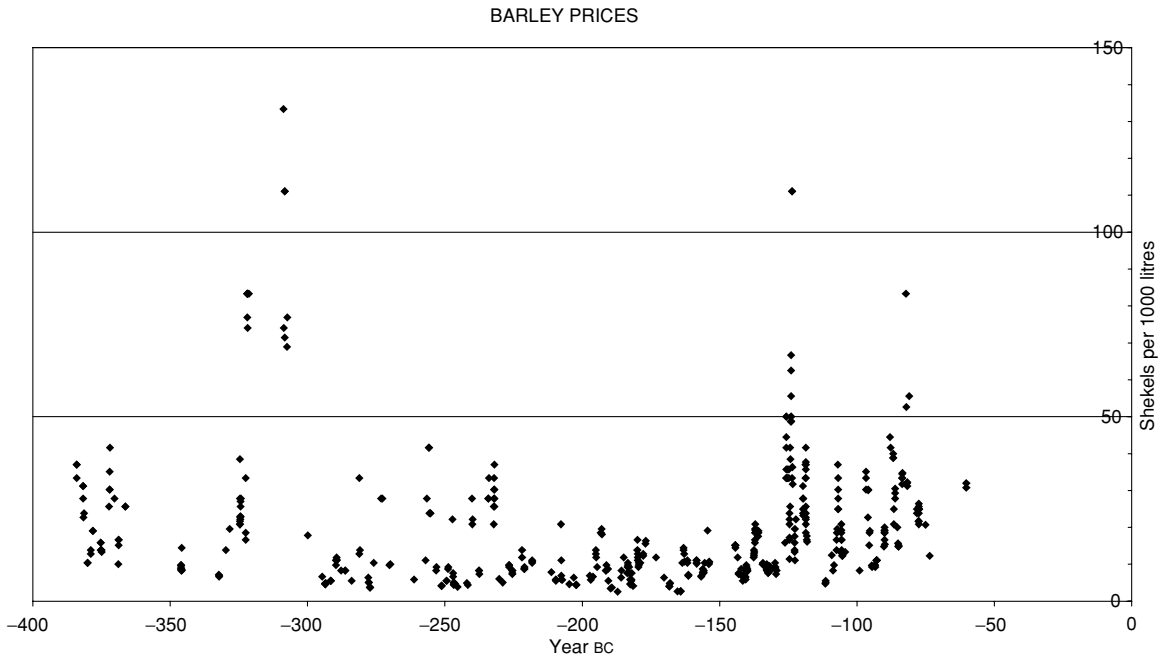


Figure 15.1(b) Barley prices in Babylon in shekels of silver (= 8.33 gr. = c. 2 drachmas) per 1000 liters
Collection of data: R. J. van der Spek; graph: G. G. Aperghis

in this direction may therefore not be the result of accidents of survival. The volatility of the Babylonian food prices points the same way. In an integrated food market trade tends to smooth out fluctuations in prices.[64] In Babylonia, however, prices sometimes fell close to zero. In 188 and 166 BC for example, the price of a ton of grain was only about 4.2 shekels (8.5 drachmas). In normal times the price was still comparatively low (circa 13 shekels [26 drachmas]), but prices of 40 shekels (80 drachmas) and higher are attested and caused famine in Babylonia.[65]

Some agricultural products, such as woolen and flax textiles, may have been exported. Borsippa was a center of flax production (Strabo 16.1.7). In the second half of the first millennium Babylonia apparently greatly increased its linen production.[66] Woolen textiles were exported in Old-Assyrian times[67] and this may have been the case in the Seleucid period. The prices of wool may give a clue here. While prices of food fluctuate heavily, the price of wool is relatively stable, but shows some long-term fluctuations (see Fig. 15.1(a)). The stability of wool prices relative to barley prices must be attributed largely to the price elasticity of demand for wool, market integration may have played a role as well. That would explain why after the Parthian conquest of Babylonia wool prices became more volatile. Trade routes to the west were now hindered by a new border.

III INDUSTRIAL PRODUCTION AND CONSUMPTION

(a) *Organization of production*

The Seleucid empire was probably not very different from other ancient empires. Industrial production was linked to agriculture, and many items (e.g., textiles) were produced at home. In cities there were companies and craft organizations (of unknown size). Some regions developed specialties: Phoenicia was famous for purple dyes, glass (glass blowing was invented in the Levant in this period), and ships, and Babylonia for woolen and linen textiles, salt, and bitumen. Babylonia was agriculturally rich, but poor in other natural resources. There was little timber. The date palm was the most important tree, but was unsuitable as timber. Strong wood had to be imported, like cedar from the Lebanon. There were no metals (gold, iron, copper, tin), and very few stone quarries.[68]

Minting was a state industry, and mints existed all over the empire. Pottery was initially imported from the old Greek world, but was soon replaced by local production.[69]

[64] Persson 1999: 91–3. [65] Van der Spek 2006: 295. [66] Oppenheim 1967: 251.
[67] Veenhof 1972: 98–103; Kuhrt 1998. [68] Cf. Potts 1997: 91–121.
[69] Davies 1984: 275; Aperghis 2004: ch. 5.4–5.5.

(b) *Connecting supply and demand*

The ideal of autarky had not died out in the Hellenistic period. Large workshops in the temples produced in the first place for their own personnel. Some products, especially luxury goods and basic raw materials that were not available locally, had to be imported, and the regions that produced special products exported them along caravan routes. Trade routes connected India and the Mediterranean, though they are better documented for Parthian and Roman times (Map 15.1). Some cities emerged and flourished on these routes, like Palmyra in the Syrian desert. Peasants brought their products to neighboring villages, cities, and periodic markets, which sometimes received royal tax exemptions.

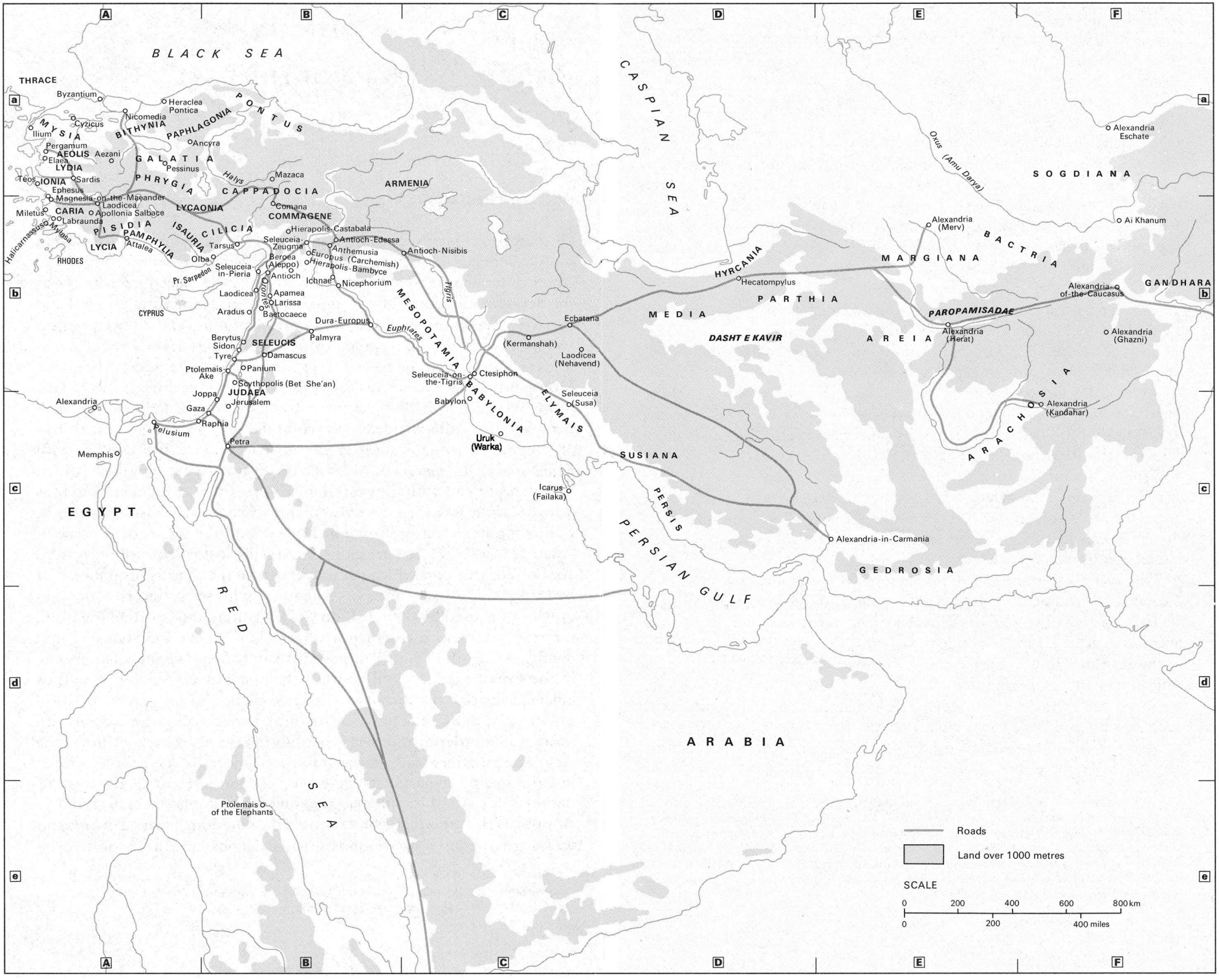
As noted above, Babylonia was poor in non-agricultural products, but some industrial products may have been exported. I have already mentioned flax and wool; other exports may have included salt and bitumen. Documents from Uruk and Seleucia record the salt tax.[70]

However, the Seleucid empire was by no means a perfect market economy. Most products were consumed by the primary producers, be they private individuals or great organizations. State intervention played a major role, providing silver and some other commodities. The kings brought in their taxes, gifts, and spoils of war. Seleucus I founded Seleucia-on-the-Tigris, Antiochus I rebuilt temples in Babylon and Borsippa, and the temple of Anu was rebuilt in Uruk in 244 BC.[71]

It is hard to say whether trade within Asia increased in Hellenistic times. New cities must have encouraged it, but safety, transport, law, and political stability hardly improved. Trade in bulk goods overseas was easier, but the extent is debated (see below, Chapter 17). The new *lingua franca*, *koine* Greek, will have helped trade with the Aegean.

We can perhaps trace internal trade through the circulation of money. Preliminary studies of coin hoards show that coins struck in the several mints of the Seleucid empire were found all over the empire. Coins from Babylon and Seleucia-on-the-Tigris had particularly wide distributions in Asia Minor and Syria. On the other hand, only a few coins from other mints found their way to Babylonia.[72] These contradictory data need further research. Another approach to trade routes is to ask *where* coin hoards were found. Frédérique Duyrat's inventory (Map 15.2)[73] reveals an interesting distribution, which must to some extent reflect trade routes. However, we must remember that the initial diffusion of coins was to mercenary troops, so distribution patterns reflect the routes of armies as well as trade.

[70] Cf. Rostovtzeff 1932a: 81; McDowell 1935: 180–4; Aperghis 2004: 154–6.
[71] Falkenstein 1941; Finkbeiner 1987; Kose 1998.
[72] Houghton and Lorber 2002: 73–131; Van der Spek 2005a. [73] Cf. Duyrat 2005.



Map 15.1 The Seleucid empire
Source: Walbank et al. 1984: 176–7

IV URBANIZATION AND POPULATION

Urbanization perhaps correlates positively with economic development: towns require trade, provide cheap labor, foster economic rationality, and create a forum for cultural and intellectual change that aids institutional and technological innovation. Was this true in the Seleucid empire?

Seleucus took over an empire with densely urbanized regions. Southern Mesopotamia had very ancient cities: Babylon, Borsippa, Cuthah, Kish, Sippar, Nippur, Ur, Uruk, Larsa, Udannu, and Marad are all mentioned in Hellenistic cuneiform texts. Variations in excavation mean that we cannot tell how densely some of these cities were populated in Hellenistic times. Some certainly flourished; Nippur, covering about 84 hectares, had denser settlement than in Achaemenid times. The temple of Enlil still functioned in the 150s BC.[74] Uruk has produced hundreds of tablets, and two-thirds of the walled area (300 hectares) was inhabited.[75] In Iran, Susa and Ecbatana (Hamadan) survived Alexander; other cities of note are Bactra and Marakanda (Samarkand).[76] The Syro-Palestinian coast had many ports, but with the exception of Arados, these were long in Ptolemaic hands. Artaxerxes III destroyed Sidon in 345, and Alexander did the same for Tyre in 332.[77] Western Asia Minor had long been urbanized, but this intensified in Hellenistic and Roman times. New cities were founded, and older cities like Miletus, Ephesus, and Sardis grew.[78]

Alexander's and the Seleucids' urbanization policies are well known. Many Macedonians and Greeks emigrated to the east; new cities were founded, often on more or less vacant territories. This was especially true for northern Syria, "Seleucis," where four large cities were founded: Seleucia-on-the-Sea (Samandağı), Laodicea-on-the-Sea (Al Ladhiqiyah), Antioch-on-the-Orontes (Antakya) and Apamea-on-the-Orontes.[79] Seleucia-on-the-Sea, near the mouth of the river Orontes, was particularly important. Despite the roughness of the coast, Seleucus developed Seleucia as a port, because the Phoenician cities were in Ptolemaic hands after 312.[80] Seleucia became a major capital of the empire, and Seleucus I was buried there. Unfortunately for the Seleucids the Ptolemies held the city from 246 through 219.

Many other cities were founded. The most important was Seleucia-on-the-Tigris (Tell 'Umar, destroyed by the Romans in AD 165), covering 550 hectares, with Greek, Macedonian, Babylonian, Syrian, and Jewish inhabitants.[81] It was not the only city: Seleucia-on-the-Euphrates

[74] Gibson 1992; Van der Spek 1992: 250–60.

[75] Finkbeiner 1982; 1987; 1991. For overviews of all the Babylonian evidence, see Oelsner 1986; Boiy 2004.

[76] Le Rider 1965; Sherwin-White and Kuhrt 1993: chs. 3–4. [77] Grainger 1991: 23–31, 34–40.

[78] Tscherikower 1927; Gauthier 1985; Hanfmann 1983; Mitchell 1993.

[79] Cf. Millar 1987; Grainger 1990. [80] Seyrig 1970. [81] Invernizzi 1993.

Table 15.1 *Changes in certain key areas in the study regions**

Region	Level of urbanization?	Signs of colonization?	Population	Agricultural intensification
Greece	Unchanged, some synoecism	–	Down in LHL	Down in LHL
Macedonia	Up	–	Up?	Up?
Crete	Unchanged, some synoecism	–	Variable	Variable
Cyprus	Unchanged, destructions/ foundations	Yes?	Variable	Variable
Asia Minor/Turkey	Up, synoecisms	–	Up?	Up?
Syria	Up	–	Up?	Up?
Palestine/Israel	Up	–	Variable	Variable
Jordan	–	–	Unchanged	Unchanged
Arab-Persian Gulf	Unchanged	Yes?	Unchanged?	Up?
Mesopotamia/Iraq	Up	Yes?	Up	Up
Susiana/Iran	Unchanged	Yes?	Up	Up
Bactria/Afghanistan	Up	Yes?	Up	Up

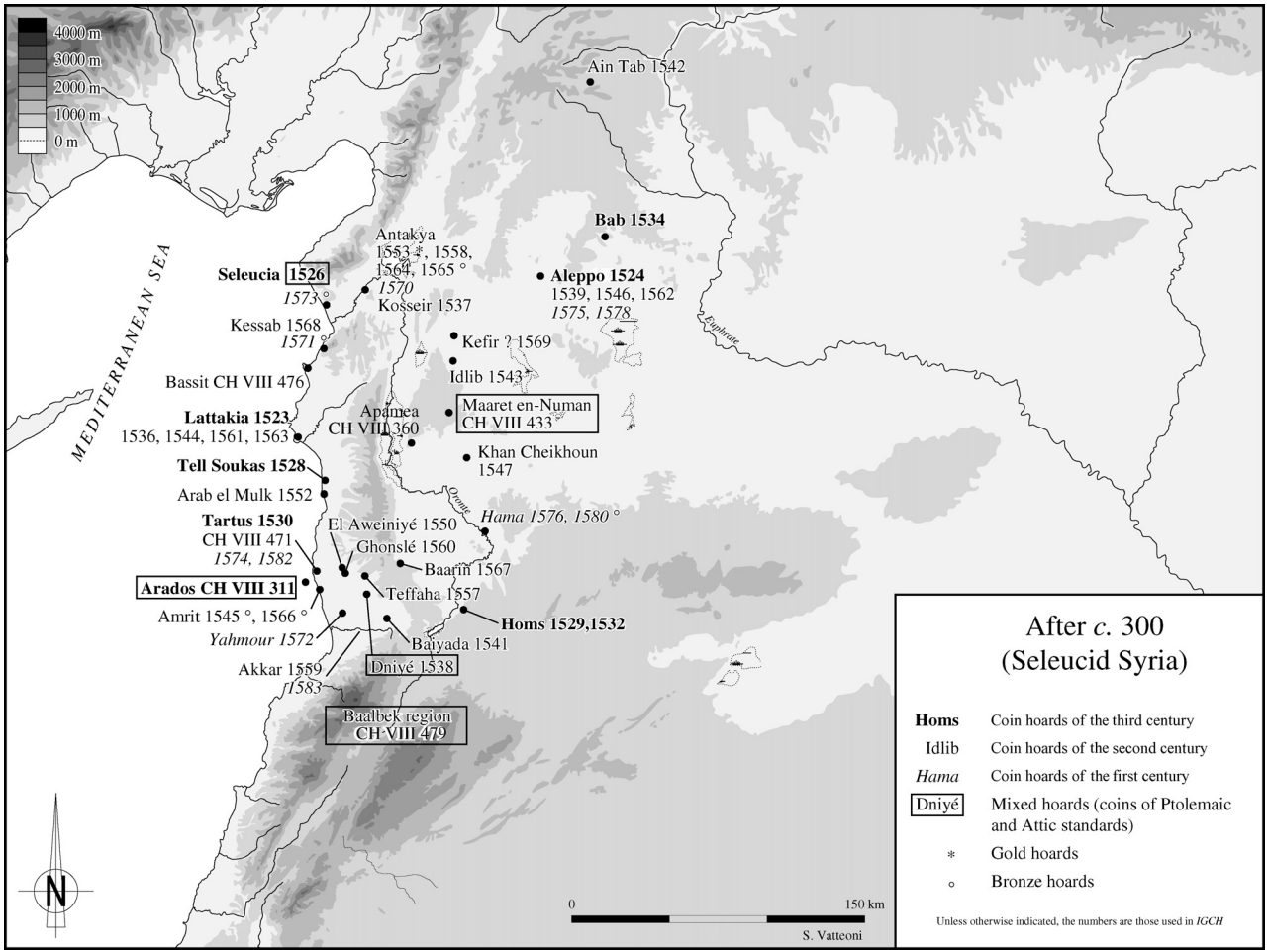
*Adapted from Alcock 1994: 187.

(Zeugma), Seleucia-on-the-Red-Sea, and others were created. Ai Khanoum in Afghanistan is a case in point. It was a large city with a palace, far outshining that at Vergina in Macedonia. The extension of its irrigation system indicates growing population and heavier exploitation of the land.[82] Other noteworthy foundations include the island of Failaka in the Persian Gulf, and Doura (Semitic name) or Europos (Macedonian name) on the Euphrates, founded as a military colony. Evidence for Hellenistic activity in the Persian Gulf and Arabia is growing.[83]

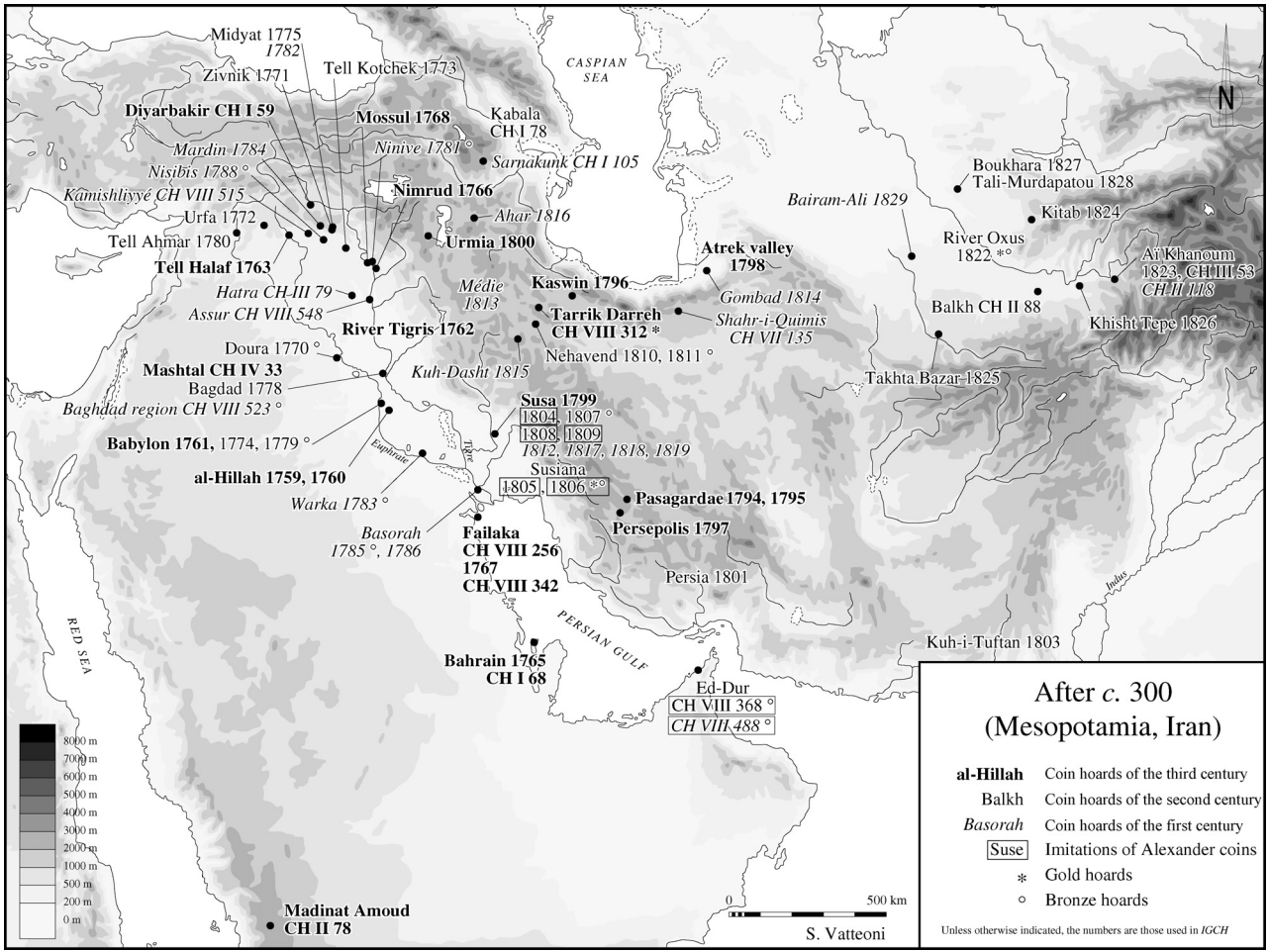
Greeks also entered indigenous cities and gave them Macedonian names. Susa (Seleucia-on-the-Eulaeus), Aleppo (Beroea), and Hamath (Epiphaneia) are cases in point. Greeks and indigenous inhabitants often lived in segregation.[84]

If this picture of urbanization is correct, it must have stimulated land reclamation and agricultural intensification. Archaeological surveys may illustrate this (Table 15.1).[85] The Diyala region and the central Euphrates floodplain (northeast of Nippur and Uruk) show an impressive increase in numbers of settlements and canals, probably reflecting increasing population and state intervention.[86] The largest *ziqqurat* (temple tower) ever built in Mesopotamia was not Nebuchadnezzar's "tower of Babel" but one built by Anu-uballit, whose second name was Nikarchos, in 244 BC. The ancient city of Nippur grew substantially.[87] New trade opportunities were created,

[82] Sherwin-White and Kuhrt 1993: 70, 111–12.
[83] Roueché and Sherwin-White 1985; Salles 1987; Callot 1989; Potts 1990.
[84] Van der Spek 1986: 50; 2005b.
[85] Alcock 1994; Wilkinson 2000; 2003.
[86] Adams 1965; 1981; Adams and Nissen 1972; Kose 1998.
[87] Downey 1988: 18 (*ziqqurat*); Gibson 1992 (Nippur).



Map 15.2 Main coin hoards of the Hellenistic period (copyright Frédérique Duyrat)



Map 15.2 (*cont.*)

especially in Seleucia-on-the-Tigris, favorably located on the confluence of the Tigris and the Royal Canal between the Euphrates and the Tigris, and at Seleucia-on-the-Sea. Mesopotamia's urban center of gravity shifted toward the Tigris, and the Seleucia area has remained the core of Iraq's urbanization into modern times.

Aperghis has estimated that the population of the Seleucid empire peaked around 14–18 million people c. 280 BC (at the death of Seleucus I) and c. 190 BC (just before Antiochus III's defeat by the Romans). He suggests 4–6 million people in Seleucid Mesopotamia including Susiana.[88] This may be too high. Iraq had 7 million inhabitants in 1960, although the large desert in today's southern Iraq was irrigated in Hellenistic times. Scheidel (above, Chapter 3) offers lower estimates.

The size of temple buildings and the number of their personnel may give a clue to city sizes. The cuneiform administrative texts document personnel in Babylon.[89] A ration list from 312/11 BC lists fifty lamentation priests, adding that this was only half of their number (*CT* 44.84), and three ration lists preserve the names of 34 millers.[90]

As late as 93 BC a scribe of the millers is recorded, who receives money to buy 540 liters of barley, to be used in one month, i.e. 18 liters a day.[91] In addition, the millers receive 2.5 shekels (c. 5 drachmas) as monthly wages. The fact that a scribe was needed to administer the millers implies that there was a large number of millers; but the amounts are small, suggesting to the contrary that few millers were left in temple service. The solution may be that these expenses, made from the offertory box of a temple, were only made for daily offerings to the gods (18 liters per day) and not for feeding the temple personnel, and that the wages were only paid for this particular job.

V STOCK OF KNOWLEDGE

Historians often suggest that technological progress was limited in antiquity because Greek intellectual efforts tended toward philosophical issues, not menial, "banausic" technical applications.[92] Babylonian scientific attitudes differed from Greeks', showing more interest in solving daily problems, such as measuring land, than in formulating abstract theories. Babylonian mathematics was a practical pursuit, which helped the Babylonians with geometry, irrigation, architecture, and seeding devices.[93]

However, Babylonian science also had its impractical side. Scholars put enormous efforts into divination. They raised astronomy to high levels,

[88] Aperghis 2004: 56–8. In an earlier study, Aperghis defended higher estimates (2001: 76–7).
[89] Boiy 2004: 240–62. [90] Boiy 2004: 249–50, 267–9; Jursa 2002b.
[91] Van der Spek 1998a: no. 11: 7–9; 13: 8–11; 18: 5–8. [92] But cf. Greene 2000. [93] Powell 1984.

and were the Greeks' teachers, but used it only as the foundation for astrology. The astronomical diaries, which are so important for us as historical source, were a database for astrological research. A bewildering corpus of cuneiform texts consists of endless lists of omens. Alexander the Great was impressed by the astrologers' advice, and the "Chaldaeans," as these scholars were incorrectly called, earned a great reputation in the Greek and Roman world.[94]

VI INSTITUTIONS

The state is the most important institution. Deliberate economic policy hardly existed, but state activities had economic consequences. The kings' main goal was to accumulate wealth for the royal household and army. Taxation, plunder, and coinage were the main instruments. Land registers were kept in archives. Some kings actively furthered investment in land. State activities had unintended consequences for the economy. Unsuccessful warfare, the devastation it brought, and heavy spending outside the empire to buy prestige had negative effects, while the foundation of cities, building programs, building of roads, minting (both intended for soldiers), successful wars,[95] and the maintenance of justice had positive results.

The Seleucid kingdom had no constitution. Many legal systems coexisted: Greek institutions, varying from one city to another; Babylonian practices (which were very old and are well documented); Jewish law; etc.[96] Sometimes these systems coexisted within one city, as in Ptolemaic Egypt.[97] The diverse legal systems protected contracts and property rights with clauses about ownership, eviction, and penalties in case of default. The use of law was at the discretion of the contract partners and could be overruled only by royal legislation, as happened with royal taxes on salt and slaves circa 274 BC.[98] Royal decrees were the only unifying element in the Seleucid legal system.

Nor were city governments uniform. Since Alexander "democracy" was the norm in Greek cities, but differences prevailed. Some types of magistrates, councils, and assemblies were found in most places, such as royal overseers (*epistatai*). In some Greek cities Macedonian institutions are apparent, like the council of elders (*peliganes*) in Laodicea, Seleucia-on-the-Tigris, and the Greek colony within Babylon.[99] Non-Greek cities retained their ancestral institutions alongside Hellenizing influences. The high priest and Sanhedrin governed Jerusalem; the *shatammu* (chief temple administrator) and *kinishtu* (board of temple functionaries/prebendaries) ran Babylon, Nippur, and Uruk,[100] in Babylon since c. 170 juxtaposed to Greek

[94] Van der Spek 2003. [95] Cf. Austin 1986. [96] Geller and Maehler 1995.
[97] Goudriaan 1988. [98] Doty 1977: 308–35. [99] Van der Spek 2005b.
[100] Van der Spek 1987; 1992.

institutions; and a *dikastes*, which must be a Greek translation of Phoenician *shofet*, "judge," oversaw Sidon.[101] Greek cities were not particularly favored. They had to pay taxes and tolerate garrisons and overseers, just like non-Greek cities. They could even be deported or given as gifts. The word *polis*, "city," in spite of the usual assertions to the contrary, had no juridical implications.[102]

Other relevant institutions include banks, professional organizations, occasional common trade enterprises, and annual fairs, often combined with religious festivals (*panegyreis*). These fairs were attractive for cities, since they brought in visitors and merchants and allowed peasants to sell surpluses and buy necessities they could not produce themselves.[103]

The Babylonian temples are of special interest. They had elaborate workforces with far-reaching divisions of labor. Hellenistic documents record carpenters, smiths, jewelers, reed-weavers, leather workers, bleachers, weavers, potters, builders, millers, brewers, bakers, cooks, butchers, doorkeepers, cleaners, agricultural laborers, herders, fowlers, fishers, tablet scribes, parchment scribes, boatmen, boat-towers, orchard managers, hired laborers, workers.[104]

VII CONCLUSION

There was a great economic continuity from the Persian to the Seleucid empire. The palaces and temples retained their importance and economic impact in both Mesopotamia and Asia Minor. The agricultural labor force consisted of several types of dependent labor (royal slaves, temple slaves, people attached to estates). Private small and large landowners must have existed everywhere, in Greek and in oriental cities, but their numbers cannot be established. Markets existed everywhere, but those in Babylon differed from those in Sardis or Antioch-on-the-Orontes.

But there was also change. A new *lingua franca* conquered the world: Greek. While Aramaic had been the language of the international relations in the Near East before Alexander, Greek now became a language of traffic from Spain to Afghanistan. The Seleucid empire played an important role in this: Greek became (without obliterating indigenous languages) the language of trade and government in Asia. This diminished transaction costs.

Monetization accelerated in the Hellenistic period, but was not a uniquely Greek phenomenon. Silver had been used as a means of payment for millennia, but its role now increased. Persian royal policy encouraged this and the Seleucids continued, to be followed by the Romans. The use of coinage was an innovation, but not in all respects an improvement. Coinage

[101] Bikerman 1939. [102] Van der Spek 1987: 58. [103] De Ligt 1993a. [104] Boiy 2004: 241–62.

mattered more as a propaganda weapon than as an economic medium. It burdened the Near East with exchange rates, exchange offices, and moneychangers, which increased transaction costs for millennia to come. The Roman empire, which introduced Roman coinage into the entire Mediterranean, was indeed a step forward.

The foundation of many cities was another important development. Assyrian and Persian kings had founded new cities, but the scale of Hellenistic urbanization was unprecedented. This process probably triggered aggregate growth, and possibly per capita growth. Aggregate growth was crucially important for the kings, since it meant an increase in tax revenue. This in turn allowed heavier spending on wars that might bring more plunder and tribute.

Did the Hellenistic kings pursue economic policies aimed at increasing their subjects' prosperity? My answer must be no. Their policies were primarily directed toward their own wealth, prestige, and power. Everything else was secondary. These secondary objectives could include the prosperity of their subjects, if it would increase tax revenues and make them more loyal. Royal interest in irrigation, land reclamation, international trade, etc., all served the same purpose: the king's glory. Royal support for temples had its basis partly in religious scruples, but the temples were also sources of regular income and could be robbed in emergencies.[105] When economic growth occurred, the palaces captured much of it; but this also made possible the growth of great cities, like Seleucia-on-the-Tigris and Antioch-on-the-Orontes.

The Seleucid empire flourished for about 170 years, before succumbing to other imperial powers: the Parthians (in 141) and then the Romans (64 BC). Were these empires economically more successful? Possibly not. Military success or failure can decisively change world history. The Parthian conquest of Mesopotamia weakened the Seleucid empire, and the incompetence of Seleucid kings after Antiochus IV and Roman intrigues and military superiority did the rest. In Roman Asia developments that had begun in Seleucid times developed further, including Hellenization, urbanization, road building, monetization, and the unification of law and institutions, providing a firm basis for Greco-Roman empire for seven centuries to come. The Eastern Roman empire outlived the western empire, and the Seleucia region (Baghdad) was the center of an Arab empire under Harun al Rashid around 800. Western Europe only came to rival the empires of the East in early modern times.

[105] Van der Spek 1994.

CHAPTER 16

HELLENISTIC EGYPT

JOSEPH G. MANNING

I INTRODUCTION

I treat here the internal economic history of the Ptolemaic dynasty, the longest lived of the Hellenistic successor states, leaving aside the Ptolemaic empire (relevant to the first half of the period, or roughly from 330–168 BC), the role of military conquest (its expenditure and revenue), and international trade.[1] The following can in no way stand for a synthesis. Much important work is underway, or about to appear, on various aspects of the Ptolemaic economy, and there is still considerable unpublished material, particularly written in Demotic Egyptian, which bears on the understanding of the economy. The period was remarkable in the economic history of the Mediterranean, when Greek immigrants' institutions were integrated with ancient modes of production and social organization. Like the Seleucid dynasty, the Ptolemies established themselves on a Persian foundation and provided a new incentive structure for state service and private economic activity.[2] Egypt had been an important trade axis connecting the Mediterranean to the east and south for a millennium before the Ptolemies, but Greek immigration, the new city of Alexandria, and Greek institutions had profound effects.

Despite the relative abundance of documentation, much remains unclear or uncertain with respect to revenue and expenditure, and thus, there are severe limits to the quantification of performance.[3] Some subjective measures are possible. The building of new urban centers at Alexandria and Ptolemais, the founding of new villages (especially in the Fayyum), and the construction of new temples is one obvious measure of expansion. The most serious absence of evidence is our restricted knowledge of the Greek urban centers (Alexandria, Naucratis, Ptolemais).[4] The Fayyum is the best documented region in the third century BC, and is therefore the most thoroughly studied. Surviving documents suggest changes from the early (the

[1] Austin 1986. Launey 1949–50: 767ff. on military finance. Historical background in Hölbl 1994; Huß 2001. Préaux 1939; 1978 remain important.

[2] An excellent survey of Persian history in Briant 1996.

[3] Bagnall 1995.

[4] For Alexandria, Fraser 1972, esp. chapter 4, Préaux 1978: 496–511. Recent archaeological work in Alexandria: Tullio et al. 1995; Empereur 1998.

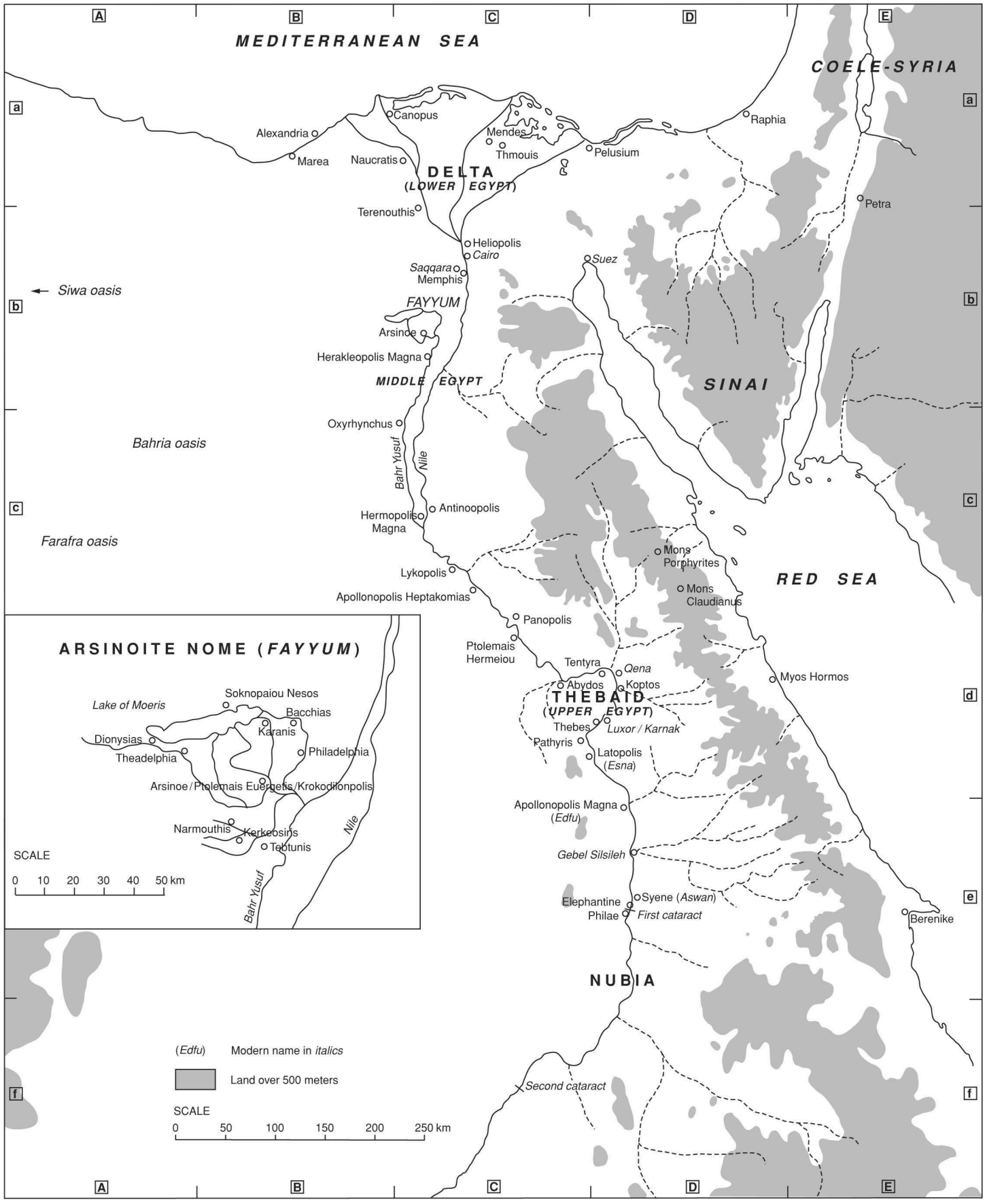
first three Ptolemies) to the later Ptolemaic system, as well as differences between the intent of state institutions and the rural realities of agricultural production and taxation. At the highest level of generality, the Ptolemaic economy shows many similarities with the Seleucid (see above, Chapter 15): continuity of basic institutions, notably temples, the importance of the settlement of soldiers on the land, immigration of Greeks, with concomitant growth in new land under production, new crops, new urban areas and new fiscal institutions, resulting in increased monetization of the economy.

Here we can begin to expand the "parameters" of the post-Finley debate.[5] The central question is this: to what extent did the Ptolemaic state effect economic development, and to what extent was development driven by demographic change? Ptolemaic state formation did not merely join two economic sectors, but attempted to integrate the ancient institutional structure within a new fiscal system.[6] The interaction between Egyptian and Greek social networks should be stressed, rather than the cultural isolation of the two. For if anything, herein lies the basis of Ptolemaic economic development and constraint. Change came in economic intensification – increased urbanization, increased long-distance trade, and increased monetization, and in structure – intensified agrarian production, royal banks, and royal granaries. Along with this change came rural unrest that, on one occasion (207–186 BC), led to the secession of most of the Thebaid from the Ptolemaic state.[7] The increased presence of Greeks and their role in the bureaucratic hierarchy, in military service and in other economic activity, altered the structure of social power in terms of language (the increased use of Greek in the villages) and in terms of access to rents (i.e., income).

I emphasize the structure of the Ptolemaic economic system and its institutions rather than economic performance because our poor knowledge of the preceding Persian period, the lack of a good time series of prices (a contrast with the Seleucid economy), our only approximate knowledge of the population (and no means of knowing the fourth century BC population), the absence of Alexandria and Ptolemais in the documentary record, and uncertainty about overall capture of revenue by the state leaves too many uncertainties. The following is clear: there was an increased urbanism (e.g., the important new Greek *poleis* of Alexandria and Ptolemais, and probably an expansion of the nome metropoleis), an increase in trade, and a concentration of wealth among the elite in new urban centers. The foundation and growth of urban centers, the development of roads out to the Red Sea, and the reclamation of new land in the Fayyum, are enough to suggest that the early Ptolemaic period experienced aggregate economic growth,

[5] Saller 2002. [6] On the two sectors, "ancient" and "oriental," see Finley 1999: 183.

[7] On the revolts of the period, see the summaries in McGing 1997; Manning 2003: 164–71, and the fuller treatment by Véïsse 2004. The causes of the revolts are unclear.



Map 16.1 Greco-Roman Egypt
Adapted from Walbank et al. 1984: 120–1

and the increased farming of wheat (at least in some areas) resulted in greater agricultural productivity. Per capita growth was probably restricted by old institutional structures, the limited application of new technology, and investment in human capital, although it does appear that there was an increase in literacy rates, at least in Greek (encouraged by taxation policy), and a consequent increase in the use of writing.[8] The last two centuries, however, were marked by dynastic disputes, rural uprisings and flight from the land that must have affected state revenues as well as agricultural productivity and overall economic performance.

II AGRICULTURE

(a) *Agricultural production*

As in other pre-modern economies, agricultural production was the basis of private wealth and the principal source of revenue for the state. Egypt was one of the richest and most densely populated states in the Mediterranean for most of its ancient history. Both of these features were a product of the Nile, its annual flood, and the resulting productivity of the soil.[9] The location of and distance between regional centers, linked together by communication along the river, the basin irrigation system, the annual agricultural cycle of flood, sowing, and harvesting, the maintenance of the irrigation canals and dykes – what Braudel called the "fixity of the geographical setting"[10] – was the single most important factor in ancient Egyptian socioeconomic and political history which the Ptolemies could hardly have changed. But Egypt, although more uniform in its geography than Seleucid Asia, was neither a fixed nor a uniform environment. There were three "eco-zones" in Egypt (the Delta, the Fayyum, the Nile valley) not including the western oases, and variability of water, the organization of agricultural production, and to some extent economic institutions varied across these three regions.[11]

The agricultural year was based on the annual rhythm of flooding, sowing and harvesting (Fig. 16.1). The flood began to be seen at Aswan, in June, and reached Memphis a month later. Throughout July, August, September, and into October, most fields were flooded and little agricultural work was possible.[12] When water from the flood had reached the desirable level, the dykes were released and water was let into the flood basins, which were subdivided into smaller plots of four or five acres along the main canals.

[8] Thompson 1994.

[9] "Normal" yields in Roman period Oxyrhynchus were about 1:10, but could be considerably higher elsewhere. See Rowlandson 1996: 247–52, with a discussion of the factors that affected productivity.

[10] Braudel 1980: 31. [11] Butzer 1976.

[12] Thompson 1999a: Appendix C for a composite yearly schedule of maintenance activity in the third-century BC Fayyum.

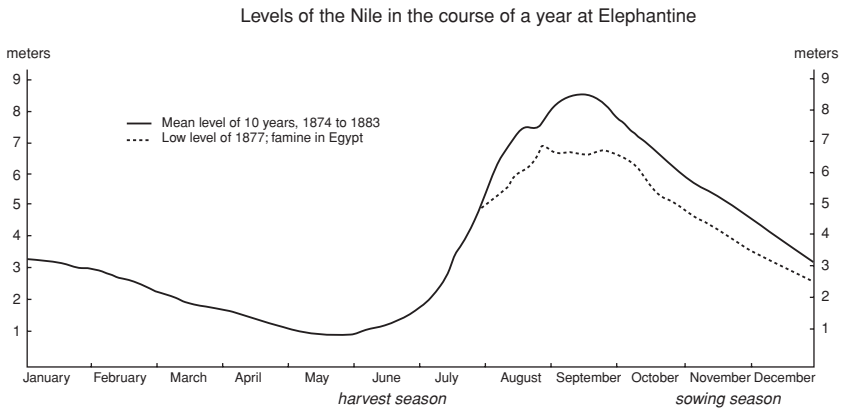


Figure 16.1 Levels of the Nile in the course of a year at Elephantine
Adapted from W. Willcocks, *Egyptian Irrigation* (1889), plate IV, as reproduced in P. W. Pestman, *The New Papyrological Primer* (1990) 314

The water was kept on the fields for forty to sixty days and then drained off through canals. Farmers often had to work fast because there was a short ploughing season before the soil would become too dry. The fields were then sown. The progress of the flood each year reinforced regional differences and posed specific problems for the central government. The height of the flood determined the annual agriculture output. It was a delicate matter for the state and for the farmers. The pattern of holding scattered plots reduced risk, and local organization of the irrigation network was the natural result of the virtually flat (1:12,000) gradient of the Egyptian Nile river valley.[13]

Irrigation of the fields followed for the most part the ancient pattern of basin irrigation with gravity fed feeder and drainage canals. Such a system, following the natural rhythm of the Nile flood and recession, allowed one crop per year. Orchards and vineyards were perennially irrigated.

Planting decisions were also determined by the condition of each field. Outside of large estates of the third century BC (below), agricultural production was probably in most places conducted by small-scale cultivators. The state, in the case of flax for example, promoted production at a specified amount, but production and distribution were largely private affairs.[14] On royal land (probably a higher percentage in the Fayyum), the state provided the seed. The main crops in ancient Egypt were barley, sown on drier land, emmer, and flax on the wettest land, with grain crops taking up about half of the available fields and producing one crop per year. Where possible,

[13] On the decentralized nature of land management, Butzer 1999: 382, Bonneau 1993. For the gradient of the Nile, see Butzer 1976: 47.
[14] Thompson 1988: 51.

fodder crops or lentils were grown in the summer months.[15] Fenugreek and pulses could also be grown in the basins, while vegetables were generally grown in garden plots, and palm trees were cultivated on the higher-lying levees as well as in walled gardens. Rotating fields every other year with legumes, more typical of the Fayyum because the Nile silt did not reach the fields there, replenished the soil with nitrogen, although historically the fertility of the soil allowed the planting of grain in the basins two years in five on average.[16] It is not easy to discern a system on the basis of the normally short-term horizon of the evidence, and in any case there was regional and inter-annual variability. A two-field system operated at least in some areas of Egypt, while in other cases a three-field system (cereal for two years followed by legumes or a fodder crop) prevailed.[17]

During the Ptolemaic period, there was a significant shift to wheat (*triticum durum*) and wine production and consumption. The shift from emmer to durum wheat, the latter being the preferred grain of the Greek immigrants, was more the result of a natural shift in crops caused by forced demand for wheat and not the result of Ptolemaic state direction, although there was a connection between wheat production and royal land.[18] There may have been some efficiency gains in the amount of labor required to harvest wheat, a factor that has not been considered in either rural productivity or in the growth of Alexandria.[19] Wine production, although like wheat not entirely new with the Ptolemies, was intensified and, by the second century BC, grew to impressive levels.[20] The new Greek population dominated viticulture, at least in the Fayyum – half of the production being in the hands of kleruchs, who had a tax advantage. Viticulture was a major part of the Greek household and export economy in the Fayyum but Egyptian temples also received revenue from their vineyards.[21] There was some experimentation with new crops and livestock, documented principally in the third-century BC Zenon archive.[22] In some cases, the experimentation built on pre-Ptolemaic trends.[23]

III URBANIZATION AND POPULATION

No figures survive on pre-Ptolemaic population, although most scholars assume population growth under the Ptolemies largely due to immigration

[15] Butzer 1976: 50.

[16] So Williams 1992: 1113. See the comments by Baer 1971 with comparison to Girard's account in the *Description de l'Égypte* and later nineteenth-century data.

[17] Crawford 1971: 116–17, with Schnebel 1925: 218–39.

[18] On wheat, see Nesbitt and Samuel 1995. On the shift, see Thompson 1984; 1999b; Sallares 1991: 370–2, Van Minnen 2001a. The shift to durum wheat production is dramatically illustrated in *P. Petr.* III 75 (235 BC) cited by Thompson 1999b: 129.

[19] Nesbitt and Samuel 1995, cf. Samuel 1984: 197, n. 22.

[20] Rostovtzeff 1922: 93–103; Clarysse and Vandorpe 1997: Thompson 1999b.

[21] Clarysse and Vandorpe 1997. [22] Orrieux 1983; 1985. [23] Thompson 1988: 39–46.

into new urban centers. The usually accepted estimate for the first century BC, including the city of Alexandria, lies between 3.5 and 4.5 million (cf. below, Chapter 26), on a theoretical maximum agricultural base of nine million *arouras* (1 aroura = c. two-thirds of an American acre, or 2756 m^2; the total is 24, 793 km^2), roughly comparable to Egypt at the beginning of the nineteenth century AD.[24] Greeks comprised roughly 10 percent of the population.

The growth of Alexandria and the reclamation of the Fayyum were without question the two most impressive developments of the period. The city of Alexandria, occupied by 311 BC, was the first "urban giant" in the Mediterranean.[25] The centralization of political power there, the rent-seeking behavior of the Greek elites, and its role as a trading center all played their part in concentrating a population of around 200,000 by the middle of the third century BC. We know very little about the grain supply to the city. It seems likely that market exchange, as in Memphis, played an important role. By the early Roman period the city had grown to perhaps 500,000.[26]

The ancient capital city of Memphis, an important political center since the unification of the Egyptian state c. 3000 BC, remained a vital economic center of manufacture, distribution, and shipping under the Ptolemies.[27] The size of the city was something on the order of 50–60,000.[28]

The reclamation of land and the settlement of new populations in the Fayyum and in the Herakleopolite and Oxyrhynchite nomes was surely one of the great accomplishments of the early Ptolemaic state. New land in the Fayyum was perhaps trebled (the exact amount of new land is debated). Ptolemaic expansion was centered in the Fayyum for two main reasons: (1) it was possible to reclaim land there, (2) it directly projected state power on new land and new settlements.[29] The new land was continually in danger of returning to marsh. Expansion onto new land allowed the Ptolemies to establish, as it were, new rules, and direct management of the land, although the process was a combination of the state and private initiative. The amount of royal land in the area was probably higher than elsewhere, and it became a kind of "showcase" of state power (density of banks, military population is notable).[30] Fayyum villages are believed, on average, to have

[24] Population estimates: Rathbone 1990: 109–15; Scheidel 2001a: ch. 3. Estimates based on documents are usually lower: Clarysse 2003: 21 estimates a total population of 2.8 million on the basis of burial records from Edfu. The estimate of seven million by Turner 1984: 167 is too high. The total arable and total cropped area would have fluctuated, and was no doubt considerably less than this maximum. The figure comes from a temple (Edfu) text, but it should not be dismissed outright.

[25] Ades and Glaeser 1995. Scheidel 2004a offers some advance on modeling urban growth in Alexandria.

[26] Delia 1988; Rathbone 1990: 120; Scheidel 2004a. [27] Thompson 1988.

[28] The lower estimate of Thompson 1988: 32–5; cf. Rathbone 1990: 141, n. 41.

[29] Rathbone 1996a; 1997b. [30] Rathbone 1990.

been larger than those in the Nile valley, and the census registers suggest a total population in the Fayyum of between 85,000 and 100,000 in the mid-third century BC.[31]

The most important center in the Thebaid was Ptolemais, the new southern administrative center founded by Ptolemy I. Strabo (17.1.42) states that it was not less than the size of Memphis, and Akhmim (Panopolis) in the same area was also a town of considerable size. Greeks from throughout the Greek world, and other groups, continued to be settled there for some time after its foundation.[32] Greeks came in smaller numbers to Thebes, a city of very roughly 50,000.[33] Despite their smaller numbers, it is clear that Greeks settled throughout Egypt, and that they dominated the new towns and in the nome capitals. New garrison towns were established, and kleruchs were also settled in the Thebaid, especially in the second century BC. Old land tenure patterns, and temples, remained important in the south.

IV THE PTOLEMAIC STATE, ECONOMIC DEVELOPMENT, AND THE STOCK OF KNOWLEDGE

The Ptolemaic period was, in many respects, a continuation of Saite and Persian (650–332 BC) control of Egypt, and fell in the middle of an important historical transition in Egypt marked by increased long-distance trade and focus on the eastern Mediterranean. Any measurement of per capita and aggregate economic growth should be taken, therefore, between about 600 BC and AD 100. The major difference with the preceding Persian rule was political, in that the Ptolemies re-established a dynasty in order to rule Egypt as an empire centered in Egypt. The decline in the use of Demotic Egyptian as a language of contract in this period is a notable result of the use of Greek as the administrative language.[34]

The Ptolemaic state has often been regarded as highly centralized, usually conjuring up the image of a despotic ruler who commanded the economy, and all those within the state. But we draw a distinction here between "centralized" and "bureaucratic," and between the direct revenue of the king, and the revenue of the state. State revenues were no doubt impressive by ancient standards, but there were limits on the degree to which economic production could ever be centralized (i.e., planned, or commanded from the center), given the nature of the Nile valley, the distances between center and periphery, and the nature of irrigation, which dictated local control and placed the emphasis on local knowledge of agricultural conditions.

[31] Clarysse and Thompson 2006.

[32] Plaumann 1910: 3, *SEG* XX 665 discussed in Fraser 1960, a Roman copy dated to the second century AD.

[33] Clarysse 1995. [34] Manning 2003: 173–7.

In Rostovtzeff's view, the Ptolemies continued the tradition of ownership of the land by the king and the compulsory labor system, the "twin pillars" of an Oriental state.[35] All land was either "royal land," directly managed by the king, or was "conceded" to others to work, but which could be taken back by the king as he desired. Many scholars have assumed an erosion of state power over land from the third to the second and first centuries BC.[36] But the theory of the devolution of royal power on the land rests on two false assumptions. The first is that the king claimed all of the land in Egypt by royal right. This idea was supported by the land terminology used in official documents that divided the land into two large classes, royal land, which was directly controlled by the crown, and conceded land. The fiscal terminology, however, somewhat different in the south, reflects neither the maintenance of traditional landholding patterns in the Thebaid nor the limited intervention there. A recently studied text confirms the widespread private holding of land in the south, although the taxation of the land compares to that of royal land in the Fayyum.[37]

Despite Hellenistic advances and the impressive scientific output in Alexandria, productivity was probably only marginally improved by new technology.[38] Much has been made of the new technologies of the period, but as far as evidence permits, the use of new machines was rather limited in the Egyptian countryside before Roman times.[39] The waterwheel and the Archimedean screw, certainly attested for the first time in the Ptolemaic period, intensified local irrigation possibilities, mainly in orchards and vineyards, although, like double cropping, the use of these machines was probably limited before the Roman period.[40]

New technology it seems, whether it was machines, or the alphabetization of census registers, was slow to reach the countryside.[41] Some advancement in irrigation machines in the period, and perhaps a greater use of draft animals, may have had some impact on agricultural productivity on marginal land and in gardens.[42] The introduction of iron into Egypt for agricultural implements and other devices, is documented in the Zenon archive although its use does not appear to have been widespread.[43] Irrigation in the Fayyum was not limited to water-lifting machines, the ancient basin irrigation system (relying on the annual flood of the river) was also used there. Taxation of the land was, therefore, more important than new technological improvement in Ptolemaic productivity. Hellenistic

[35] Rostovtzeff 1941: 271.
[36] Lewis 1986: 33; Taubenschlag 1955: 235. Cf. Husson and Valbelle 1992: 260–1.
[37] Christensen 2003. [38] On Alexandrian science, see Fraser 1972. Cf. Préaux 1966.
[39] Wilson 2002; Lewis 1997. On the relationship of technology to economic development in the ancient world, see above, Chapter 6.
[40] Samuel 1983: 58; Rowlandson 1996: 20. See below, Chapter 22.
[41] Alphabet: Clarysse and Thompson 2006: vol. II, ch. 3.
[42] Bonneau 1993: 106. [43] Rostovtzeff 1941: 362–3, 1197.

building technology was important in the construction of new villages in the Fayyum.

V INSTITUTIONS AND TAXATION

I treat in this section money and prices, the taxation system, the role of social status, and state revenue. Ptolemaic institutions were a mixture of old and new. The taxation policy above all gradually shifted emphasis away from traditional Egyptian social hierarchies toward the new realities of urban, Greek life. Change was often slow, but Ptolemaic fiscal institutions made a great impact. The legal system, if we can call it that, coordinated the traditions of Egyptian law, as well as the law of other communities, Greek being the most important. The parallel court system that determined jurisdiction of adjudication by the language of the document is clearly seen in a later Ptolemaic decree (*P. Tebt.* 5, 118 BC). The ancient system of property rights, inheritance, and contracting was left largely intact but, like the Egyptian temples, these institutions were gradually incorporated into the state system through the medium of the Greek language. Regional variation in land tenure is an important element in the history of Ptolemaic development and may have had long-term consequences. The effects of "Greek" law on Egyptian institutions was far less than was the later effect of Roman law. Major fiscal changes occurred under Ptolemy II Philadelphus (monetary reform, establishment of banks, the monetization of the taxation regime), demonstrated by an increase in the number of papyri and ostraca dated to his reign.

Despite the changes, Egyptian temples, with their endowments in land, people, and livestock, remained vital. Temples historically played several key economic roles – centralization of information, documentation, land management and grain storage being among the most important. Their land endowments, which allowed temples to sustain the cycle of divine offerings/payments to the priests and support staff, continued, as did their right to collect revenues from their land, including vineyards and gardens. In some aspects, the Ptolemies subordinated traditional temple privileges to the new regime. A lump sum payment to temples (*syntaxis*) may have served to subordinate the traditional economic role of temples, although this is not altogether clear.[44] What is clearer is that the royal banks and royal granaries into which tax payments were made displaced a traditional economic function of temples.[45]

(a) *Money and prices*

The price of commodities, and the role and circulation of coinage are the most problematic area of the Ptolemaic economy, and much work

[44] Thompson 1988: 110–12. [45] On banks, see Bogaert 1994; 2001; von Reden forthcoming.

remains to be done.[46] Some considerable advances in the understanding of Ptolemaic coinage have been made recently.[47] It is clear that Ptolemaic taxation policy, and the creation of banks, that required some taxes to be collected, or at least calculated, in terms of money played key roles in monetization.[48] There may have been a regional difference in the process, influenced by where Greeks settled. On the basis of the scanty evidence, commodity prices appear to have remained relatively stable.[49] New fiscal measures were taken in the production, manufacture, and sale of key items such as flax, salt, beer, and for certain oil crops. Here the Ptolemaic state utilized competitive bids and labor contracts that fixed workers in a specific place over the length of the contract, often supplied raw materials and tools, and granted state licenses for the sale of the finished product (the so-called Ptolemaic "monopolies," although they scarcely were). The aim here, as throughout the Ptolemaic fiscal system, was to secure labor, and to produce predictable income for the state.[50]

There was in the third century BC a tri-metallic coin system, although gold was hardly circulated. Silver coinage was used for large payments in Alexandria and other urban areas, while bronze was used for the smaller transactions in the countryside. The silver and bronze coins were linked through a fixed exchange mechanism, adjusted at the end of the third century BC.[51] The taxation policy of the Ptolemies that required some payments be made in coin, and the control of "monopoly" industries, accelerated the circulation of coin (bronze) throughout Egypt.

The Egyptian rural economy was long used to monetized exchange (usually reckoned in grain against fixed values), and grain and wine continued to be used as such into the Roman period.[52] The social impact of monetization on the countryside may have been fairly minimal given the predominance of grain production and taxation in kind on these crops, and, while it is clear that the Ptolemies were increasingly interested in generated revenue in coin, the continued use of grain as a medium of taxation limited Ptolemaic ability to monetize completely the rural economy.[53] Contract wage labor, in the agricultural sphere as well as for short-term building projects, canal building and the like, was common, payment, daily or monthly, being made in kind as well as cash.[54]

[46] Prices for land in Cadell 1994, prices for wheat in Cadell and Le Rider 1997.

[47] A good summary is available in Hazzard 1995. Important new studies are forthcoming by von Reden; Picard 2004; Burkhalter and Picard 2004.

[48] Cf. Rathbone 1989; von Reden forthcoming.

[49] Land prices: Samuel 1984; Cadell 1994. Cf. Baer 1962.

[50] Turner 1984: 151–3; von Reden forthcoming. *P. Rev.* is the key document.

[51] Von Reden forthcoming.

[52] Wine: Clarysse and Vandorpe 1997. For temple vineyards, see the notice of an unpublished papyrus in Zauzich 1991: 9, to be published by Maren Schentuleit.

[53] Samuel 1984; Rowlandson 2001: 149.

[54] Treated well by von Reden forthcoming.

The paucity of price data preserved in the papyri is a serious barrier to understanding the long-term performance of the Ptolemaic economy. References to items in the papyri can be frustratingly obscure, small items such as hoes are rarely given values, we are not always sure whether a price is reckoned in silver or bronze, and there are significant gaps in our information (e.g., for the price of wheat from the mid-third century BC to 209 BC).[55] The data derived from penalty clauses in contracts can mislead. The explanation for the long-term history of commodity prices is exacerbated by our lack of knowledge about the amount of money in circulation and the velocity of circulation.[56] The supposed price inflation that occurred in the reign of Ptolemy IV Philopator has received extensive comment and various explanations.[57] Earlier analyses have focused on the reduction in precious metal of the silver coins, on a new book-keeping system, or on a reduction of the weight of the bronze drachma and the consequent increase in the value of coin in circulation.[58] Much of the so-called price inflation, however, is derived not from a single new bronze accounting standard but from multiple re-tariffings of the bronze coins against silver and gold.[59] An independent bronze standard was introduced at the end of the third century BC.

(b) *Taxation and state development*

The complex Ptolemaic taxation system is still not perfectly understood in many of its details.[60] It was a flexible system, varied regionally, and paid for the local bureaucracy. The Ptolemies inherited a tributary economic system in which, in theory, the state was the household (*oikos*) of the king. The demotic ostraca from Upper Egypt provide important evidence that local fiscal structure under the early Ptolemies was a continuation of the old tributary system, and that the local Egyptian scribes, and the temple estate infrastructure that supported them, were incorporated into the Ptolemaic system of royal banks and granaries. But the texts also show that the economic relationship between temples and the Ptolemies was less direct in the third century BC, and the increase in the number of tax receipts in the period after the Theban revolt suggests stronger administrative control or a change in practice.[61] The land measurement receipts, again for the moment confined to the Thebaid, might suggest that these texts served to protect individual taxpayers by clearly establishing their obligations in writing. While many of these ostraca come from a restricted group of

[55] Samuel 1984. For the gap in wheat prices, see Cadell and Le Rider 1997.
[56] Bagnall 1999. [57] Reekmans 1951; Maresch 1996; Cadell and Le Rider 1997; Bagnall 1999.
[58] Reekmans 1951. [59] Bagnall 1999: 198; von Reden forthcoming.
[60] Préaux 1939 provides an index with the wide array of taxes.
[61] For the demotic receipts, Kaplony-Heckel 2000; Muhs 1996.

people, and, therefore, information regarding agricultural tax administration in early Thebes is limited, there is a wide array of tax receipts, including salt-tax receipts, which suggests that the issuance of tax receipts was common across a range of taxes.[62]

Outside of the important temple of Ptah at Memphis, and a few in the Delta (the temple of Neith at Sais), major new temples were built in the southern Egyptian Nile in the Thebaid.[63] It was here, beginning with the temple of the god Horus at Edfu in 237 BC, that several new temples were built, probably supported in large part by local financing. Temples seem to have also funded cult activities from their own lands, as they did earlier.

The one place in Egypt that was susceptible to reclamation and intensification on a significant scale was in the Fayyum depression, a state of affairs very likely coinciding with the fact that prior claims to land in the southern valley made taking over such land politically difficult. The eastern Delta and the region around Alexandria were also developed, and there were new settlements in the Herakleopolite and Oxyrhynchite nomes.[64] This expansion was probably already underway in the reign of Ptolemy I Soter, although once again the lack of documentary evidence for his reign limits certitude.[65] To be sure, the documentary evidence of reclamation and settlement is extensive for the reign of Ptolemy II, who visited the area on at least two occasions.[66]

Ptolemaic expansion in the Fayyum was a massive project, accomplished probably by restricting the flow of water into the Fayyum at a regulator at Lahun, thereby lowering the level of Lake Moeris. New canals were also dug.[67] This, along with the building of Alexandria and the southern capital Ptolemais, were the largest public works projects of the Ptolemaic state. The state's ability here to coordinate the work, the supplies, the men, and the donkeys is quite impressive. The size of the projects, both in reclaiming land and in maintaining the existing canal networks, as Thompson has pointed out, was enormous.[68] One document mentions a proposal to organize a workforce of 15,000 men to work on embankments of an "island," to be funded from the harvest of emmer.[69] The size of the labor force, it has been estimated, was sufficient for the sixty days' work covering a large portion of the Fayyum. Whether the proposed project was ever carried out we do

[62] Muhs 1996: 2. [63] On Memphis, see Thompson 1988.

[64] On the Delta, see Davoli 2001. New Upper Egyptian foundations in the second century, Vandorpe 1995: 233; Kramer 1997.

[65] See Thompson 1999b: 125. Cf. Diod. Sic. 18.33.

[66] *PSI* 4 354 (253 BC); *P. Petr.* II 13, 18a (253 BC, on the date see Clarysse 1980: 85; *P. Petr.* II 39 e 3 (247–245 BC?)). The first visit may be tied to kleruchic settlement in the area. See Clarysse 1980; 2000.

[67] Butzer 1976: 36–8. The exact processes involved in the reclamation project, and the pre-Ptolemaic reclamation, are still contested. See briefly Rathbone 1990: 111–14; 1996a: 52.

[68] Thompson 1999a: 112. [69] Clarysse 1988; Thompson 1999a: 112–13.

not know, but it reveals, at a minimum, the ambition of some men in these early years of development.[70] Correspondence addressed to nomarchs in the mid-third century BC (listing more than 4,000 tools, including axes, ploughshares, and rope) certainly conforms to similar ambitions, and many texts suggest massive and successful coordination.[71] The supply of tools by the state, and the requisition of the labor force culled from each of the nomarchies (the original development areas in the Fayyum), shows the direct involvement of the *dioiketes* and the role of regional officials. One has the strong impression here that the work was directed by ambitious men like Apollonius (see below), who were given land grants to develop, and by other officials and soldiers with an incentive to succeed. The apparently state-supplied tools, the requisition of labor, and the payment of wages were largely traditional in the Egyptian countryside.

We are somewhat hampered by both the qualitative and quantitative differences of the third century BC data from the Fayyum and from Upper Egypt which limits our hopes of a testable hypothesis. Nevertheless some broad facts can be stated. In the early Ptolemaic period, land in the Fayyum was reclaimed under state direction, and new settlements of soldiers and Egyptians were established. No similar "investment" is known in the Nile valley. The Ptolemaic maintenance of an old land tenure regime in the Thebaid, where the right to convey land already existed, the granting of land to important new constituents, and the use of agents to collect taxes all combined to reduce state revenue, but it followed from the political necessity of a regime that sought legitimacy from old institutions, and loyalty from the bureaucracy and the army.[72] The traditional temple-administered estates appear to have continued, and held privately by soldiers, temple dependants and leased out to others on short-term leases.[73] The picture of regional differences in the early Ptolemaic regime is the result of historic patterns of land exploitation. The institutional survival of the temple estates, not dissimilar from the much later example of land institutions in India under the Raj, is the result of the state's desire for stability and revenue.[74] The private archives from Upper Egypt suggest, however, that soldiers became well established in the south during the second century BC.

The transmission of property, both real and rights to income from office, by written legal instruments had a long history before the Ptolemies, although most transactions probably occurred within family and social groups without written legal instrument. Such "paperless" transactions would have reduced transactions costs, but they also reflect limited market mechanisms and created more uncertainty. Family and other group holding

[70] On the labor estimates, Thompson 1999a: 112. [71] *P. Petr.* III 49, Clarysse 1997: 70–2.

[72] For the problem of limited Greek access to land, and the consequent problems affecting royal revenues, Bingen 1984.

[73] Manning 2003. [74] Banerjee and Iyer 2002.

of land alleviated the cost for the state of defining and enforcing individual property rights in land, something that we know from recorded disputes was difficult, although the state did intervene in the case of auctions of property rights (below).

Access to land and to the market in land was limited, but this does not mean that land was not potentially available. The shortage of labor applied to the land was a serious long-term problem.[75] The historically low price of land, a low multiple of the value of a year's harvest, is another indication of the limited "market alienability" of land – it was the rights to the income from land ("economic rights") rather than individualized "legal rights" to the land itself that were "owned."[76]

The land survey established the state's authority as well as private interest in the land. But this authority, and therefore the economic power of the state, rested on the knowledge of local officials who performed and recorded the survey. Land surveying is one of the oldest state institutions in Egypt, and centralized knowledge of the exact extent of each nome, measured by its length along the Nile – in essence a theological statement of the political control of Egypt – can be traced back to the Middle Kingdom (Dynasty 12, c. 1991–1783 BC).[77] The problem for the Ptolemaic state, as it was for other states, was to obtain accurate information each year on local agricultural production. This, once again, required (although it was not always obtained) both loyalty and accuracy of the village scribe and his assistants in charge of land survey and registration.[78] The survey of standing crops and the fixing of rents, of course, give the impression of accurate measurement and recording, but there are examples of figures being carried over from old records, and land being misclassified.[79]

Tax collection was facilitated by a survey of land and, for the capitation tax, a census, which, irregularly documented, was not entirely new (Hdt. 2.177), although the social dynamics, with tax exemption and reduction for certain classes, added a new dimension.[80] The census could, at least in theory, serve to restrict the movement of the population, although mobility was restricted *de jure* only with respect to production in the so-called monopoly industries.[81] The labor market otherwise appears free.[82] Representatives of the Egyptian priesthoods were required to meet in Alexandria to ensure loyalty. Although we cannot track in the record how often this was done, the practice, remitted in the Rosetta decree (*OGIS* 90, 17, 196 BC),

[75] Samuel 1989.

[76] On the distinction between economic and legal rights, see Barzel 1997. For the price of land in ancient Egypt, Baer 1962. On prices of land in the Greek papyri, Cadell 1994.

[77] Manning 2003: 146–8. [78] Verhoogt 1998.

[79] Crawford 1971: 20–3; Verhoogt 1998: 132, n. 121.

[80] Clarysse and Thompson 2006; Thompson 1997.

[81] Braunert 1964. [82] Thompson 1988: 71.

appears to have been a regular feature of the early Ptolemaic state. The collection of taxes was also moderated by several new institutions – tax-farming, banks, and state granaries. It has been suggested that the tax-farming system, and the "monopolies" of key commodities (above), were introduced by the Ptolemies as a means of arbitrage between the economy in kind of the countryside and the Greek monetary economy.[83] Once again, what comes through, mainly on the reading of *P. Rev.*, is Ptolemaic interest in predictability, stability, insulation from risk (at least in theory), and revenue capture.[84]

Public bids for the right to collect a certain tax in a given year in a specific area were posted by the tax-farmers at royal banks. The actual collection of the tax, however, was performed by state agents (*logeutai*). The introduction of banks played an important role in the collection and payments of taxes.[85] Despite the fact that these are well documented for the period (1,750 papyri), it is not easy to establish connections between them and the performance of the economy. There were two types of banks – state banks and private banks. Both were licensed by the state. They formed, along with the tax-farmers, the intermediary between agricultural production and state revenues, the latter concentrated on currency exchange. The granaries received payments in grain and held deposits of individual taxpayers. The state granaries were also an important means by which the local state bureaucracy was paid.

(c) *Social status*

Occupation and status (*ethne*) were important factors in taxation and in tax collection as well as in the Ptolemaic legal system. The tax system favored those of "Hellenic" status, and those that supported Greek culture: e.g., teachers and athletes. Soldiers, particularly the cavalry, were vital to Ptolemaic success. The ancient social organization in which professions were organized around extended families was utilized by the Ptolemies to ensure cooperation in the collection of professional taxes.[86] Priests remained the nucleus of every Egyptian village elite, and they were always important in the cooperation between the central and the local economy. Priesthoods and others formed associations, following Hellenistic practice seen elsewhere, that among other things provided for a kind of death insurance for its members.[87] Priests often had connections with their brethren in other locations, and their correspondence is instructive with respect to

[83] Bingen 1978.

[84] For *P. Rev.*, see Grenfell and Mahaffy 1896; Préaux 1939: 65–93; Bingen 1952; 1978. On Ptolemaic intentions, see Samuel 1983.

[85] Now summarized in Bogaert 1994; 2001.

[86] Thompson 2001b.

[87] De Cenival 1972; Muszynsky 1977; Muhs 2001. For the Choachyte societies, Donker van Heel 1995: 24–6.

their business dealings and the extent of their economic and social contacts throughout Egypt.[88]

The control and circulation of royal and temple land was also tied to families and to occupation groups, a function of both the transaction cost environment that reflect the limited development of markets and the enforcement problem (see above, Chapter 5).[89] Many of the demotic sales of land from this period were transacted between two parties having the same status title (occupation title plus the addition of the phrase "servant of god X," the local divinity, or military titles "men of Aswan" etc.), indicating that they were part of the same status group, attached to the same temple, or members of the same profession. In many cases this consonance probably reflects a family relationship as well. The use of status designations in contracts served as a method of identifying individuals by their occupation, and the registration of occupation was required.[90]

(d) *Land tenancy*

Pre-modern Asian states promoted the connection between the finances of the ruler and the holding of land.[91] Ptolemaic practice linked the holding of plots of land to state service. The military institution of giving land to soldiers in exchange for service has both Macedonian and Egyptian antecedents, and was fundamental in settling the Fayyum. The primary agricultural workers, the free Egyptian tenant farmers, comprised the majority of the population, and were not historically bound to large units of production but, rather, to annual leases of small plots, within an institutional ambit of authority. Those who held leases of royal land, the "royal farmers," were a major component of the rural population.[92] The financing of agricultural production outside of royal land is not well known, but what seems to prevail in ancient areas (i.e., Upper Egypt) is the continuation of the practice of holding/leasing of temple endowment land by priests and support staff. Slavery was not a primary means of agricultural production, although household slavery did exist among Greeks and was certainly common in the Ptolemaic period, as was the use of slaves/prisoners in the mines of the eastern desert. There was a tradition of private conveyance of land as well, at least in the south where it is clearly documented.

We have incomplete information about the distribution of land, so an overall assessment of Egypt as a whole in this period is not possible, although it seems probable that the Gini index would have been lower (denoting a

[88] See for example the series of letters of the priests of Khnum at Elephantine discussed recently in translation by C. J. Martin 1996.

[89] Cf. Shelton 1976: 118. [90] Thompson 2001a.

[91] Chaudhuri 1990. [92] "Well over 50%": Thompson 1988: 38.

more even distribution) than in the Roman period.[93] Private landholding was known, this is particularly well documented in the south of the country, but the overall impression of the documents suggests that leasing private land was more common than purchasing, and there follow the usual expectations of disincentive to invest and sub-optimal productivity.[94] Private property rights, where they existed (e.g., on temple estates) were maintained, and de facto gains in private holding occurred in the period. An important Greek institution introduced in the third century BC was the public auction.[95] The Ptolemies used it to assign rights to farm taxes, to award contracts,[96] and as a method of assigning property rights to derelict or ownerless land. Its use in ancient areas such as the Thebaid, and also in the Fayyum on temple land shows the contrast between Ptolemaic control of ancient institutional arrangements and a more "colonial" exploitation of "royal" land. Even in new areas in which kleruchs were given plots of land, the Greek preference for urban living prompted them to lease their land and probably produced a disincentive for development.

A key to royal revenues was the tenancy on royal land leased by one or more "royal farmers."[97] Royal farmers were direct tenants of the king, the land was leased year to year with the terms adjusted to take account of fluctuating conditions. What were technically short-term grants of land became stable, and tenure could be passed to heirs. The term "royal farmer" was used in official contexts as a status designator for those men who took on leases to farm royal land.[98] It was thus not an indication of class but of status, and it was a status that was sought after, not forced upon the farmer.[99] It was then used of a wide range of men from peasants to priests, and the status provided access to both land and capital. So much so that in fact groups of men took on leases of small plots of royal land simply to obtain the status designation. The range in the size of the plots of royal land was generally small, but there are documented royal leases of up to 160 *arouras*.[100] It appears that the status within the royal economic sphere carried with it certain benefits, including protection from military billets, the stipulation that royal farmers could only be brought before Greek courts, and the right to be left undisturbed during sowing and harvest time.[101] Clearly individuals with this status exploited it.[102] Recently published documents from the

[93] Only the Kerkeosiris material from the late second century BC offers a chance for analysis. Cf. Bagnall 1992.

[94] Demotic leases: Felber 1997; Greek leases: Hennig 1967. [95] Pringsheim 1949; Manning 1999.

[96] *P. Petr.* III 43(2), (c. 245 BC). [97] Rowlandson 1985.

[98] Rowlandson 1985: 331. [99] *Pace* de Ste. Croix 1981: 153.

[100] *P. Lille* 8, 4 (third century BC). On the range, Shelton 1976: 152.

[101] Shelton 1976: 118. *P. Tebt.* 5 (= *Select Papyri*, vol. II, text 210; C. Ord. Ptol. 53; [118 BC]), 221–6; Rowlandson 1985: 331.

[102] On the extent and variety of the business activity of one royal farmer, see Boswinkel and Pestman 1982; Lewis 1986: 124–39.

Fayyum, however, show that the terms of the leases of royal land could be changed frequently, that rent fluctuated with annual production, and that transfers between farmers were frequent. This suggests that the Ptolemaic system was probably much more flexible, more adaptive to rural realities of Egyptian agricultural production than Rostovzteff's view admits.[103]

The early Ptolemaic kings decided to settle soldiers on land in Egypt in order to retain a loyal fighting force available for call up when needed. At the same time, the placing of Greek soldiers in the countryside served to pacify, in theory, troublesome areas and to get marginal land under cultivation. They were given plots of land (*kleroi*) according to their rank. The 100-*aroura* cavalrymen were the largest group of *kleruchs* in the third century.[104] Other *kleruchs* had smaller plots of land, thirty *arouras* (infantry soldiers), twenty-five and twenty *arouras*. This class of land evolved into hereditary tenure, leaving in the main Greeks in a better position on the land than their Egyptian counterparts. The kleruchic system had a long-term impact on the land in the parts of Egypt that had a large contingent of military settlers, forming a major part of what was classed as private land in the Roman period.[105]

The gift of large estates to high officials, not new with the Ptolemies, enabled large tracts of land to be developed quickly. The land was a temporary grant by the king, called a "gift estate" (*dorea*) in the papyri, and could not be transferred privately. The ephemeral nature of tenure on this class of land shows that such estates were essentially royal land created as a means of providing revenue for the king and his circle. The land, then, was "ceded" by the king to others to use. The estate of the *dioiketes* (the chief financial officer of the state) Apollonius near Philadelphia is the most famous example. This was a "model estate," or an "experimental farm"[106] that took advantage of economies of scale to exploit labor and production, as well as the private initiative and the capital of ambitious officials as well as immigrants.[107] The "gift" of land was in fact a creation of a potential revenue stream for Apollonius; it was up to his own initiative and ambition to take advantage of this potential. By all accounts, he seems to have done so, for the ten or so years that the estate is documented directly, but his involvement in the management of the estate appears to have waned after only a couple of years, if the survival of his correspondence preserved in the archive accurately reflects his involvement. The cultivation of vines, however, was both impressive and long lasting.[108]

[103] The papyri discussed by Shelton 1976 (esp. *P. Tebt.* 1103, 1105, 1107) are crucial in demonstrating, for example, that the rate of cessions of royal land was as high as one-third from year to year. This contrasts sharply with Rostovtzeff 1941: 284–7. See the remarks of Rowlandson 1985: 337, Shelton 1976: 120–1, and Verhoogt 1998: 27.

[104] Uebel 1968; Clarysse and Thompson 2006. [105] Rowlandson 1996: 45–6.

[106] Edgar 1931: 12. [107] Cf. Rostovtzeff 1922: 145.

[108] Thompson 1999b: 134, Clarysse and Vandorpe 1998.

We can also see that the size of the operation took advantage of the centralization of information. Unlike Apollonius' estate in the Memphite nome, which was composed of scattered plots of land around several villages, the estate at Philadelphia was one large parcel of land. Apollonius kept a close watch on the operations although the land was leased out and even turned over to others to manage.[109] Each year, for example, memos were sent out by Apollonius to his manager telling him what seed and what amounts were available.[110] From the records of some accounts at least, these memos were not followed particularly closely.[111] The estate seems also to have been a place where experiments could be tried, although many appear to have failed.[112] Economic activity was particularly dedicated to commercial operations in viticulture and later in oil crops.[113] The weaving industry was an important component on the Memphis estate of Apollonius, while the short-lived success of poppy cultivation on the Philadelphia estate, grown largely on marginal land, can be attributed to the decline of these estates by the end of the third century BC.[114] Their purpose was certainly to establish the state's direct control over new land, to settle new populations, to establish revenue streams for state officials, and to exact as much new revenue as possible.

(e) *State revenues*

Ptolemaic wealth was the subject of much literary attention, and although there is no direct testimony to the total annual revenues of the Ptolemies, the poets and the description of Callixenus of Rhodes of the grand procession under Ptolemy II Philadelphus must have reflected the real wealth of the early Ptolemaic kings.[115] The traditional figure for the annual internal revenue of Ptolemy II is 14,800 talents of silver and 1.5 million *artabas* of wheat.[116] The grain revenue is almost certainly too low, and was probably closer to six million *artabas* per annum, enough to feed 500,000 adults for

[109] In the latter case, it seems that *kleruchs* were given land from the estate itself. See further Crawford 1973: 240–1. A group of Egyptian farmers who had come to Philadelphia from the ancient center at Heliopolis took a lease of 1,000 *arouras* within the estate. See *P. Lond.* VII 1954 (Philadelphia, 257 BC), Rostovtzeff 1922: 73–5; Thompson 1999b: 136.

[110] *P. Cair. Zen.* 59292, 420–30, cited by Crawford 1973: 236.

[111] This is especially true in the case of over producing what was specified and with important crops like poppy. So Crawford 1973: 245.

[112] On the experimental nature of the estate, see Orrieux 1983: 77–97. On the poppy, see Crawford 1973.

[113] On viticulture, Clarysse and Vandorpe 1997; Préaux 1947: 22–6; and for oil crops, Sandy 1989.

[114] On weaving: Wipszycka 1961: 185–9. On the cultivation of poppy: Crawford 1973: 248.

[115] Thompson 1997.

[116] Jer. *Commentary on the Book of Daniel* 11.5 (third century AD), cf. Appian, *Praef.* 10. The revenue of Egypt under Ptolemy XII Auletes, again from a literary passage, is stated to have been 12,500 talents, Strabo 17.1.13, Cic. *Rab. Post.* 3.6. The figure of 6,000 talents for the income of Auletes cited by Diod. Sic. 17.52.6 is, perhaps, more realistic.

a year.[117] The revenue in coin alone had the purchasing power of 500,000–700,000 man/years. Expenditures are a different matter. We may assume that the finance of the military would have been a major component of taxation policy and state expenditure, as were religious festivals.[118]

Revenue from rent and taxes collected from agricultural production was the major source of internal revenue. Land was classed as either rent producing or rent free, the latter category perhaps the "land in release" known from Greek papyri. There were two principal taxes on the land, one, the tax reckoned in kind, collected on all grain-bearing land and on some fodder crops, and the other, a tax reckoned in money, called the *apomoira*, a tax of "first fruits" on vineyards and orchards.[119] The *apomoira* was also known as "portion" tax.[120] Beginning in 263 BC, also the year in which the salt tax is first attested, the revenue from the tax from kleruchic land and gift estates was earmarked for the cult of Queen Arsinoe.[121] All vineyard and orchard land was liable to the tax at the rate of one-sixth of annual production, with a reduced rate of one-tenth for certain categories of land (e.g., vineyards in the Thebaid, kleruchic land).[122] Part of this revenue was diverted to pay for local state operations, e.g., principally for the salary of police and others.[123] The *apomoira* collected on temple land was also partially "secularized," although some revenue was retained by temples. The tax was paid in kind (levied in wine for vineyards) or in cash, at a fixed rate. By the beginning of the second century BC, the tax had to be paid in cash into a royal bank, reflecting the state's increasing emphasis on a cash economy. On orchard land, the tax was always paid in cash; fodder crops also yielded money. Transactions and livestock were also taxed, as was traffic along the river.[124]

The basis of this land tax was the annual survey of the fields that assessed how much land was growing what type of crop. The ancient Egyptian system was thought to be based on an assessment of the land at a fixed rate of tax each year.[125] Rents in the Saite period lease contracts were assessed as a percentage of the yield on the land, normally at the rate of one-third of

[117] Préaux 1978: 364–5.

[118] On the military, cf. Baker 2003b. For festivals, see Perpillou-Thomas 1993.

[119] Clarysse and Vandorpe 1998.

[120] Attested outside Egypt in the Persian period: Hornblower 1994: 62, discussing *Sinuri* 1, 73 (= Hornblower 1982: 365, text M5).

[121] *P. Rev. cols.* 36–7 (both royal decrees of year 263 BC), col. 33, 9–34 (royal decree of year 259 BC).

[122] On the differential rates, see *P. Bingen* 36 (second century BC, Fayyum) published by Thompson 2000. Importantly, as Thompson points out, p. 179, the annual calculation of the tax was a percentage of annual production, and not as a fixed rate per *aroura* as some have argued.

[123] Clarysse and Vandorpe 1998: 15, with texts cited.

[124] On customs tolls, Thompson 1988: 61–5.

[125] Within the general categories of land in *P. Wilbour*, for example, land was assessed at the fixed amounts of 5, 7 1/2, or 10 "sacks" per *aroura*. Such an assessment is comparable to the later *P. Reinhardt*, dating from the tenth century BC. According to Vleeming 1993: 72–3, in both of these important texts, the amount of grain collected is now thought to have been the total production above costs (seed and labor), not simply the land tax.

the crop.[126] A taxation regime based on a share contract would technically be the less efficient solution because it created less incentive for the tenant (since the tenant's payment amounts to an *ad valorem* tax), but it may have been more suitable in the Egyptian context because it spread risk between tenant and landowner, was more in keeping with the inter-annual variability of the Nile regime, and better solved the imperfect information problem.[127] Here the local nature of land tenure, and the structural problems of the state, are at their clearest. Share contracts require higher enforcement costs in policing output for the central state, and would induce tenants to farm parts of several plots of land to increase income.[128] The main concern of the state was stable revenue, the assessment was undertaken at the local level by village scribes since conditions of crops and tenure varied considerably from place to place and over time. The collection of a share of the harvest certainly gave advantage to the local officials who could more easily disguise shares rather than fixed amounts of the harvest.[129] The crop reports were related back to the capital so that the government could estimate its revenue. There was no central planning here. The structure itself stimulated production on kleruchic and temple land, something that we might expect given the fact that there was less government control on these classes of land. After the reorganization of the *apomoira* tax in year 22 of Ptolemy II Philadelphus, this was collected on all vineyards and orchards in Egypt. An additional flat tax, called the *eparourion*, was assessed on the size of the plot and the condition of the soil.[130]

The collection of taxes can be documented through the granary tax receipts from the Thebaid, and it is only in this region that we can be certain of the process.[131] There may well be regional differences in the methods of collection, and much primary work remains to be done on the Ptolemaic taxation system before an overall assessment is possible. Grain taxes were usually paid at state granaries in installments throughout the year after the grain harvest, and a receipt was issued and countersigned by state officials for the taxpayer.[132] This method of payment applied to Upper Egypt as well as the Fayyum.[133] On the basis of the dates of the grain tax receipts, the taxes were paid after the harvest, due in full by the end of the regnal year, and transported to the royal granary by the taxpayer. This issuance of receipts, as far as we know, is a new aspect of the traditional grain tax

[126] Hughes 1952: 22, nn. 25–6. Cf. Vleeming 1993: 73.

[127] For a good discussion of share contracts in Roman land tenure, see Kehoe 1988a. On share contracts and the economic analysis of the arrangement in modern settings, see Cheung 1969; Ellis 1993: 146–65; Barzel 1997: 33–54; Stiglitz 1989.

[128] Barzel 1997: 35. [129] See further above, Chapter 5, on this point.

[130] Préaux 1939: 181; Clarysse and Vandorpe 1998: 35. [131] Packman 1968; Vandorpe 2000a; 2000b.

[132] Packman 1968: 62–3; Keenan and Shelton 1976: 9. On installments for the grain tax, cf. *P. Siut* 10597 (Asyut, 171 BC).

[133] Cf. Keenan and Shelton 1976: 9.

process, and might have been designed to protect taxpayers from overzealous tax collectors. Because of the scattered survival of the receipts, it is very difficult to assess the overall revenue in any one area. Clearly though, there was a shift from the use of demotic to Greek for the issuance of receipts concomitant with the installation of Greek officials in the Thebaid after Antiochus IV's invasion in 168 BC.[134] But this shift in language was not permanent, and it is interesting to note that demotic as a "fiscal" language used in receipts emerges again in the early Roman period. On the basis of the published tax receipts from Pathyris, it seems clear that there is a correlation between tax collection and the installation of loyal state officials working in the granaries. The collection of taxes was a major problem for the state over the long term.[135]

There appears to be a regional difference between Upper and Lower Egypt. In the former, a harvest tax was collected, in the latter a fixed land tax, although later on a harvest tax was also collected in the north.[136] On royal land, and according to *P. Haun. inv.* 407 on land in the Edfu nome, the tenants paid a fixed rent (*ekphorion*) on the entire plot according to its assessed value unless it was classed as *hypologos*, in addition to a harvest tax.[137] An additional charge of one half *artaba* per *aroura* was assessed on royal land called the "crown" tax.[138] The assessment was originally charged on an ad hoc basis and was used to pay for gifts to the crown, but it evolved into a regular tax by the end of the third century BC. The total tax burden, on royal land including various small charges for transportation, repayment of seed loans etc., approached half of the production each year.[139]

On kleruchic and temple land outside the Thebaid, a flat tax was collected on grain land. The tax was called the *artabieia* tax and was assessed at the rate of 1/2, 1, or 2 *artabas* of grain per *aroura*, whether the land was under cultivation or not. By the end of the third century BC, the grain tax in the Thebaid is documented.[140] But in the Thebaid, the tax on productive grain land held by temples and by individuals was collected as a percentage of the annual production. This tax in Upper Egypt was termed the *epigraphe*, or *shemu* in demotic.[141] The harvest tax was collected by the royal granary and a tax receipt was issued to the taxpayer upon payment of the tax. In Upper Egypt, the time of the harvest was normally in April, and a little later, May and June, further north.[142]

A tax on transfers of property was collected by the government. This "circulation" tax, known later in Greek documents as the *enkuklion*, was

[134] Vandorpe 2000b.
[135] Clarysse and Thompson 2006: vol. II, chapter 3. [136] Vandorpe 2000a: 174–5.
[137] *P. Haun. inv.* 407: Christensen 2003. For royal land: Keenan and Shelton 1976: 2–9.
[138] Préaux 1939: 394–5. Royal land that was leased by temples was exempt from the tax. See further Shelton 1975.
[139] Préaux 1939: 131–3. [140] *O. Tait Bodl.* I 147, 220.
[141] Packman 1968: 70–2; Vandorpe 2000a. [142] Schnebel 1925: 162.

a continuation of the 10 percent levy on property introduced in the reign of Psammetichus I.[143] Once the tax-farming system was established, this transfer tax was farmed out to tax-farmers, and shifted from a fixed charge to a variable rate of a percentage of the value of the property. The rate of the tax was 5 percent of the sales price in the mid-third century,[144] was raised to normally 10 percent at the end of this century, but was temporarily reduced to 5 percent.[145] An additional 2 percent, known as the *allage*, was collected on payments made in bronze. The tax was levied against the purchaser, and was imposed not only on real sales, but also on pledges, at a lower rate, and on wills.

The taxation of person, through the so-called salt tax (documented from 263–217 BC but probably collected throughout the period), was both a source of revenue (smaller than the Roman poll tax) and a means to enhance loyalty between the ruler and the new elite. "Hellenes" were exempt from the largely symbolic obol tax; teachers and athletes from the salt tax.[146] Some aspects of the tax (how often, how thorough, age range of liability) remain unknown. The basis of the collection of taxes on persons and livestock was the census.[147] The traditional labor service by all peasants to clear canals was maintained, but the intent of the Ptolemaic census appears to have been fiscal.[148] In addition to the capitation tax, a tax on professional occupations was collected.

VI CONCLUSIONS

The path of economic and institutional change in the Ptolemaic period can be traced back to the Saite (650–525 BC) social and political reforms, and to Persian imperial rule. Greek immigration, and the use of demotic for private contracts begin then. Ptolemaic taxation policy, which demanded that some taxes be paid in coin, certainly increased the amount of revenue captured by the state. There were, however, strong structural constraints to the development of the economy. The failure to develop a private property rights regime was a barrier to development, and stands in contrast to the Roman period. The structure of the ancient property regime remained, initially at least, in areas such as the Thebaid, although over the long term it was altered by land grants to soldiers, and, to a certain extent, by the use of public auction. The taxation in kind of agricultural production on

[143] Malinine (1953) 56–88. [144] Préaux 1939: 277, 332, on the variation in rates.

[145] Mattha 1945: 53; Préaux 1939: 333. At Pathyris, whence much of the Ptolemaic evidence for the tax is derived, 10 percent was again collected after 124 BC, perhaps due to the troubles in the area in the years 132–130 BC. See Pestman 1965: 61 n. 108.

[146] On the salt tax: Vleeming 1994; Thompson 1997; Clarysse and Thompson 2006: vol. II, chs. 2–3.

[147] Rathbone 1993; Clarysse and Thompson 2006. [148] Préaux 1939: 395–400.

grain-bearing land limited the ability to monetize the economy.[149] There were new fiscal institutions which allowed greater capture of revenue, at least over the short term, but the continuation of ancient structures, the structure of the bureaucratic system that was developed over the course of the third century BC, and the concessions to local elites, severely limited potential for sustained per capita economic growth, which, after all, was not the aim of the regime.[150]

The Ptolemaic dynasty, built on Egyptian institutions, was a remarkable and important era in the economic history of the ancient world. There was much innovation in the fiscal system. Many things remain obscure. Among them: the performance of the economy over time, and the overall GDP. Older views of the role of central planning have been replaced by a richer picture of the interplay between new state fiscal aims and private incentives. Military demand played the key role in this development in terms of land settlement, monetization and, to some extent, trade (e.g., African elephants and the eastern desert roads). State direction was important, but private initiative and old institutions cannot be ignored. The promotion of "Hellenic" status in the taxation system may have exacerbated social tensions and created serious barriers to the formation of a unitary state. This should not surprise given the variable ecological system dependent on the annual flood of the Nile, and the nature of the regime itself. Agricultural technology remained at a low level of development. New irrigation technology probably increased agricultural production only at the margins, on garden and fruit tree land, and there were efforts early on to introduce new crops and new livestock. But on the whole, Rostovtzeff's view that we are dealing not so much with a "radical change" in the economy as with "its partial improvement and its systematic organization" is sound.[151] In many ways, indeed, it was a continuation of earlier pharaonic development of irrigation and agriculture, although much of the observed change came in newly developed areas and with Greek institutions, some of which had long-term consequences.[152] The Greek language was among the most important. Others include the state's promotion of the circulation of coinage driven by taxation policy, the cultivation of wheat, the tax-farming system, and the formation of an urban "Hellenic" class. Modest gains in efficiency in scribal practice, the control of interest rates, the use of tax receipts (only in the Thebaid?) may have been offset by inefficiencies in legal institutions, agency problems (cf. above, Chapter 5) in the farming of taxes, and ethnic divisions that were reinforced by taxation policy. The Romans built on Ptolemaic developments, and in several areas improved economic conditions.

[149] Rowlandson 2001. [150] Samuel 1983: 41.
[151] Rostovtzeff 1941: 1197. [152] Below, Chapter 22, and Bagnall 1993: 310–25.

CHAPTER 17

HELLENISTIC GREECE AND WESTERN ASIA MINOR

GARY REGER

I INTRODUCTION

The conventional boundaries of the "Hellenistic period" – the death of Alexander the Great in 323 BC and the Battle of Actium in 31 BC – were unquestionably important political events, but their relevance for understanding economic history is less clear. In many ways the third century shows more economic links to the preceding hundred years than to the following two hundred. After 200 the increasing presence of Italian troops, traders, and settlers in the Aegean world and western Asia Minor transformed much of the political, social, cultural, and economic life of "old Greece." Several markers point to new economic configurations after 200 BC – activity that may represent new, trans-Mediterranean links between west and east (perhaps groundwork for the more integrated Mediterranean of the first three centuries AD) and perhaps some real, though slight, productivity growth.

Politically, the Hellenistic world saw first the creation of great new Greco-Macedonian empires on the ashes of the Persian empire and second the intrusion of Rome. Van der Spek and Manning (Chapters 15–16) review the impact of these phenomena on southerly and eastern parts of the Middle East. In this chapter I focus on "old Greece" – the southern Balkans, the Aegean islands, and western Asia Minor. Greek-speakers had settled this region centuries earlier. The *polis* remained the basic political unit, although earlier formations persisted, especially in Asia Minor and northwestern Greece, and new, or re-configured old, political arrangements like the federations of the Aetolians or Achaeans complicated the scene. Non-Greeks like the Carians and Lycians remained in much of Asia Minor, but their identities, which had taken on Greek features across earlier centuries, weakened further in Hellenistic times. All these entities had to confront large land empires claiming direct or indirect sovereignty, and with the economic implications of those claims – most notably, warfare and taxes.

II DEMOGRAPHY AND URBANIZATION

Greeks had always moved around the Mediterranean, but mobility has been argued to have accelerated between 350 to 250 BC. Archaic and classical movements are attested by documents as diverse as the Persepolis Fortification Tablets, with Greek artisans in Persian pay, and the soldiers' graffiti at Elephantine on the upper Nile.[1] But Scheidel's estimate that 2–3 percent of Greeks moved to colonies between 750 and 650 BC[2] reminds us that few people ever strayed far from where they were born. It is worth asking whether the modalities of movement changed in Hellenistic times – did people move for different reasons, did their options change (particularly for members of different social classes), or did the numbers of migrants differ? But these questions are difficult to address.

The most obvious cause of large-scale, long-distance movement was war. Alexander's army averaged perhaps 100,000 people, including camp followers. Some returned home, but others stayed as settlers in Alexander's new cities (see below) or as corpses in his cemeteries. After Alexander, however, there were no analogous large-scale conquest-driven permanent movements. The boundaries of the successor empires were relatively stable, excepting places like Coele Syria and Caria, and the loss of the eastern Seleucid empire (see above, Chapter 15). Armies that operated beyond the frontiers, like Antiochus III's forces in his war against Rome, typically returned home after hostilities ended. The military mechanism that did generate continuing movement in Hellenistic times was the demand – especially by the Seleucid empire – for fresh faces from Greece and Macedon. Within Greece and western Asia Minor military demands continued to fuel smaller-scale movements, as the occasional listing of garrison troops with their ethnics attests.[3] In general, it seems that the great burst of migration driven by military demands played itself out in the century ending by roughly 250 BC, and that thereafter the scale of such movement is likely to have contracted.

However, another engine drove movement in later Hellenistic times – Italian penetration of the East. Once again hard numbers are lacking, but literary sources for the Mithridatic Wars stress the visibility of Italians – including women and children – in cities like Ephesus and Delos during the first century BC. They also appear in inscriptions from Delos and elsewhere. In absolute terms they remained a minority in the Aegean, but they

[1] Hallock 1969 with Root 1997 on the Fortification Tablets; Porten 1996. [2] Scheidel 2003b.

[3] Here are three examples: (1) *IG* IV 854 with the correction of [T]i[m]aios to [Ei]renaios; see Foxhall et al. in Mee and Forbes 1997: 270 no. 8. In a dedication from Thera the same Eirenaios is called "secretary of the troops and fighters in Krete and Thera and Arsinoe [= Methana] and *oikonomos* of the same places"; *IG* XII 3 466 (Foxhall et al. in Mee and Forbes 1997: 271 no. 12); see *Pros. Ptol.* 15103*. (2) Thera: *IG* XII 3 325 with p. 230, and 3 Suppl. p. 283, explicated by Robert 1963: 388, 411–18. (3) Delphi: *ISE* 2 81.

nevertheless made important contributions to the economic life in the later Hellenistic period.

But how far were these movements pulled by social and political demands, or pushed by actual population growth? Recent demographic research (Scheidel, this volume) shows the constraints on secular growth for pre-transitional populations. Appeals to "growth" are suspect without very good data. Two lines of evidence seem worth considering, though neither provides definitive answers. Archaeological surveys in Greece (which remains better documented than western Asia Minor) reveal a fairly consistent pattern of changes in settlement sizes and numbers between the fourth and first centuries BC. Generally, there was notable growth in the numbers and sizes of settlements – especially rural settlements – from about 350 through the late third century. Thereafter numbers and sizes declined. This can be linked with comments in literary authors – most notably, Polybius – suggesting rural depopulation in Greece after roughly 200 BC.[4]

We might conclude that fourth- and third-century population growth put pressure on subsistence, fueling Alexander's conquering armies, then petered out, perhaps as the demand for troops outstripped the Greek world's ability to provide them. This might also explain the apparent pressure on landholding in third-century Greece and struggles over debt relief and land redistribution (see below).[5] The state of our evidence prevents us from saying whether the same story might apply to western Asia Minor.[6]

But the evidence for this interpretation is fragile. Survey results have come under scrutiny. Rural sites are usually dated from extremely small numbers of diagnostic sherds. The methods whereby sites are identified vary from survey to survey, and even within a single survey. Distinguishing between "early" and "late" Hellenistic (at c. 200 BC) may sometimes be overoptimistic. The reality of the change and links between the "facts on the ground" and the ambiguous written evidence have been questioned.

Improvements in our understanding of the Macedonian kings' recruiting practices may clarify the issue. New and newly reinterpreted inscriptions from Macedon reveal the kings' urgent concern with assuring steady, reliable supplies of troops. Fifteen-year-old boys were registered by household and eligible for call-up from sixteen; exemptions based on family needs were carefully laid out, but the state tried to guarantee that every family contributed at least one soldier. The state's interests reflected in these texts perhaps parallel Philip V's famous orders to Larisa to enroll new citizens (*SIG*^{3} 543) – presumably Philip's desire to find soldiers, not abstract concerns for Larisa's welfare, drove his intervention. But again, the demographic implications are hard to read. Availability of troops and systems for calling them up were always fundamental concerns of Hellenistic states. There is

[4] See Reger 2003b for a summary. [5] Fuks 1984. [6] Hatzfeld 1919; Mavrojannis 2002.

still no clear evidence for new urgency after 200 BC, or that numbers had declined.[7]

(a) *Urban foundations*

Royal creation of new cities was not a Hellenistic innovation, or even Alexander's brainchild, though his precedent came to be tantamount. Isocrates had urged Philip II, significantly, to found new cities in Asia Minor and populate them with unemployed Greeks (*Phil.* 120). Philip himself refounded Krenides as Philippi in 356; Diodorus says that "by founding noteworthy cities in appropriate places he put an end to the Thracians' audacity" (16.71.3). Philip's activities involved population transfers,[8] effecting movement of people first by immigration (forcible or otherwise) of Greeks and Macedonians to establish the "Greek" core of cities; second, by moving people into new cities from the countryside around them; and third, by taking people away from Greece.

But there were also foundations within old Greece. According to Strabo (7.21), Cassander founded Thessalonica by "destroying about twenty-six settlements (*polismata*) in Krousis and on the Thermaic Gulf and resettling them in one place."[9] He also refounded Potidaea as Cassandria in 316.[10] Strabo (9.5.15) also tells us that

> Demetrius Poliorcetes founded Demetrias, named after himself, between Nelia and Pagasae on the sea [in Thessaly], resettling in it the nearby towns (*polichnai*) Nelia and Pagasae and Ormenion and Rhizous, Sepias, Olizon, Boibe, and Iolkos, which are now villages (*komai*) of Demetrias. This was moreover for a long time a naval station and palace (*basileion*) for the kings of the Macedonians, and it controlled Tempe and both mountains Pelion and Ossa, as mentioned already.[11]

Such foundations (or resettlements, for all three are called *synoikismoi*) must have had profound local economic consequences. Even when no population was added, the act of concentration in a new or enlarged urban center created a new locus of demand for food and other essentials, and new markets (both in the physical and metaphorical sense). Another, often cited, example of this and royal interests in it comes from the failed *synoikismos* of Teos and Lebedos in Asia Minor, ordered by Antigonus the One-Eyed.[12] Moreover – and surely this was always one of the kings' chief interests – a new city was also a new source of taxes and manpower.

[7] Hatzopoulos 2001.

[8] See Cohen 1995: 15–17 on Philip's policies, with further references. [9] Cohen 1995: 101–5.

[10] Diod. Sic. 19.52.2, *IG* XII 444.117 (*FGrHist* 239); Strabo 7.25; further details in Cohen 1995: 95–9. Buraselis (1982: 37) discusses whether Cassander founded Cassandria and Thessalonica to draw north Aegean trade.

[11] See Cohen 1995: 111–14. [12] Welles 1934 nos. 3–4.

(b) *Taxation*

Kings were always interested in taxes, as the first two books of the pseudo-Aristotelian *Oeconomicus* show. Kings were prodigious consumers of money. In 315 Antigonus the One-Eyed apparently enjoyed an annual income of 11,000 talents in addition to 10,000 that had just fallen into his hands (Diod. Sic. 19.56.5). Ptolemy II reportedly had an annual cash income of 14,800 talents (*FGrHist* 260 F42). This money supported the army and underwrote the expenses of kingship. Kings were expected to be generous to their friends and subjects. In the same passage in which Porphyrius of Tyre (as transmitted by Jerome) reports Ptolemy's income he also lists the king's armed forces: 200,000 infantry, 20,000 cavalry, 2,000 chariots, 500 elephants, 1,500 warships, and 1,000 supply ships. Even allowing for exaggeration, the numbers are impressive.

Money also flowed out of the royal treasuries as gifts. Alexander famously gave Phocion 100 talents (Plut. *Phoc.* 18), and Livy (35.18.1) explicitly mentions an Acarnanian who left Philip V's service for Antiochus III's because the latter had more money. Grants of property and/or tax exemptions (representing a loss to the treasury) could also be gifts. Granting (or re-granting) of several parcels of land to Perdiccas, Cassander "gives also to him and his descendants exemption from taxes (*ateleia*) when he imports or exports items related to the property,"[13] that is, for personal use; such restrictions on tax exemption are common in grants.

The huge tax revenues that kings required flowed from multiple sources, big and small – but a good portion must have been raised by imposts on *poleis* under their authority. An inscription from Miletus in Ionia gives a sense of the scale of demands a king might place on a *polis.* In 283/2 the Milesians found themselves unable to pay the second installment of money owed to king Lysimachus, and turned to Cnidus for help. The Cnidians lent 55,000 drachmas (9 1/3 talents), part at interest, part interest free.[14] It has been suggested that many loans taken out by *poleis* as corporate bodies – particularly a series by Cycladic islands in the early third century – were intended to pay taxes to their sovereigns.[15]

Of course the *poleis* themselves also raised money by imposing taxes. We hear of various tithes on agricultural production, taxes on land sales, import and export dues, and so on; sales of citizenship and priesthoods become mechanisms for raising money.[16] Most famous – but very difficult to contextualize – is an inscription from Cos listing civic taxes in the

[13] *SIG*^{3} 332.27–31, to be read in Hatzopoulos' new edition (1988: 22–5).
[14] *Milet* I 3 138; Migeotte 1984: 299–304, no. 96.
[15] Migeotte 1984: 156–7; discussion: Reger 1994: 37–8.
[16] Jonnes and Ricl 1997: 4 lines 46–7 (*SEG* 47 1745); Lambert 1997, on Athens; on sales of priesthoods, Parker and Obbink 2001. A full study of Hellenistic taxation remains a *desideratum.*

context of obligations owed by the farmers who bought them.[17] A series of inscriptions from Athens records payment of a 1 percent tax on land sales.[18] The mechanisms by which *poleis* raised money seem as varied as those of the kings.

From an economic point of view it remains hard to assess the meaning of all this taxation. In general, kings could apparently raise money whenever they needed to, including money for wars, lavish spending, and to pay indemnities. Aperghis argues that the tax burden on the Seleucid empire was, relatively speaking, not heavy.[19] Be that as it may (see above, Chapter 15), only after the Roman civil wars of the first century BC do the literary sources speak broadly of economic exhaustion in the Greek world. There were certainly economic problems in Hellenistic Greece, but the economy's continued ability to support wars through taxation suggests that burdens were manageable. We should not assume that the need to pay royal taxes lay behind every loan that *poleis* took out in these centuries. Loans were often taken out, especially from the citizen and metic body of a *polis*, for local purposes – be this self-defense, as in a famous case on Cos during the First Cretan War, supporting building activity, creating grain-buying funds, or for any other possible civic purpose.[20]

III AGRICULTURAL PRODUCTION

Agriculture remained the chief economic activity for most people in Greece. Outside of the northern kingdoms (Macedon, Epirus) this took place on land belonging to *poleis*, the "independent" city states that were sometimes linked, strongly or weakly, into various kinds of federations.[21]

Of the fifty-two writers of agricultural manuals named by Varro in his *De agricultura*, all but a few seem to have been Hellenistic; unfortunately, their works are lost.[22] Some historians argue that regulations in certain leases implying "scientific" farming reflect the contents of these manuals. For example, a series of fourth- and third-century Attic leases attests to renting and regulation of use of land in private (often corporate) hands; some of these leases include explicit instructions about land use, planting, and other matters.[23] A fourth-century lease from Arkesine on the island of Amorgos (*IG* XII 7 62; *SIG*^{3} 963) regulated the frequency of ploughing and the digging of the vines and figs on the property, and imposed fines for failing to follow

[17] *SIG*^{3} 1000. For problems with tax-farmers at Colophon, see Etienne and Migeotte 1998 (*SEG* 48 1404).

[18] Lambert 1997. [19] Aperghis 2001.

[20] See the splendid collection of evidence and analysis in Migeotte 1992.

[21] For the Aetolians, see Scholten 2000; Grainger 1999a; on the emergence of the federal state in Greece, see Corsten 1999.

[22] Varro, *Rust.* 1.7–9; see, briefly, Flach 1996: 225.

[23] *IG* II^2 2490–2504 (2495 = *Agora* XIX L10; for a translation of 2492, see Burford 1993: 231–2).

the regulations. The Athenian Androtion served as governor on the island at roughly the same time (*IG* XII 7 5; *SIG*³ 193), and his writings on farming may have inspired the detailed conditions of this lease and another from Rhamnous in Athenian territory.[24] The Rhamnous lease, which ran for ten years from 338 BC, specifies the frequency of ploughing ("alternately," *enallax*), that half should be planted in wheat (*pyroi*), a quarter in pulses, and a quarter left fallow. Regulations govern the care of olives, figs, other fruit trees, manuring, and irrigation of the garden. The owners of this property – a group controlling a sanctuary at Herme – were anxious to guarantee that the renter took care of the property and returned it at the end of his lease in a condition that would permit easy re-rental. Leases of various kinds survive from many communities, with various terms and types of obligation, including "sacred" leases from places like Delos.[25]

Some cautionary remarks are in order. First, the leases with detailed stipulations about land-use all come from public or quasi-public contexts. Only one Greek lease deals strictly with privately owned land rented to private individuals (*SIG*³ 302, of 326/5). We therefore cannot say whether the surviving leases' interest in regulating the kinds of agricultural activity undertaken reflect the responsibilities of corporate bodies to keep their land in good condition. For example, Apollo's agents sometimes required the lessees of sacred land on Delos to undertake specific activities, like the planting or extirpation of vines, or to allow sacred animals to graze on land they rented – even if such grazing might be detrimental to the renter's interests (*ID* 503.21–26, *IG* XI 2 287A58). The conditions probably at least partly relate to the terms of the leases. On Delos renters held estates for ten years; leases up to forty years are known (*IG* II² 2492.2–3), but the land ultimately reverted to the owner, who will have wanted it returned in a condition that would be attractive to a new lessee. (One may contrast the permanent leases of certain properties at Mylasa in Caria, granting renters the rights of owners.[26]) But Xenophon's advice in the *Oeconomicus* should alert us to private owners' interest in getting the most out of their land; it would be surprising if the same men who scrupulously stipulated conditions for renting land in Herme failed to exercise similar care on their own properties. However, these leases do not necessarily mean either that there were efforts to increase productivity or that there were fundamental changes in agricultural regimes in Hellenistic Greece.

[24] For the Rhamnous texts, see now Petrakos 1999: 143–6, no. 180 (*IG* II² 2493 + 2494; a newly discovered fragment bearing lines 39–63 remains unpublished) with Jameson 1982; 1987; the fragments of Androtion's *Georgika* are presented in *FGrHist* 324 F75–82. See Walbank 1991: 157: "some of its [the Amorgan lease's] terminology and provisions may derive from Androtion's work." The Amorgan lease is republished with English translation and commentary in Rhodes and Osborne 2003: 282–6, no. 59. On pasturage in leases, see Chandezon 2003. I am preparing a study of Hellenistic land-leases in connection with a larger work on agricultural writers and practices.

[25] Osborne 1985b; 1988; Sosin 2000. [26] For example, *IK Mylasa* 206.20 and 801.16.

The strong evidence from archaeological surveys for increased rural settlement in the fourth and third centuries, followed by a striking drop in the numbers of such sites after about 250–200 BC,[27] may help explain these leases. In the southern Argolid, the number of small ("third-order": 0.05–0.30 hectares) rural sites increased rapidly between c. 350 and 250 BC, until there were ten (98 in total) for each first-order site. Press-beds and other traces of olive culture abound, and increased investment in olives may have been linked to the new dispersed settlement pattern. Around Flamboura it has even been possible to trace out the likely boundaries of seventeen properties, ranging from 5.5 to 22.5 ha. – too large for simple subsistence agriculture. This pattern changed drastically after about 250, as the number of third-order sites dropped to seventeen and soil deposition in valleys suggests increased erosion, possibly due to failure to maintain upland terraces. Population decline may have caused the changes, provoked consolidation of land-ownership in fewer hands, and stimulated the emergence of a large non-citizen population at Epidaurus, as inferred from a casualty list of 146 (*IG* IV 1^2 28).[28]

Polybius famously remarked on Greek depopulation in the Hellenistic period: "In our time the whole of Greece has been subject to a low birth rate and a general decrease of the population, owing to which cities have become deserted and the land ceased to yield fruit, although there have neither been continuous wars or epidemics." Polybius attributes decline to greed: people refused to have children, or had only one or two, to preserve their patrimony. Then, if they died prematurely, "houses must have been left unoccupied . . . so by small degrees cities became resourceless and feeble" (36.17.5–6). Philip V's famous letters ordering Larisa to enroll more citizens so the city would be strong and the land not deserted seem to support this view (*SIG*^{3} 543). However, Polybius' views are framed in moral, not economic, terms, and do not relate exclusively to the countryside. For Philip, Larisa's problem lies not in low population in general, but a lack of citizens to farm the land (which only citizens could own); he even threatens to enroll freed slaves, after the Roman model. Other factors may lie behind the decrease in evidence for rural settlement, from actual decline of rural population, to loss of property by citizens (who may have become landless rural laborers), to misreading of the evidence.[29]

Other explanations are possible. In the Athenian deme of Atene a fourth-century increase in rural houses associated with land apparently planted

[27] For example, at Thespiae and Thisbe in Boeotia, Bintliff and Snodgrass 1985: 31–3; in the Nemea valley, Wright et al. 1990; and on Keos, Cherry et al. 1991. Generally, see Alcock 1993: 33–92.

[28] Jameson et al. 1994: 383–400.

[29] Mark Lawall has cautioned me about the difficulties of dating Hellenistic pottery as precisely as some surveys claim to do (for example, the Keian survey: Cherry et al. 1991), meaning that the reality of the phenomenon described may not yet be established. See also Corvisier and Suder 2000: 112–17.

with olives has been attributed to a local export-oriented specialization in olive culture, and population decline at the end of the century to the collapse of "free and unhindered commerce . . . guaranteed by the imperial supremacy of Athens in the Aegean."[30] Still other explanations, like possible competition from Argive olive groves, can be imagined. Multiple causes are possible and must be tested for.

Some documents that are not typically brought into the discussion provide evidence that the well-attested classical practice of owning multiple, non-contiguous properties as protection against highly localized crop failures remained important in Hellenistic Greece. In one case, the Macedonian Perdiccas son of Koinos owned properties in three different places; in another, Lysimachus awarded three separate estates (*agroi*) to Limnaios in 285/4: one, of 1,200 plethra, with trees (probably olives); another with trees of 630 plethra; and the third with 900 plethra in trees and 20 in vines.[31] These estates covered roughly 120, 63, and 92 hectares – well beyond the size of the farms identified in the southern Argolid, and clearly on the scale of sizeable, slave-operated estates.

IV PRICES AND MARKETS: LINKING PRODUCTION TO CONSUMPTION

Multiple interests converged in the process of bringing agricultural commodities to consumers. The least visible are the producer-consumers: farmers feeding their families directly off the production of their land, who certainly dominated production and consumption throughout Hellenistic times. Growing their own food, however, did not mean they were isolated from market and non-market forces that moved agricultural commodities off farms. In the first place, urban centers acted as magnets for food. Large urban centers exercised strong demand (because they housed so many non-producers and because they controlled so many of the mechanisms by which food products were distributed), to the extent that during periods of stress urban dwellers may have had more access to food than rural folk.[32] But urban centers were also loci of wealth and power, which exercised decisive control over the distribution of food. A good portion of the land in many *poleis* was in the hands of wealthy urban dwellers who insisted on making money from their holdings and so moved a substantial portion of their annual production through the market. Second, even the poorest, most isolated subsistence farmer needed cash to buy food in hard times and items he could not produce himself, like large storage *pithoi* which required

[30] Lohmann 1992: 56.
[31] Hatzopoulos 1988: 17–54 (*SEG* 38.619), with details on the estates at 36–43.
[32] See generally Garnsey 1988.

special skills to make, and to pay taxes.[33] The problem, again ultimately intractable, is to gauge how far the agricultural world was "plugged into" and influenced by market (and non-market) transactions.

Prices can be a measure of the integration and productivity of the agricultural sector (see above, Chapter 15), if a smoothly functioning market sets them. Greece and western Asia Minor have provided nothing comparable to the price series from Hellenistic Babylon – prices all the more precious because they come from a major city with a massive, fertile hinterland. Van der Spek concludes from these prices that "the integration of the food market of Babylonia with the rest of the (Seleucid) world was poor." It is hard to say how far this was true of Greece and western Asia Minor. Some studies suggest that local markets set prices with relatively little integration between *poleis* even at relatively short distances,[34] while others see a more integrated market that at least set prices for grain across a broad region.[35] The disagreements stem in part from the lack of data – the best price series comes from Delos, which is in many ways a special case. However, there was apparently a general sense of what prices for staple grains *ought* be, especially following the harvest. That price was typically around 5–6 dr per *medimnos* of wheat.

Market integration depends on reliable flows of information, so judging market integration in Hellenistic times requires consideration of how information about prices moved. Information transfers had to involve movement of people – whether traders themselves or others to whom they entrusted letters or verbal accounts of market conditions. The Hellenistic data (including Egypt as well as Greece and western Asia Minor) suggest two fundamental poles. First, there were efforts to transmit data about prices from place to place, especially between major centers of sea-borne traffic like Rhodes, Alexandria, and Athens. Second, the unpredictability of travel conditions made the effectiveness and timeliness of these transmissions highly uncertain.[36]

Thus these views may not be wholly irreconcilable. On the one hand, the movement of traders, travelers, and information around the Aegean assured that people everywhere had a general sense of where prices tended to sit. Such general knowledge could account for a fairly widespread sense that (say) wheat should sell for so many drachmas after harvest. But delays due to weather, shipwrecks, war, etc., could frustrate timely transmission of information (and goods) over even short distances, so that local conditions – crop failure, war, sudden tax demands, etc. – could create short-term but strong price differentials. The Hellenistic market was probably only partially, imperfectly, and transitorily integrated – it linked local markets which

[33] Note the model of Gallant 1989.
[34] Reger 1994: 124–5, but see now also the critique of Sosin 2002. [35] Bresson 2000.
[36] The classic case, frequently cited, is Ps.-Demos. 56.3 (with Reger 1994: 75–82).

exercised mutual affects on each other, but acted only slowly, and sometimes not at all, to correct price fluctuations.[37]

Finally, public entities also sought to control prices by non-market intervention. These practices are too widely attested to be dismissed as exceptional.[38] Public actors also tried to influence pricing by less direct means, such as dumping publicly held commodities – especially foodstuffs – on the market at times of price stress, stockpiling and public sale at reduced prices (which may have been motivated by non-economic considerations), and through persuading private actors to moderate prices. These activities reconfirm the importance of the market – unless prices *were* subject to market fluctuations, the state would not feel compelled to intervene – but also hint at belief in a doctrine of "fair prices" such as Aristotle laid out in the late fourth century.[39]

V MONEY AND MONETIZATION

Below the radar screen of our sources, many economic transactions doubtless still took the form of barter between individuals. Their agreement to swap so much *x* for so much *y* may have been influenced by a sense of what the goods might fetch for money, but doubtless also reflected social and personal considerations. Non-monetarized transactions also occurred on a larger scale. Taxes were collected in kind as well as in money, and the state could requisition large stocks of agricultural commodities. We cannot quantify this sector, but it must have been important throughout Hellenistic times, and surely influenced people's sense of what goods were "worth" in the market as well, in ways that are difficult to uncover.

But many Hellenistic exchanges were definitely mediated through money. Money's role in exchange in classical Greece has become much clearer, and the trends in place in the fourth century definitely continued thereafter. States needed coined money to pay troops, war indemnities, and numerous other expenses. Many private transactions were also monetarized, and the increasing spread of coins in "bronze" – actually copper alloys – which were introduced in the fifth century permitted the monetarization of even quite small exchanges. An inscription from Cos about the sale of a priesthood offers a typical example, in which cash payments may replace traditional offerings in kind.[40] Two aspects of money's influence on the economy require deeper investigation: the impact of inflation on prices, and the role of standardized coinage in facilitating exchange and market integration.

[37] See also the regional model in Horden and Purcell 2000.

[38] Migeotte 1990; 1991; Bresson 2000. [39] Reger 1993; Migeotte 1990; 1991.

[40] See Reger 2003b: 347–9 for examples. For the Coan inscription, Parker and Obbink 2000; it is hardly the only example. Shipton 2000 argues that fourth-century Athens was already highly monetized.

Discussion of inflationary pressures must begin with the impact of Alexander's seizure of the Persian treasuries. According to the literary sources,[41] Alexander seized roughly 180,000 talents in the form of about 312 tons of gold and 2,000 tons of silver, mostly from Persepolis and Susa.[42] At least some of this metal was later coined. It has been estimated that between roughly 330 and 290 the drachma equivalent (in staters, tetradrachms, and drachms) of over one billion coins was struck on the Attic standard (4.3 gr/dr). This represents roughly 170,000 talents of silver – strikingly close to the total taken by Alexander.[43] The equivalence cannot be pressed, since other sources of metal continued to be exploited for coinage, most notably Macedon's mines (see below). Nevertheless, the new coinage put into circulation in the early Hellenistic period was considerable. On average, it represents roughly the equivalent of adding 25 million drachmas per year (4,167 talents) to the money supply – roughly four times the annual revenues of the fifth-century Athenian empire.

Unless balanced by equivalent productivity gains, adding such huge quantities of money to the Greek world was a recipe for inflation. Prices from early Hellenistic Babylon may reflect this.[44] Babylon, of course, was by far the most important city in Mesopotamia and – equally important – Alexander had been spending profligately there in preparation for his next expedition.[45] The concentration of spending in time and space could easily have driven inflation.

The story in Greece and western Asia Minor is more complicated. Not all the money Alexander seized can have returned to the west. He must have spent heavily in the Middle East, on his wars and civic foundations (even if our sources grossly exaggerate their number).[46] The money that did return to Greece did so over several years, as discharged soldiers returned home and coins put into circulation in the Middle East made their way west. It is hard to know what percentage of the coinage in circulation the new coins struck off Alexander's plunder represented. For some sense of scale, Athens' estimated annual public income under Lycurgus after 338 totaled about 1,200 talents,[47] roughly 30 percent of the total coinage being added annually. We

[41] Diod. Sic.17.66.1–2, 71.1, 74.5, 80.3; Plut. *Alex.* 36.1; Strabo 15.3.9; Arr. *Anab.* 3.16.7; Curt. 5.2.11, 6.9–10, 6.2.10; Just. *Epit.* 9.14.9.

[42] De Callataÿ 1989a. [43] De Callataÿ et al. 1993: 13–18.

[44] Grainger 1999a; Van der Spek 2000b; Temin 2002; and see Chapter 14.

[45] Arr., *Anab.* 7.19.3–5 reports the construction of a new fleet requiring the cutting down of all the trees in Babylonia, excavation of a harbor to hold 1,000 warships and docks, and the dispatch of Mikkalos to Phoenicia with 500 talents (30,000,000 drachmas) to hire crews. These operations alone will have put an enormous amount of money into circulation at Babylon in a very short time.

[46] Fraser 1996.

[47] Plut. *Mor.* 842F gives the figure of 1,200, which, however, sits uncomfortably with the total that Lycurgus is said to have been in charge of over his term, 14,000 or 18,650 talents (841B and 852B). Burke (1985: 251–2 n. 5) offers a reasonable, if not wholly satisfactory, solution.

cannot determine what percentage this represented of the money circulating at Athens, but if, as has been argued, Lycurgus generated most (perhaps two-thirds) of this income from commercial traffic, then these 1,200 talents may have been just 10 percent of the coinage in circulation. Such wealth was not typical of Greek cities – even after the Social War Athens was a major power, capable of fielding considerable forces in 338 – but does offer a sense of scale. In general, we might suppose that the coins struck from Alexander's plunder had some impact on prices, but that impact is hard to read in our sources,[48] probably because it was spread over a long period and acted differently in different places, due to variations in the "pull" of different centers on the coinage (presumably places well connected to long-distance trade and regions from which soldiers were heavily recruited would have attracted more of this money than places not so situated) and to the imperfect integration of the market already discussed.

However, there were two apparent far-reaching consequences of this spate of minting. First, the coins produced appear to have largely satisfied demand for coins until about 225 BC. There were relatively few royal or *polis* issues in these decades. After about 225 civic and royal mints came back into play, producing new issues with increasing frequency; in the first third of the second century, Athens re-entered the market for coins by issuing the so-called "New Style" coinage, probably irregularly at first but certainly annually after 145.[49] Much of the third century, therefore, apparently enjoyed sufficient pre-existing coinage to satisfy demand. Second, the Alexanders and similar issues (Lysimachoi, Demetrioi, etc.), all struck on the Attic standard, came to serve as the "common currency" (to borrow a phrase of Pl. *Leg.* 742a) of the Greek world. Payments were often stipulated in Alexanders or coins of Attic weight.[50] The last phase of monetary changes in Greece came late in the Hellenistic period, starting with Sulla but accelerating only with Marc Antony, as large numbers of Roman *denarii* entered Greece.

VI INSTITUTIONS

The Hellenistic world inherited from classical times a wide array of institutions that continued to serve central economic functions, but also saw the emergence of new institutions and some important changes to pre-existing

[48] De Callataÿ 1989a, De Callataÿ in De Callataÿ et al. 1993; Reger 2003b: 347.

[49] Thompson 1961 remains indispensable, but her dating is universally rejected. Most scholars today accept Mørkholm's 1984 dates of 145/4–78/7 for issues 20–87. Many reject his starting date of 185–180 in favor of a date of c. 168 (e.g., Mattingly 1990; Price 1989; see also Touratsoglou 1993: 31–40). The views of Dreyer 2000 seem to me unlikely to be right.

[50] Knoepfler 1997; Marcellesi 2000.

institutions. Identifying what drove these changes, and whether they reflect new economic conditions, are central questions.

One old institution saw extraordinary growth in the Hellenistic period – euergetism, the practice of individuals giving gifts, in money or kind, to public institutions, especially *poleis*, in return for recognition and status.[51] Euergetism had long been a mainstay of Athenian public finance as a mechanism for building and maintaining its fleet (until new financial arrangements were introduced in the mid-fourth century) and for financing civic displays like the annual dramatic festivals. Its spread throughout Greece and western Asia Minor in the Hellenistic period was a distinctive feature of the age. Two new developments should be noted. First, kings and their families emerged as outstanding *euergetai* for many *poleis*, making gifts on scales unimaginable to even the wealthiest fifth- or fourth-century Athenian. For example, around 299 the eldest son of Antiochus I financed the construction of a stoa one *stadion* (about 200 m.) long at the sanctuary of Didyma near Miletus, emulating gifts of his father. A second-century royal gift to Miletus of 160,000 *medimnoi* of grain and wood to build a gymnasium represented a value, in the grain alone, of between 130–260 talents – a huge sum.[52] In exchange for such gifts, kings received honors – most notably, cult. These gifts were moves in the complex dance between kings and cities that formed one of the chief features of the political, social, cultural, and economic life of the Hellenistic world.[53] Wealthy individuals adopted the model provided by royal euergetism. Particularly after about 200 BC, their gifts came to resemble the royal version especially in the honors extracted from *poleis*. The implications ran beyond the economic sphere, but as an institution euergetism surely played a fundamental (though unpredictable) role in the finances of Greek and western Asia Minor *poleis.*

Banks had of course existed in classical Greece, although their roles have been disputed in the debates over the "primitiveness" of the economy.[54] Private Hellenistic banks are well attested, such as the Delian banks that took over the treasury of Apollo in the early second century. Public or state banks also existed, and were sometimes used to administer funds given to *poleis* by *euergetai* (*Milet* I 3 145; *SIG*^{3} 577). Banks both "stored" funds and made loans.[55]

It remains to consider whether Hellenistic Greece saw the emergence of new institutions (whether public or private – and the degree to which this distinction applies is debatable), or the reconfiguration of old institutions, to serve economic ends. One institution that seems to be reconfigured is

[51] Gauthier 1985 remains fundamental, but see also Bringmann and van Steuben's massive (1995) collection of evidence.

[52] *OGIS*213, Bringmann and van Steuben 1995: 338–41 no. 281; *idem* 346–8 no. 284.

[53] A perennial topic for historians – see Ma 2003.

[54] Millett 1991; Cohen 1992. [55] For example, Beschi 1992–3: 263.

proxenia. Originally a "guest-friend" in one *polis* who served the interests of another (hosting ambassadors, standing surety, providing access to the machinery of the state), the role of the *proxenos* expanded in Hellenistic times. Some inscriptions are laconic, like this one: "The Aetolians have given *proxenia* according to the law to Lysikles son of Phaidros the Athenian" (*IG* IX I 4.3–4), but others are more informative: "Parmeniskos son of Alexidikos is *euergetes* and *proxenos* of the Kalymnians, both himself and his family (*genos*), forever, and they have the right to own property on Kalymnos and exemption from taxes on things imported and exported in both war and peace" (*Tit. Cal.* 1A, fourth century BC). It would be a mistake to see economic motives ("promotion of trade") behind all proxeny decrees. Many were granted for other purposes.[56] But some did serve economic ends. The proxeny awarded by Geronthrai in Laconia to a citizen of Lacedaemon granted him the right "to own land and a house and to pasture animals and freedom from seizure in war and peace and all the other benefits accorded to the other *proxenoi* and *euergetai*" (*IG* V.I. 1112). *Poleis* jealously guarded the right to pasture animals, as many texts adjudicating disputes or awarding mutual pasturage rights attest. The Lacedaemonian granted rights here would have hoped to draw economic benefit; his tax exemption on imports and exports would have added value to the award. Moreover, the award of *proxenia* and other honors sometimes recognized tangible economic benefits to the *polis*:

> Since Peitas son of Kratesinikos of Asopos is well disposed toward the *polis* of the Kotyratans through his ancestors, and now, when the city had need of funds to expend (*diaphoroi*) and men appointed with the ephors came to him from the city and explained the need, he promised to lend the city money and he gave as much as the city needed without interest. . . .

Peitas was rewarded with a series of benefits, starting with *proxenia* and including *isopoliteia*, pasturage rights, and complete freedom from taxation (*IG* V.1.962). It has been suggested that the Athenians in the late fourth century explicitly granted the right to own property to merchants and traders to attract commerce. Some scholars see Athens' needs to encourage grain imports at good prices as lying behind honorary decrees from the later fourth and early third centuries.[57]

Asylia was another largely new institution which had, or could have, economic effects.[58] In general, declaring *asylia* involved the recognition by others of a sanctuary and its territory, or a sanctuary and the city in which it stood, as "sacred and inviolable," standing outside the traditional right of corporate entities and persons to "seize . . . goods . . . as reprisal for an alleged wrong."[59] The earliest examples of declarations of *asylia* on inscriptions date

[56] See Reger 1994: 63–74 (but with a narrow Delian focus).
[57] Peçirka 1966: 59–61; Bresson 2000. [58] Rigsby 1996. [59] Jones 1999: 56.

to the 260s; Tacitus provides the latest, in AD 22–3.[60] A recent major study of *asylia* insists that its only purpose was to bring honor to the sanctuary and city.[61] While *asylia* did bring its subject honor, the texts suggest that other motives, some broadly economic, also played a role. A decree of the Amphictyonic Council for the sanctuary of Apollo Ptoios in Akraiphia declared inviolability for five days for persons coming to and departing from the god's *panygeris* and "while the *panygeris* is going on for them and their servants and the goods (*chremata*) which they have, everywhere; and if anyone, in violation of these provisions, seizes (*agei*) anyone or robs him, let him be subject to prosecution before the Amphictyonians."[62] This declaration enhanced the security of the festival and encouraged attendance. Other texts relating to festivals show the economic advantages accruing to the cities that sponsored them.[63] When the Phocaeans recognized *asylia* of the sanctuary of Poseidon and Amphitrite on Tenos and of the whole island, they also contributed five *mnai* (500 drachmas) toward work on the temple, and promised further contributions once their own affairs and a war were dealt with.[64] In this case the relationship, *oikeiotes*, between the cities facilitated the contribution.[65] Here, then, was an institution whose fundamental purpose was non-economic but whose side effects at least sometimes entailed economic advantages for the honorand.

We should also note institutions that facilitated the movement of persons or groups: in particular, *isopoliteia* and the various forms of *sympoliteia*.[66] Declarations of *isopoliteia* permitted citizens of one *polis* to immigrate to another and claim citizenship rights (sometimes with temporary conditions). For example, an agreement negotiated with Aetolian help established *isopoliteia* and the right of intermarriage (*epigamia*) between Messenia and Phigaleia in the mid-third century (*StV* III 495). A more detailed agreement between Pergamon and Temnos in Asia Minor specified:

> There is to be citizenship [*politeia*; the more precise *isopoliteia* is used earlier in the text] for Temnians in Pergamon and for Pergamenes in Temnos, participating in the things that the other citizens also participate in, and there is to be the right of ownership of land and house for the Temnian in Pergamon and the Pergamene in Temnos. In Pergamon the Temnian is to pay tax at the same rate the Pergamene pays, and the Pergamene in Temnos at the same rate as the Temnian pays. . . .
>
> (*OGIS* 265, *StV* III 555.17–24)

[60] Rigsby 1996: 580–6; Tac. *Ann.* 3.60–3, 4.14.

[61] Rigsby 1996: 22–5; but see Jones 1999: 56, recognizing implicitly the economic dimensions of the institution.

[62] Rigsby 1996: 63–7 no. 3; *SIG*[3] 635; Rigsby's translation, adapted.

[63] For example, the famous regulations of the festival at Andania, *SIG*[3] 736. For the festivals of sanctuaries, see De Ligt 1993a with the brief but useful remarks of Andreau 2001: 121–2 on the historiography; for Asia Minor, Dignas 2002.

[64] Rigsby 1996: 154–6 no. 53; Etienne 1990: 93–5.

[65] Cf. Curty 1995.

[66] For *isopoliteia* see Gawantka 1975; for *sympoliteia*, Reger 2004.

A similarly explicit agreement between Hierapytna and Priansos on Crete specified the right to buy and sell, to lend and borrow money, and to exchange all other things in accord with the laws in each *polis*.[67] The economic benefits could not be clearer. The increasing incidence of such agreements between Hellenistic *poleis* eased movement and facilitated trade, making access to courts and other local institutions easier. But there was also a price, in the form of surrendering citizenship in the home country.

Sympoliteia was a more complex phenomenon, by which two neighboring *poleis* were united politically, creating one community where there were previously two. These unions, however, were not always complete or permanent. The best known is the failed *sympoliteia* of Lebedos and Teos in Asia Minor, promoted by Antigonus the One-Eyed and heartily resisted by the two cities.[68] Because, unlike *isopoliteia* agreements, *sympoliteiai* linked neighbors, their impact on the movement of persons and on economic activity tended to be limited to a local or regional scope. Nevertheless, the economic implications could be profound. An inscription recording the absorption of Pidasa by Miletus emphasizes the agreement's economic implications: the Pidaseans were granted a series of concessions, including temporarily reduced taxes on many agricultural products and the promise of a road connecting Miletus and the former territory of Pidasa.[69]

Sanctuaries were another institution with a substantial economic role. Sanctuaries might control significant wealth in the form of dedications, buildings, and landholdings, and because of the protection of their gods, served as storehouses for public wealth and as banks. The fifth-century Athenians had kept their public surplus in the Parthenon, but they were hardly unique; in the third and second centuries the Delian state stored its funds, largely in cash, in Apollo's temple. The lines between the god's wealth and the city's sometimes blurred. In 248 the priests of Heracles at Beroia in Macedon complained to king Demetrius that "some of the god's income had been diverted into civic income"; the king ordered the practice stopped.[70] Sanctuaries also received income from practices like manumission, typically when manumitted slaves were required to make thank-offerings to the god.[71] Many sanctuaries rented out land or other real estate. And, of course, they acted as banks. It has even been suggested that the sanctuary at Delos acted as a source of funds to free up civic monies for more speculative loans.[72] Sanctuaries in Asia Minor may have sought to keep their financial interests separate from the *poleis* that controlled them,

[67] *IC* III iii 4.16–18; Chaniotis 1996: 255–64, no. 28, and see his discussion of *isopoliteia* at 101–4.
[68] See Reger 2004, with further references.
[69] *Milet* I.3: 149. See especially Gauthier 2001; also Reger 2004.
[70] Hatzopoulos 1996: 2.28–30, no. 8.4–8.
[71] E.g., *IG* II² 1553–78, *SEG* 25.180; Hatzopoulos 1996: 2.28–30, no. 8.9–13; see also Meyer in press.
[72] Gabrielsen 2005.

reflecting differences in interests between cities and sanctuaries (as represented by families of priests who controlled them and sought independent relations with sovereigns, for example).[73]

"Private" institutions also facilitated economic activity. A number of merchant associations are attested on Delos in the period of Athenian control after 167.[74] In 153/2, for example, the association (*koinon*) of *emporoi* and *naukleroi* of Tyre who worshiped Heracles honored one of their number who had served as ambassador to Athens to request a place on Delos to build a sanctuary of Heracles (*ID* 1519). An association of "merchants and ship-captains and warehousers" of Berytus who worshiped Poseidon (*emporoi kai naukleroi kai endocheis*) is perhaps the best known. They left a long decree honoring the Roman banker Marcus Miatius (*ID* 1520). Starting in 121, other associations of private persons came together on Rhodes to facilitate their economic activities. The group of "those who live in the Lindian *polis* and who farm in the Lindia," later expanded to "those who live in the Lindian *polis* and farm and sail in the Lindia" (*Lindos* 300a4–6, 384b15–16), embraced both citizens and non-citizens. This group may have pooled resources to transport, store, and ship agricultural products they produced in the *chora* of Lindos; citizen members could use their access to Rhodian state institutions to protect all members' interests. Indeed, archaeological evidence for storage and shipping facilities within Lindian territory may be associated with these groups.[75] An inscription of probably 146 BC from Troezen may provide another example of this sort of institution. Among forty-one groups giving their property to the city for its "fortification and preservation" were the *patriotai* of the Arcadians, who had received the right to own land, but not citizenship. The right of non-citizens to own land in Troezenia is reminiscent of the story (mentioned above) of Philip V's attempt to increase cultivation at Larisa in Thessaly in the late third century by pressuring the city to grant citizenship – and so the right to own land – to resident aliens.[76] These institutions – and more examples could be adduced – reinforce the impression of economic distress and a general decline in population in Greece after roughly 250 BC.

Another "private" institution with economic aspects is the family. "Family" in the Greek sense embraced a wider range of persons than today's nuclear family; like the *familia Caesaris*, the Hellenistic family might include more distant relatives, slaves, freed persons, and others.[77] The idea of the family as an economic unit is a commonplace in Greek literature and had long been the basis for agricultural and other production.[78] But family

[73] Dignas 2002. [74] Roussel 1987. [75] Gabrielsen 1997: 107; 2001: 233; Reger 2003a: 185–9.
[76] *IG* IV 757 (Maier 1959: no. 32) with Jameson et al. 1994: 565–6; *SIG*^{3} 543, of 217 and 214 BC.
[77] Weaver 1972; Pomeroy 1997; Patterson 1998; Van Bremen 2003.
[78] One need only recall the beginning of Aristotle's *Politics* or the precepts of Xenophon's *Oeconomicus*.

connections also played a part in larger scale, more formal economic activities. For example, consider the family of Tyre known from Delos.[79] Italian traders and merchants in the Hellenistic east also often relied on family ties. The L. Aufidii Bassi who lent money to Tenos in the first century were a father-and-son banking operation. Another Roman family of interest is the Gessi Ampliati. Their name appears on glass vessels at Herculaneum. A family member appears in the *senatus consultum* for Adramytteion and again on Delos, and yet another was procurator in Judea in the 60s AD. This family may have had a long-standing business importing and selling of aromatics in Italy in glass bottles manufactured by or for them.[80]

Institutions could also be physical, including publicly maintained infrastructure that supported economic activity. Ports provide a good example. Athenian investment in improving conditions at the Piraeus in the later fourth century probably contributed to Lycurgus' success in increasing state revenues.[81] Work on the port of Delos is another example (see Duchêne and Fraisse 2001).

VII WARFARE

As it did in earlier and later times, war absorbed an extraordinary amount of the gross product. War was waged on multiple levels. The seemingly endless struggles between the Successors, Seleucids, Ptolemies, Antigonids, and, after 200 BC, the Romans, formed the most spectacular and obvious level. These wars mobilized hundreds of thousands of troops and entailed logistical nightmares in moving and supplying the armies.[82] Regional wars involved smaller kingdoms like Pergamum, Epirus, or various *poleis*; Polybius memorialized the war of Rhodes and its allies against Byzantium in the later third century. These involved fewer troops and less money, but were still expensive for the participants. Finally, the *poleis* of Greece and western Asia Minor never relinquished their right to fight their neighbors. The fiscal and material support that Hellenistic "fighting *poleis*"[83] demanded from their own populations was puny compared to the needs of an Antiochus III or Flamininus, but could nevertheless swamp a small city state's resources. An example has recently appeared in an inscription from Cyme in Asia Minor. Needing weapons to arm as many citizens as possible, the Cymeans asked Philetairos of Pergamum to sell 600 sets of peltast weapons.

[79] Le Dinahet-Couilloud 1997.

[80] *CIL* X.2: 8062.56 with Scatozza Höricht 1986: 48 no. 93; *IK Adramytteion* 18.19 (Sherk 1969: no. 12), *CIL* III Suppl. 14203.4; Joseph. *BJ* 11.277, 284; *AJ* 20.257; Tac., *Hist.* 5.10; Plin. *HN* 12.111–113, all with Scatozza Höricht 1991: 76–8.

[81] Burke 1985: 259.

[82] Austin 1986 remains the classic treatment, but deals more with finances than the economy in general; cf. Launey 1987; Migeotte 2000.

[83] Borrowed from the title of Ma 2000.

Philetairos generously made a gift of the weapons out of a stock of 600 he had at hand.[84] Similarly in 213, after Antiochus III recaptured Sardis, which had been held by a rebel, he had to offer the city concessions, including tax relief and the right to cut wood from royal forests, to recover from the devastation.[85]

VIII IDEOLOGY, TECHNOLOGY, AND STOCK OF KNOWLEDGE

The stock of knowledge that can be used for economic ends includes both strictly "technological" innovations that permit new activities or increase the productivity of old, and information that can be exploited for economic gain. The long-standing view that the Hellenistic world was technologically stagnant is now yielding to research emphasizing the period's creativity, especially innovations at Alexandria in Egypt.[86] In one area – military technology – the Hellenistic world saw major innovations, from siege warfare, to the use of elephants, to the construction of ever-larger ships.[87] War was a central sector of the ancient economy, so such innovations point toward important changes more broadly in the economic scene. But new technologies were also applied to such basic sectors as agriculture. These improvements remain virtually invisible to us because of the paucity or difficulty of written sources and the restricted spheres in which the improvements were felt.

It has recently been argued, for example, that Alexandrians invented new mill technology for raising irrigation water and grinding grains in the third century and exploited it on a broad scale in the Egyptian countryside. The horizontally wheeled water mill may have been invented in the mid-third century around Byzantium, spreading around the Mediterranean over the next two centuries.[88] A poem of Antipater in the *Anthologia Graeca* (9.418) celebrates the overshot water mill as a labor-saving device.

It seems likely that the wedge press was a Hellenistic invention. This press, described by Hieron in his *Mechanika*, was specially adapted to producing fine oils in small quantities for perfumers. The press consisted of a wooden stand with cross pieces that could move vertically. Sacks of olives or other objects for pressing were placed in the rack, and workers drove wedges between the cross pieces to increase pressure on the sacks; the pressed oil flowed through a spout on the press-bed into a collecting basin. The identification of an early first-century BC example on Delos suggests that

[84] Manganaro 2000. [85] Gauthier 1989.

[86] On antiquity in general as a period of stagnation, see Finley 1965b; *contra*, Greene 2000; Wilson 2002.

[87] For siege technology see Garlan 1974; McNicoll 1997; elephants, Holt 2003; Scullard 1974; marine technology, Tarn 1930.

[88] Lewis 1997; Wilson 2002: 11.

this press was indeed a Hellenistic innovation. It permitted perfumers to press fresh oil for each batch of perfume and to control quality carefully; such control presumably compensated for the press's relative inefficiency and low production.[89]

Glass blowing was invented in the Levant (probably Palestine) in the first century AD. Mould-made glass containers were popular in classical and Hellenistic Greece, but the labor-intensive and relatively difficult manufacturing process made them expensive. Blowing glass was faster and easier, and surely brought down prices. No prices survive, but the gradual disappearance of clay *unguentaria* across the first century AD probably reflects the impact of blown glass.[90]

Technological innovation was important in Hellenistic times, but was not the only way that changes in the stock of knowledge affected economic activity. The "discovery" of the Indian Ocean monsoons has long been attributed to Eudoxus of Cyzicus, working in the (rather hazardous) employ of the Ptolemies in the late second century BC. His discovery made it possible to sail to India and back, increasing trade in the spices and other exotica that entered Greece via Alexandria. Sailors in the Indian Ocean had long used these winds for trade, but Eudoxus added their know-how to the stock of knowledge available to Greeks.[91]

The compilation of *periploi* in the later fourth century and Hellenistic period constituted another kind of increase to the stock of knowledge. These sailing guides, describing coastal features and particularly towns and harbors, were again no new phenomenon; Herodotus refers to some. But as new towns appeared and facilities changed, knowledge became outdated and revisions were required. The *periplous* attributed to Pseudo-Skylax is a good example. Some scholars see it as a genuine product of the sixth-century Skylax mentioned by Herodotus, but most now favor compilation in the later fourth century.

Thorough examination of economic ideology lies beyond the scope of this chapter. The loss of so much Hellenistic philosophy renders the task especially difficult; there is no text like Aristotle's *Nicomachean Ethics* against which to measure behavior and belief. But some motors of economic ideology may be proposed. First, the great kingdoms' interests played a major role in shaping attitudes toward economic activity. The kings' fundamental interests lay in the preservation and expansion of their holdings through warfare. Military success rewarded kings with plunder, often in enormous quantity (Alexander was the unmatchable model in this as in every other

[89] Hieron, *Mech.* 2.1.4 in the edition of Carra de Vaux 1988: 46; Brun 1999 with details; for Hellenistic perfuming, Reger 2005.

[90] Israeli 1991; Fleming 1999: 16–17.

[91] De Romanis 1996: 141–6; Eudoxus: *FGrHist* 87; Posidonius F 28 (E K² F 49; Th. F 13); Casson 1989: 12, 224. Strabo 2.98–9 for Eudoxos. Agath. 103, *GGMI*, p. 191.

field), which the kings distributed to their retinues as reward for past and pre-payment for future loyalty.[92] Hellenistic armies were expensive, and kings focused heavily on raising revenues. Pseudo-Aristotle's *Oeconomica* gives example after example of clever, not to say unethical, strategies for raising money. In considerable part, the kings' constant and all too visible hunger for money shaped Hellenistic economic ideology.

Private ideology is harder to get at. The debate over acquisitiveness seems to have run its course; in the Hellenistic period, as in the rest of antiquity, wealth was regarded as positive. Once again, the kings were important models. There is evidence for growing luxury in Hellenistic times, in the form of large, extravagantly decorated houses, taste for fancy precious-metal plate, expensive perfumes, and exotic imports. Such conspicuous consumption may be tied to evidence for larger personal fortunes, including the increased role of a few extremely wealthy euergetists, especially after about 200 BC, and the emergence of large private landholdings, especially by people with ties to kings. Once again, emulation of kings surely lies behind such attitudes. This ideology of wealth had its critics. Diogenes and the Cynics, who rejected not only wealth but also other conventional virtues like marriage, clothing, and personal modesty, are the best known. When Alexander asked Diogenes whether he needed anything (the king clearly had money in mind) Diogenes famously requested the king to move out of the sun (Diog. Laert. 6.38; Plut. *Alex.* 14). Alexander's response – that if he weren't Alexander he'd wish to be Diogenes – was philosophically right but practically wrong: only a tiny minority rejected wealth.

IX GROWTH, STAGNATION, AND STANDARDS OF LIVING

Other chapters emphasize the difficulty of measuring growth in the Hellenistic economy and the theoretical difficulties of applying the concept of growth to the Hellenistic period. I will not repeat these considerations here. In general, though, there are some indications that the third century saw little or no substantial economic growth, while the second and first centuries BC saw if not growth at least intensification of activity affecting some (not all) sectors of the economy. This may have issued more in economic realignments than in real growth – although growth may have occurred in some sectors. The main possible innovation in the agricultural sector was the water wheel in its various guises; otherwise we hear little of new crops[93] or intensification (changes in fallow patterns, more efficient ploughs) that could have substantially increased agricultural productivity. Practices like intercropping (reducing potential maximum yields in exchange for protection against failure of one crop) continued to be standard, even if in some

[92] See Billows 1995. [93] For the different situation in Egypt, see Chapter 16.

cases (such as the Argolid) there may have been moves toward market-oriented monoculture (though even in this case, there are doubts about the claim). Real progress was needed in agriculture for serious growth to occur, since it dominated the economy. Thus whatever growth occurred in Hellenistic times was confined to other sectors, and limited by the constraints of the economy as a whole.

The claim that the third century saw little growth arises from several considerations. Evidence for fiscal crises at many levels – from small *poleis* borrowing small sums to the kings' endless demands for money – suggests there was no substantial growth in the third century. Public building programs seem relatively few in the third century, another indicator that money was tight. The recent conclusion that the coins put into circulation in the first fifty years of the Hellenistic period satisfied demand till after 225 BC militates against substantial growth, which would have required more coins (which could have been satisfied by striking new issues) or by increasing the velocity of circulation (which would probably have driven existing coins out of circulation faster as they wore faster). The rising demand for new coinage after 225 does not necessarily indicate growth, since old coins might have been wearing out.

But after 200 BC other evidence may point to change. Shipwrecks suggest rising maritime trade after about 200 (though the trend began in the third century). Uncertainties surround these data, but the increase in known wrecks is too marked to be a chance result.[94] This period also saw increasing private wealth, at least among the rich, whose growing prominence as *euergetai* points in the same direction. Many *poleis* in Greece and especially in western Asia Minor began major public building programs after 200 – again suggesting that resources were easier to mobilize. But we lack quantifiable evidence that could differentiate between growth and reconfiguration of economic activity; and these two possibilities are, in any case, not mutually exclusive.

Although (for example) numbers of shipwrecks were already rising in the third century and new coinages were appearing by 225 BC, the arrival of the Romans may have been an important engine driving changes in the Hellenistic economy. After 200 BC, Roman armies were increasingly present in the Aegean and western Asia Minor, and their demands for food and other supplies must have strained and reconfigured distribution systems. A Thessalian inscription illustrates how Roman needs for grain affected local distribution and storage.[95] Italian traders also entered the Aegean and western Asia Minor in growing numbers, establishing themselves in centers of trade and diverting goods and money westwards. The resentment they provoked exploded in massacres at the start of the First Mithridatic War.

[94] Gibbins 2001: 279, figure 10.2, 288–90. [95] Garnsey et al. 1984.

That is to say, at least in part an engine behind the changes visible from about 200 BC on may have been this new presence. However, it should be borne in mind that some possible indicators of change appeared before the Romans, suggesting that some underlying changes, perhaps associated in part with a refocus of attention eastward after Alexander, may have already been operating.

Many years ago, Tarn assessed Hellenistic standards of living on the basis of prices recorded on Delos. He concluded that the standard fell in the third century, and connected this to a more general economic crisis that, he argued, struck Greece.[96] His conclusions rest on fragile foundations, and no one attempted a similar global assessment in the following eighty years. It is hard to judge from other, typically anecdotal, evidence – Menander's comedies, Herondas' mimes – whether living standards rose, fell, or stagnated. The indicators of economic stress noted above may suggest that the third century saw new challenges, but I would hesitate to draw sweeping conclusions.

In general, however, we should remember the constraints on growth prevailing at all times in the ancient Mediterranean. Periods of growth and reconfiguration occurred within an "underdeveloped" economy, founded on agricultural production organized mostly at the family scale, supplemented by larger-scale ownership by a tiny elite, and some slave labor. While the distribution of wealth and the capture and distribution of surplus production may have changed in Hellenistic times, the larger structural features persisted. Redistribution – especially concentrating goods in fewer hands – may have caused hardship for the poorer majority. But the limitations of our evidence preclude much detailed discussion of these matters.

[96] Tarn 1923.

PART V

EARLY ITALY AND THE ROMAN REPUBLIC

CHAPTER 18

EARLY ROME AND ITALY

JEAN-PAUL MOREL

This chapter deals with Italy in the period from the beginning of the Greek colonization through 133 BC. It is difficult to approach such a broad topic – all of Italy over six centuries – without risking omissions and simplifications. I will therefore give more weight to new data and recent approaches.

Historians have mined literary sources exhaustively. The importance of this evidence is incomparable, but so are its drawbacks: the need to distinguish between technical and purely literary texts,[1] the absence of quantitative data, and ancient authors' generally limited interest in economic aspects of life. Inscriptions are very rare during our period, and have little to do with the economy. Historians agree that new findings may be expected above all from archaeology.[2] Its daily discoveries, the supposedly neutral nature of its findings, and its "auxiliary" disciplines (e.g., the study of amphoras, ceramic analysis, the study of storage facilities, agrarian archaeology and the analysis of the countryside, and underwater archaeology, as well as the application of the natural sciences to antiquity in palaeoanthropology, palaeobotany, archaeozoology, metallurgical analysis, sedimentology, etc.[3]) have provided many of the data presented in this chapter. For half a century, and especially more recently, archaeologists have explored new approaches in response to new demands: precise quantification (despite immense difficulties), wider and more diversified use of pottery (for example for the study of society and modes of production), and interest in "primitive" economies. But we remain very poorly informed in domains in which archaeology has not yielded comparable gains. In short, given the challenge of appreciating the nature of the ancient economy, all types of evidence, from a single sherd to Cato's treatise on agriculture, must be studied with the same degree of interest, the same respect, and the same reservations. This chapter focuses on the Italian peninsula, touching only briefly on northern Italy and the islands, or the world of non-Roman indigenous cultures. The wealth of the subject matter necessitates painful choices.

[1] Morel 1978. [2] Cf., e.g., Nicolet 1977, *passim* (95, 97, etc.); see also Gabba 2001: 17.

[3] E.g., Potter 1979: 62; Cristofani 1986: 115, 155; Gialanella 1994: 170–1; Coubray 1994; Morel 1997: 222–3; Carter 2001: 792.

For Italy and the Mediterranean in general, the history of these six centuries is largely one of conquests and submissions, of colonization in both senses of the word (the foundation of colonies and the phenomena of transformation and acculturation). Our core subject is Rome, but Rome only gradually became the major player in the economy (and politics). At the beginning of our period, the Greeks in the south (Magna Graecia) and the Etruscans enjoyed positions of primacy. How did Rome develop from one of many Italian towns into the most powerful polity in Italy and a leading Mediterranean power? To answer this question, we must examine the impact of wars, treaties, and the founding of colonies, Greek as well as Etruscan and Roman, reciprocal influences, forced or spontaneous transformations. In short, we need to analyze the driving forces and processes of evolution, the phenomena of reception and diffusion.

The traditional economic history of Italy assigns a primary place to agriculture and finances, a secondary place to exchange, and a sometimes derisory place to the activities of artisans and manufacturers as well as to technology. Given ancient realities and perceptions, this approach can to some extent be justified, but we must nevertheless correct this imbalance whenever it becomes excessive. It will also be appropriate to consider phenomena of production, diffusion, and consumption together. Finally, I will choose not to attach too much importance (without neglecting them altogether) to conventional and somewhat sterile historiographical debates ("primitivism" versus "modernism," pre-industrial versus industrial, artisans versus manufacturers), and focus on concrete developments.

I will distinguish three major periods, despite the fact that this division is at times somewhat artificial: from the earliest Greek contacts with Italy to the middle of the fourth century BC; from the middle of the fourth century, which saw Rome's military and political ascent and its rise to economic power, to the Second Punic War; and finally, from the Second Punic War, which caused profound upheavals in the Roman economy, to the period of the Gracchi.

I FROM THE EIGHTH CENTURY TO THE MIDDLE OF THE FOURTH CENTURY BC

When modern observers consider Rome's geographic situation and the causes of its exceptional success, they often stress that it occupies a major "bridge site," established at the crossing of important routes – a river route leading from the sea to the interior of Italy and a land route linking Etruria, Latium, and Campania. More importantly, however, Rome was situated between the two most advanced and enterprising civilizations in Italy, the Greeks and the Etruscans.

In an economic history of Rome's relations with Italy, it is hard to overestimate the consequences of this situation, given that both these cultures greatly stimulated and influenced Rome's social and economic evolution. They opposed Rome in rivalry or hostility, but also offered alliances and models, and finally provided Rome with opportunities of conquest. I will consider Magna Graecia and Etruria from these angles.

The four centuries under review are marked by the blossoming of the Greek colonial movement, the decline of the Etruscans, and the rise of Rome under Greek and Etruscan influence from a village of shepherds to a great power. While I will deal with these three aspects separately, we must remember that they increasingly interacted as the four centuries progressed.

(a) *Magna Graecia*

The term "Magna Graecia" is somewhat ambiguous; it can refer either to the Greek colonies of southern Italy and Sicily, or just to those of mainland southern Italy. For the sake of convenience, I use it in the former sense. The study of the economy of Magna Graecia has often been overshadowed by the rich record of arts and crafts in this region, to the detriment of more mundane questions of economic history and especially of its archaeological aspects, which hold little aesthetic appeal. Furthermore, the scale of its artisan production has often led to the incorrect assumption that Magna Graecia exported hardly anything except its pottery (and grain). This cultural splendor has made it easy to forget that "archaic hellenization has grafted a common civilization on a varied economy,"[4] and masked the diversity of local economic conditions. Novel approaches allow more up-to-date readings.

Debates over the causes of Greek colonization continue (see above, Chapters 8 and 10): "primitivists" see land hunger, triggered by overpopulation in mainland Greece, as the main motive for overseas expansion, whereas "modernists" are more sensitive to commercial motivations such as the search for metals.[5] This is an old, schematic, and endless debate, which does not alter the fundamental fact that any colonial movement is rooted in economic causes. The debate, reduced to these simple, even simplistic positions, is largely artificial, and should eventually be superseded by archaeological insights. Three main points merit attention.

First, the problem of ascertaining the ultimate causes of Greek overseas settlement disappears when we consider what is often called colonial "networks." The most important ones were the Euboean, Corinthian,

[4] Vallet 1958: 209. [5] Vallet 1958: 199–205.

and Achaean networks, although the Megarian, Locrian, or Rhodo-Cretan settlements might also be described similarly. A whole range of motivations must be taken into account: land, or trade – one ought to distinguish further between exports (for example, pottery or wine) and imports (for example, grain or metals) – craft industries, strategic concerns, and of course demographic factors: all these characteristics would be intertwined in one complex process.

The twelve Euboean (mainly Chalcidian) establishments in Magna Graecia – Pithekoussai, Cumae, Parthenope (and later Neapolis), Rhegium, Zancle, Naxos, Catania, Leontinoi, Mylai, Himera, and Matauros – are a case in point. Some of them were (or appear to have been) mainly commercial centers (Pithekoussai, Himera) while others were agrarian settlements (Cumae, Catania, Mylai, Matauros, and *a fortiori* Leontinoi, an inland colony, located at the edge of a particularly rich plain). Others served defensive purposes (Parthenope), or provided ports or controlled maritime routes (Zancle, Rhegium, Naxos, Neapolis). These classifications entail considerable oversimplification, since each of these establishments in fact had diverse functions. Suffice it to say that over three centuries (c. 770–470 BC) an elaborate system developed, covering all the economic functions one might associate with a colonial movement.

As for the Corinthian network, no one can dispute that Syracuse, Corinth's main foundation in Magna Graecia, was a major economic power. But it also protected the maritime front of its territory by founding Heloros in the south (and later, around 483 BC, by destroying its rival Megara Hyblaea). And, above all, it created a territorial "empire" (extending over some 4,000 km²) which ensured agrarian revenue by occupying the whole of southeastern Sicily, and by founding Akrai and Kasmenai in its hinterland, before completing this strategy with the creation of Camarina on the south coast. These activities, which we may probably call a program, pursued with tenacity for more than a century (from 733 to the beginning of the sixth century BC), helped Sicily become one of the granaries of Greece and later Rome.

Second, colonial foundations that were clearly "marked" by one dominant activity may turn out to be more complex. Pithekoussai (on Ischia), long seen as the archetypical trading colony, turns out to have engaged in manufacture (in metals, in particular iron) as well. The quest for metals is in fact regarded as the reason for the founding of this settlement, the first of its kind in the west (c. 770 BC).

Its proximity to Etruria and its metal resources do appear to offer the best explanation for its establishment, an interpretation that receives further support from the presence on Ischia of iron ore from Elba, processed by the local metallurgical industry. But agrarian activities are now also documented at Ischia, since a village has been found at Punta Chiarito, in the

south of the island, where farming took place:[6] so far, this remains a modest discovery, but nevertheless indicates diversification and meshes with Ischia's reputation for fertility, in particular arboriculture (*eukarpia*, Strabo 5.4.9). Moreover, we know that shortly after its foundation and after that of Pithekoussai, Carthage received significant quantities of so-called ZitA amphoras ("zentral-italische Amphoren").[7] These containers, produced in Tyrrhenian central Italy from northern Etruria to Ischia, reveal that agricultural products (probably wine) were exported at a very early time. They also reached other sites such as Toscanos in Spain or Milazzo in Sicily. This discovery changes our understanding of early Italian agriculture and of the export capacity of Campania and Etruria in this period.

It is the Achaeans of Magna Graecia, with their four colonies at Metapontum, Sybaris, Kroton, and then Poseidonia, who offer the clearest examples of agrarian colonies, aiming to occupy "large" plains (compared to those of Greece). Let us furthermore note that three of these communities (Metapontum, Kroton, and Poseidonia) marked the core of their territory by building "extra-urban" temples dedicated to Hera. Metapontum offers a particularly clear example of agrarian colonization: an extensive and fertile territory, carefully cadastered and dotted with farms;[8] the importance of the cult of Demeter; apparently modest commercial activities; a coastline unsuited to harbor installations; and a wheat ear as the local symbol on coins, recalling the main product of the city. Even so, matters might not be as simple, as is shown by the neighboring city of Sybaris, which likewise used to be seen as a prime example of an unquestionably rich and agrarian city without commercial influence, except perhaps for the diffusion of a small number of large bronze vases such as the crater of Vix. But recent research combining the study of amphoras with a re-examination of textual evidence suggests that Sybaris largely exported its wine in locally produced amphoras, which used to be thought of as "Corinthian B."[9] The same may be true of Poseidonia. These discoveries help resolve the apparent contradiction between a Magna Graecia that was thought to be an agricultural and manufacturing giant and at the same time a commercial dwarf that failed to sustain significant exports. In addition, they also cast light on the economic history of importers such as Carthage.

Third, the archaeology of agriculture and the urban territories continues to yield new facts (or develops new analytical concepts), fine-tuning the typology of the occupation of the countryside of archaic Magna Graecia: for example, the range of uses of the territory of Gela, from cereal cultivation in the plains (without farms) to zones of tree cultivation in the hills (with farms), or, in the territory of Tarentum, the arrival of the "farming villages"

[6] Gialanella 1994. [7] Docter 1997: 192–215.
[8] Most recently Carter 2001. [9] Sourisseau 1997: vol. 1, 95–6.

of the seventh and sixth centuries, a new development that would transcend the traditional opposition of city and farmstead. This phenomenon was already foreshadowed at Pithekoussai[10] and can also be seen in the Hellenistic period, for instance in the territory of Heraclea.[11] At the same time, comparable agrarian villages also appeared in the Roman sphere.[12] At the very end of this period, from the middle of the fourth century to the Roman conquest, the proliferation of farms – which came to occupy cities' territories in their hundreds – underscored the vitality of agriculture in Magna Graecia.[13]

We cannot complete this cursory general survey of the economy of Magna Graecia without emphasizing a factor which remains fundamental for any economic evaluation of Italy and Rome in this period: the diverse stock of models, concepts, and techniques that Magna Graecia bestowed on Italy in general and Rome in particular, either directly or via the Etruscans. The potter's wheel, olive oil and probably wine, and perhaps large-scale grain cultivation, as well as preconditions of economic growth such as ports, writing, coinage (adopted shortly after its emergence in the Aegean, around 550 BC), and perhaps banking techniques[14] – as well as art and intellectual pursuits.

(b) *Etruria*

The economic history of the Etruscans poses serious problems: very few texts exist, and most are inscriptions that are difficult to interpret and in any case teach us little about economics. Further, even more than in Magna Graecia, the study of economic history has suffered from the fact that historians and above all archaeologists have until recently focused exclusively on cities at the expense of their territories, on cemeteries at the expense of settlements, and on art and craftsmanship at the expense of agriculture, manufacture, and trade. But external evidence, such as the import of Etruscan wine into Gaul, now illustrates the realities of the Etruscan economy. This discovery shows that in the first half of the sixth century BC, practically all the wine drunk in Marseille came from Etruria, shedding light on previously unknown agricultural production and commercial organization in the latter region.[15] Etruscan economic history increasingly revolves around individual cities.[16] These days, scholars take proper account of rivalries and alliances among the Etruscan polities, of the differences in their resources (such as ores),[17] in the wealth of their territories, in their access to

[10] Gialanella 1994. [11] Greco 1996: 234–5, 238–9, 242. [12] Morel 1994: 414–15.
[13] Greco 1996: 241–2. [14] Andreau 1987: 344–5.
[15] Bats et al. 1992, *passim*; *Gli Etruschi* forthcoming, *passim*.
[16] Cristofani 1986 is essential.
[17] Cristofani 1986: 121–4; in general, see *L'Etruria mineraria* 1981.

transport routes, and their relationships with other powers (Carthaginians, Greeks, Romans, and Celts). Archaeologists have explored territories and, albeit to a lesser degree, inhabited sectors of cities, and have fine-tuned the typology of fine or coarse pottery and especially of amphoras. The study of the rich mineral resources has likewise improved, as has our knowledge of the Etruscan peripheries in Campania and northern Italy. We know more about Etruscan export to Gaul, Spain,[18] and Africa, in particular to Carthage, where a large number of archaic amphoras of the "ZitA" type have been discovered, as mentioned above.[19]

Overall, the emerging picture is of a very diverse Etruria, characterized by farming as well as manufacturing. Some cities used land and workshops to produce goods for export (Caere, Vulci), while others were active in mining and industry (Vetulonia and above all Populonia), and others still, less endowed with agricultural and mineral resources, developed trade networks with the Greeks (Tarquinia, Pisa). In most of these cities, agriculture formed a solid economic base, but crafts, mining, and industrial activities were also remarkably successful. Large-scale exports of wine throughout the sixth century BC and beyond, notably from Caere and Vulci, document the capacity of Etruscan viticulture. Agricultural production not merely for domestic consumption but for overseas exports speaks against a rigid distinction between agrarian and mercantile economy. In the domain of grain cultivation, the remarkable yields of archaic Etruria (three times more than that of Latium[20]) explain how the Etruscans could alleviate shortages in fifth-century BC Rome on several occasions. When we look at craft production, the massive production of "*bucchero nero*,"[21] a high-quality ceramic fineware, and its export overseas (similar to that of wine), implies a scale of organization that made this the most widely exported Italian pottery prior to the rise of Campanian A wares in the second century BC. Mining and metallurgy also flourished, and left impressive traces in Populonia.

A systematic survey of a large zone in southern Etruria and the *ager Faliscus*, between Veii and Falerii, has allowed us to trace the evolution of settlement here and to understand better the relationship between the Etruscan countryside and cities over more than a millennium.[22] For the period c. 750–550 BC, these data indicate considerable growth in population, in structures related to human occupation, and in the number of towns and rural sites. From early on, the Etruscans built a substantial subterranean drainage system, the *cuniculi*, to improve the land.[23] The Roman conquest subsequently led to further progress in land use.

It is remarkable that the Etruscans developed their economy as well on the land as on the sea. Of the large Etruscan cities, only Populonia is

[18] Remesal and Musso 1991. [19] Docter 1997: 192–3, 198–9, 202, 204–5, 209–10.
[20] Cristofani 1986: 116, 119. [21] Gran-Aymerich 2002.
[22] Potter 1979; 1992. [23] Potter 1979: 84–7.

located on the sea, while some (Caere, Tarquinia, Vetulonia, Vulci) were established near the coast and had harbors. The Etruscan colonization of Campania (Capua, Fratte, Pontecagnano) and northern Italy (Felsina, Marzabotto, Spina, with extensions of trade across the Alps towards the Celtic heartlands) was essentially terrestrial. The Etruscans maintained communications with both regions by land rather than by sea. They established their main cities there (Capua and Felsina/Bologna) not on the coast but in the heart of the territories' particularly fertile plains, perhaps due less to the existence of earlier settlements in those places than to their intention to focus on agricultural exploitation. This, however, did not prevent the Etruscans from being counted among the "thalassocracies" of antiquity, from frequent naval warfare, or from vigorous maritime commercial expansion, often represented as "piracy" by hostile sources.[24] Etruscan navies (no doubt sometimes accompanied or relieved by Greek ships) were responsible for the export of the numerous amphoras and Etruscan vases described above. The wreck of Grand Ribaud F, recently discovered on the French coast near Hyères and datable to about 500 BC, provides remarkable evidence of this process.[25] In other words, the Etruscans were significant in both areas, *terra marique* (just as the Romans would be later on).

Etruria as a region was open to contact with other peoples, but filtered these contacts in two ways. The cities accommodated individual incomers, generally specialists in appreciated crafts, who contributed their know-how and were integrated into society. The rise, in the sixth century BC, of a class of "nouveaux riches" in the coastal cities, originating in manufacturing and trading and claiming equal status with the old landed aristocracy, documents the scale of social mobility.[26] In other cases, cities admitted groups which they confined to trading posts where Etruscan authorities maintained control. At Gravisca, a harbor of Tarquinia, an *emporion* was founded around 600 BC, and was frequented by Ionians and traders from Aegina. Much the same was true of Pyrgi, a harbor of Caere used by Carthaginians, as attested by the famous gold tablets in Etruscan and Punic from c. 500 BC (another harbor of Caere was called *Punicum*); and also of Spina, a mixed Etrusco-Greek city (but under Etruscan sovereignty, probably exercised from Felsina/Bologna) at the mouth of the river Po, where in the classical period Athenians obtained grain from the Po valley in exchange for their luxury pottery, which ended up in the local graves.[27] This controlled opening towards the Mediterranean was a powerful catalyst for economic development in central-northern Italy.

The Etruscans were late to use coins and did so on a relatively small scale. Nevertheless, perhaps from the sixth century BC onwards they were

[24] Cristofani 1986: 124–8; Camporeale 1992. [25] Long and Sourisseau 2002.
[26] Cristofani 1986: 114. [27] Rebecchi 1998.

probably responsible for the appearance in Italy of pre-monetary means of exchange in the form of bronze ingots, a special feature of ancient Italy: rough ingots (*aes rude*), or, in a more elaborate form, "ramo secco" ingots (with herringbone patterns), which may have been cut up into smaller units. These are mainly known from Etruria itself and the Po region, but spread thinly all the way to Croatia and Sicily.[28] Etruria opened up somewhat to foreign coins: a hoard found in Volterra, datable to around 500 BC, contains small issues of Etruscan silver coins, perhaps minted by *gentes* rather than states, and some issues from Phocaea and Greek Gaul. The latter reflect Etruscan links with the Phocaeans of Asia Minor and the west (who had perhaps founded the emporium of Gravisca)[29] to obtain Greek pottery and export their own goods to Gaul. The first "regular" gold and silver currency was issued by Populonia from the middle of the fifth century BC onward, followed at the time of the Roman conquest by bronze coins, a metal which other cities (Chiusi, Cortona, Arezzo, Volterra) also used for coins.[30]

Finally, Etruria acted as an intermediary between Magna Graecia and Rome. But it also introduced to the banks of the Tiber its own customs or innovations, such as the pre-monetary use of bronze, perfected procedures of drainage (the *cuniculi*), methods of cadastration, and metallurgy.

(c) *Rome*

The traditional foundation date of Rome (753 BC) coincides with the first Greek settlements in Italy and the dawn of the "orientalizing" period in Etruria. Spectacular tombs in Latium suggest that wealth was being concentrated in the hands of elites, and that the economy produced a significant surplus.[31] In the first part of this "archaic" period, Rome was merely one Latin city among others, albeit more profoundly "Etruscanized." The excavations and research of the last decades have gone some way in rehabilitating the image of "the great Rome of the Tarquins."[32] After a period of crisis in the fifth century BC (characterized by the impoverishment of individuals and of the community as a consequence of continuous warfare with varied outcomes), the fourth century saw the start of lasting Roman expansion in Italy, improved access to land, a general rise in living standards, and "modernization" of the Roman economy. The chronology and turning points remain disputed, and cannot be considered in this context.

Agriculture was evidently of fundamental importance. The varied landscape of central Italy favored diversified agriculture and provided various natural resources (fishing and hunting, wood, stone and clay, thermal

[28] Cristofani 1986: 139–42. [29] Torelli 1982: 323–5.
[30] *Contributi introduttivi* 1976; Cristofani 1986: 142–51.
[31] Crawford 1976: 202; see also Ampolo 1970–1: 51–5. [32] Cristofani 1990.

springs, salt etc.). In all this, the grain supply was the main problem (and remained an issue throughout antiquity). This was one of the weaknesses of the Roman economy. In a long series of *frumentationes* regularly reported in the annalistic sources, Rome received wheat from the Etruscans, Italians (Volsci), the Greeks of Italy (Cumae) and Sicily (Syracuse), particularly in the fifth century BC, prior to the onset of its territorial expansion. The earliest recorded agrarian laws date to the fifth century (486 BC), culminating in the *lex Licinia Sextia* of 367 BC, which limited the amount of land and perhaps the number of cattle a single citizen could own. Early constraints on the availability of land are encapsulated in the tradition of the small size of the lots allocated in land distributions, the *heredium* of two *iugera* (about half a hectare), which was clearly insufficient to feed a family but sometimes seems to have corresponded to reality.[33] One assumes that these lots were supplemented by access to public land or that of rich individuals in return for rents in kind.[34]

Techniques of land exploitation inherited from the Etruscans, such as the network of drainage tunnels (*cuniculi*) in the Pontine plain, appear from the fourth century BC onward. Animal husbandry was essential, symbolized by the role of cattle as the measure of wealth. Archaeology has made progress in detecting and interpreting the traces of these pastoral activities (through the study of soil, paddocks, and sheepfolds, and milk containers).[35]

During this period, external trade played a negligible role in the Roman economy, but as a rising power in Italy, Rome came to be integrated in Mediterranean exchange networks. We may assume that Phoenicians had access to the Forum Boarium, Rome's harbor at the time.[36] These contacts may have been behind the first treaty between Rome and Carthage at the end of the sixth century BC.[37] Rome was drawn into overseas relations by its proximity to Etruria, where nearby Caere was allied to Carthage. The foundation (or restoration?) of temples such as those of Ceres and Mercury (495 BC?) also mark the modest beginnings of Roman interest in trade.

The chronology of Roman money use remains controversial. Relative to the Greeks and even Etruria, Rome was definitely late in adopting coinage. One hypothetical reconstruction assumes a progressive evolution from barter to money-cattle (hence the word *pecunia*), then to bronze ingots in various forms, marked or otherwise, with or without "ramo secco" – *aes rude, aes formatum*, and subsequently *aes signatum*.[38] This development was stimulated by the introduction of military pay (*stipendium*) in 406 BC. Another model places the adoption of metal as the principal form of wealth accumulation in the middle of the fifth century BC, the appearance

[33] Brandt 1985: 25–6. [34] Crawford 1976: 205–6.
[35] Morel 1997: 216–19, with references regarding different periods.
[36] Rebuffat 1966. [37] Scardigli 1991: 47–87. [38] Zehnacker 1973: 199–222.

of coinage as a unit of metal in the second half of the fourth century BC (following the custom of Neapolis), and that of genuinely Roman minted coins in 269 BC.[39]

The study of this process is complicated by the coexistence of two principles (value [money] and coins [coinage]), two metals (bronze and silver), and two techniques (casting and minting). Whatever the details, the transition from direct exchange to exchange via the medium of a convenient unit of value was an essential stage of economic development in which Greek and Etruscan influences were decisive.

II FROM THE MIDDLE OF THE FOURTH CENTURY TO THE END OF THE SECOND CENTURY BC

It might be tempting to call this period the "early Hellenistic period." However, Rome's economic development in these centuries owed little to the events surrounding Alexander the Great and his successors. Rather, the main changes resulted from regional events that began in the third quarter of the fourth century BC and elevated Rome to a central role in the Italian peninsula by giving it the means for hegemonic politics and causing profound transformations of its economy. Modern historians have long neglected this "Roma medio-repubblicana." Its cultural as well as economic importance was not appreciated until a radical revision of the archaeological data about a third of a century ago[40] underscored the importance of Rome at the expense of Magna Graecia and Etruria, societies that were certainly brilliant and prosperous but henceforth increasingly weak relative to Rome. This period profoundly transformed Roman political and social structures, exemplified by the appearance of coinage and more general economic change.[41]

This period, and above all its early phase, saw a series of Roman victories over Latins, Campanians, Samnites, Etruscans, Sabines, Umbrians, and the Greeks of southern Italy from 348 BC onwards. This was also the time of the "great Latin colonization" – a colonization program organized by Rome that also involved Latins and other subject peoples and led to the creation of "Latin" as well as "Roman" colonies: from Ostia at an unknown date in the middle of the fourth century BC if not earlier,[42] to Antium in 338, Cales in 334, Cosa and Paestum in 273, and finally Placentia and Cremona in 219, to name but a few.[43] By 200 BC, the Roman state and its allies controlled a territory of some 130,000 km² with an estimated free population of about 3 million (and a somewhat larger overall population including slaves). The Roman state in the narrow sense covered some 30,000 km²

[39] Pedroni 1993: 191. [40] *Roma medio-repubblicana* 1973. [41] Pedroni 1993: 13–16.
[42] Brandt 1985: 29. [43] In general, see *La colonizzazione* 1988.

with an estimated citizen population of around 1 million.[44] Colonization was vitally important both in military and strategic terms, but inevitably had social and economic motives and consequences as well, notably for agriculture and trade.

The foundation of a colony in Ostia underlined Rome's interest in maritime activities and expansion,[45] an interest reinforced by victories over its Etruscan, Latin, and Campanian rivals that confirmed its leading role in Italy and (soon) beyond. In 353 and 351 BC, Rome defeated Caere and Tarquinia. In 352 or 348 BC, a second treaty between Rome and Carthage confirmed Rome's status as a regional west Mediterranean power.[46] In 343–341 BC, the First Samnite War involved Rome in the affairs of wealthy northern Campania around Capua. In the following years Rome gained the upper hand over the Latin League, which was dissolved in 338 BC. Its victory over Antium in particular, an ancient maritime city and refuge for pirates, suppressed dangerous competition on the sea. The pro-plebeian reform of Q. Publius Philon in 339 BC resulted in a strong push toward the south, in particular into Campania. From 339/8 BC, Romans settled in the *ager Falernus*, and *Campani* became Roman citizens. In this way, Rome came into commercial contact with Neapolis and in 326 BC formed a *foedus* with this city, whereby Neapolis supplied much-needed warships. The Second Samnite War (327–304 BC) accelerated Rome's contacts with southern Italy. In 310 BC, new victories over the Etruscans expanded Roman control in Etruria.

All this set the scene for new enterprise on land and sea: *terra marique* was to become the motto for an expansion which made Rome master not only of all of Italy – Greek, Italic, Etruscan, and Gallic – but of the whole Mediterranean. Rome's will to assert itself assumed more concrete expression in 311/10 BC with the creation of two *duoviri navales*, in charge of the navy, followed in 306/304 BC by treaties with maritime powers, including Rhodes and Tarentum as well as Carthage.[47] The First Punic War (264–241 BC) was a consequence of this involvement. Despite Rome's success and the concomitant reversal of Rome and Carthage's military and economic status, this conflict seems to have left its mark as a period of stagnation in Italy's economic development. This lasted until the Second Punic War, suggesting that Rome barely profited from its new maritime supremacy. It was in Italy proper that Rome continued to consolidate its advantage in successful campaigns against the Gauls in the Aemilia and the Po Valleys (236–218 BC), thereby opening up new territories of great agricultural abundance, and also against the Ligures (238–233 BC, a conflict

[44] These figures, obviously approximative, were taken from Nicolet 1977. For the methods and problems of such calculations, see Morley 2001.

[45] Cf. Brandt 1985: 29. [46] Scardigli 1991: 89–127. [47] Scardigli 1991: 129–62.

which ended with the foundation of Genoa), laying the ground for the complete conquest of the territory of modern Italy. Rome had already annexed Sicily and Sardinia after the First Punic War.

In a period of abundant change, I can merely focus on a few distinctive elements of economic development.[48] The creation of infrastructure facilitated the exploitation of Italy and shored up Rome's presence overseas: most notably, a road building program,[49] starting with the Via Appia (312 BC) between Rome and Campania, which illustrates the notion that it took a generation after territorial conquest to set up roads.[50] These roads symbolize Rome's intention to impose its footprint on Italy: many of them bypassed older cities, as they were conceived solely to serve the economic and above all the strategic needs of the center.[51] Replacing an earlier unplanned and "flexible" network linking cities that were now downgraded, the new road system created a planned and "rigid" network radiating exclusively from Rome. The roads' usefulness for the heavy transport is controversial, and the view[52] that land transport was not hugely inferior to transport by sea appears debatable. It cannot be doubted that Rome, like Etruria, expanded both by land and by sea. However, while the strategic and political value of Roman road building is clear, the solid yet bumpy surfaces were not particularly good for carts. Packsaddle animals, on the other hand, move equally well on ordinary tracks. Above all, we must remember the importance of river routes, even if there are only few major rivers in Italy: the Tiber, Anio, Arno, and Po played a major role in this context.

Agriculture remained the main engine of the economy. The *ager Romanus* grew from 5,525 km² to 26,805 km² between 338 and 264 BC. Between 340 and 290 BC, the first centuriations appeared east and south of Rome, from Alba Fucens to Norba and Minturnae, then Sinuessa, indicating the appropriation, partition, and rational exploitation of the conquered territories of the Latins, Volsci, Campanians and other peoples.[53] Models of cadastration and land partition were available in both Magna Graecia (where the bronze tablets of Heraclea in Lucania in the same period mention a scheme to measure, divide, and distribute land)[54] and in Etruria, particularly at Volsinii.[55] The first *villas*, heralds of the great transformations of the second century BC, appeared in central Italy by at least the third century.[56] At the same time, many areas, especially in Bruttium and Lucania, experienced a dramatic decline and desertification from the second quarter of the third century onward, following the Roman victories over Pyrrhus and Tarentum. Their prairies and forests were used by a sparse population, woodcutters and charcoal burners who perpetuated what have been called

[48] *Società romana* 1981: vol. 1; Coarelli 1982a. [49] Coarelli 1988. [50] Laurence 2001: 597–8.
[51] Potter 1979: 80, 93, 102; Morel 1991: 129–30; Morel 1997: 226. [52] Laurence 2001: 594–8.
[53] *Structures agraires* 1987: 87–90; Morel 1997: 220. [54] Greco 1996: 242.
[55] Cristofani 1986: 119, 136; Scardigli 1991: 97. [56] Morel 1997: 221.

"residual" or "pre-Roman" modes of production.[57] They produced food or raw materials (e.g., wool, meat, dairy products, wood, pitch, charcoal), which were then put to "industrial" use in economically dynamic centers in the plains such as Capua and Neapolis, Brundisium and Canusium, and of course in Rome itself: a genuinely "colonial" manner of exploitation, which continued for centuries. In other regions, less marked by mountains and forest, Roman conquest accelerated population growth and rural cultivation thanks to land distributions such as those that had earlier occurred in Veii and in the *ager Faliscus*. Resistance, as in the case of Falerii, might trigger brutal reprisals: that town was destroyed in 241 BC and the farms in its territory were abandoned (although even in this case cultivation soon reappeared).[58] The exploitation of new agricultural territories could be just as deliberate and, on occasion, brutal: by means of great works of at least partial drainage of lakes or marshes (e.g., at the Alban and Nemi lakes from the early fourth century BC onward);[59] by roads that disturbed the traditional organization of the countryside; and by the despoilment and redistribution of land. The Adriatic coast is a different case: the coastal regions of the Adriatic and adjacent parts of the Apennines (such as Samnium) retained their trading orientation towards Greece and the east. In the following decades they imported much more wine from Rhodes than the Tyrrhenian regions; while Ancona, a true Greek enclave, continued to produce or import decidedly Hellenistic pottery. Overall, great regional differences persisted. It is significant that Rome's interests in the southern interior did not go hand in hand with acculturation and that these regions remained under the influence of Magna Graecia, notably in terms of architecture.

Research on the Roman and more generally Italian agriculture of this period must take account of the evidence of the "Greco-Italic" amphoras.[60] These took over from vessels produced in Magna Graecia and Sicily in the fifth and fourth centuries BC, the so-called "MGS" (i.e., "Magna Grecia-Sicilia").[61] The new types emerged in the middle of the fourth century, concurrently with Rome's increasing stature in international trade. In fact, the Greco-Italic containers were typical of a much more "Romanized" Tyrrhenian central Italy: the northern and Vesuvian Campania (Sinuessa, *ager Falernus*), Latium (Fondi, Astura), and maritime Etruria (Albinia). We can observe a shift of Italy's economic core from the south towards the center, from Magna Graecia and Sicily towards a zone around Rome. These amphoras were used to export wine from these regions to Gaul, Spain, and Africa. The *lex Claudia* of 219/218 BC which forbade senators and their sons to own ships of a capacity of more than 300 amphoras (80 hectoliters)

[57] Lepore 1981; see also Giardina 1981. Rathbone 1983: 161. [58] Potter 1979: 98–101.
[59] Leveau 1995: 378. [60] Empereur and Hesnard 1987: 25–30. [61] Vandermersch 1994.

(perhaps intending to confine them to the role of a "landed aristocracy")[62] must refer to containers of this type.

Crafts were evidently much less important than agriculture and less important than in the following epoch, although we should note the quality and vitality of artistic activities from the first decades of this period onward. The pottery workshop of Petites Estampilles[63] reveals an interesting evolution. At the end of the fourth century and in the first third of the third, it produced good-quality pottery with black glaze mainly in Rome but probably also in one or several workshops in Etruria, as did a few dozen workshops across Italy in this period. The wide spread of its vases in central Italy and, most importantly, its exports to Marseille, Carthage, and their respective zones of influence are a unique phenomenon that bears testimony to Rome's commercial opening-up to the Mediterranean at the time of the third treaty with Carthage and the creation of the *duoviri navales*. Rome, Marseille, and Carthage formed a kind of "trade triangle" in the western Mediterranean, as they did again a century later at the time of Campanian A pottery.

On the other hand, the ceramic data indicate that the last two thirds of the third century were marked by the double process of Italy withdrawing into itself and the splitting up of production among local areas. Should we assume that the First Punic War, despite Rome's victory, undermined the dynamics of economic and cultural integration, or that it interrupted trans-Mediterranean trade networks? Either way, in southern Latium and northern Campania the new trend in pottery production coincided with expressions of artisanal pride, advertising the identity by potters, mostly free men who signed their vases with name markers signaling their filiations, origins, and specialties. Sometimes, known families were involved in craft production, for example in Praeneste or Cales. The conquest of southern Italy brought about an important change in the production of bricks and tiles, the *opus doliare*, which – in Magna Graecia and among the Italian peoples of the same region (Mamertins, Bruttians, Lucanians, Samnites) – was public, monitored by cities or communities under the aegis of their magistrates, as the marks on them indicate. In Rome's orbit, this production devolved upon private *figlinae*. An analogous privatization in the southern zones also affected transhumance, which was previously communal. Significant private capital formation favored these developments. Certain agglomerations such as Atina and Ferentinum with their *fora pecuaria*, or Saepinum, became important landmarks or crossroads of the *calles*, the routes reserved for herd movements, and owed their prosperity to transhumance.[64]

[62] Crawford 1976: 202–3. [63] Morel 1969.

[64] See the references in Morel 1991: 134–5; on transhumance in general, Gabba and Pasquinucci 1979 (esp. 92–4).

Finally, it might be worth investigating links between manufacturing and colonization, again through the medium of pottery.[65] These differ greatly from colony to colony. Some settlements, like Brundisium, ignored Roman models. Others, like Ariminum, were strongly influenced by them, perhaps through the collaboration of Roman artisans and the transfer of specialists. In general, however, Rome's colonies did not specifically consume products manufactured in the center. Indeed (and this extends into the next period) there was no such thing as a "colonial preference" in Republican Italy or beyond: in other words, the Roman provinces did not consume more, or fewer, products of Roman Italy than those Mediterranean regions that remained outside the empire (except for the regular and faithful clientele of Roman troops that were scattered over the Mediterranean world and whose camps offer archaeologists the best samples of Italian products).

Our understanding of Roman coinage is inevitably affected by the same uncertainties as in the previous period: for example, modern proposals for the date of the introduction of the *denarius* range from 269 to 187 BC! It is however clear that coinage first appeared in the third century. 339 BC has been suggested as the date of the appearance of *lateres signati*, "marked ingots" guaranteed by the state, which provided pre-coinage units of value for internal use and for exchange between Rome and other economies. At the same time, Campani who had become Roman citizens issued coins with the Greek legend "Romaion." Soon after, between 318 and 310 BC, the first professional bankers set up shop in the Roman forum.[66] In 289 BC, Rome issued the first series of cast bronze coins, and in the following years, ateliers in Magna Graecia and Sicily (and perhaps even in Alexandria)[67] issued bronze and silver coins on behalf of the Roman state. In general, the onset of Roman coinage fits into a series of contacts with the cities of Magna Graecia or farther away, in which technological, iconographic, artistic, political, military, and of course economic factors were intermingled. Two dates are essential here: in 290/89 BC, Rome created special magistrates, the *triumviri monetales*, who might have presided over the appearance of series of libral bronze coins); and in 269 BC, Rome opened a mint. Roman motivations developed from a desire to operate with set units of value to a wish for closer technical and monetary collaboration with Greek cities in southern Italy and Sicily. The notion that the late beginning of Roman coinage is merely an aspect of Rome's general isolation in this period[68] is not self-evident.

Although Italian regional craft production and exchange flourished in this period, large-scale export trade had barely begun to develop. There were certainly exceptions, some modest in scale (such as black-glazed vases of the

[65] Morel 1988. [66] Andreau 2001: 65.
[67] Pedroni 1993: 19–55. [68] Crawford 1976: 197–9.

type group Petites Estampilles mentioned above) and some more significant (such as the proto-Greco-Italic and the earliest Greco-Italic amphoras), but these were not at all comparable to the massive volume of exports of the following period. The fact remains that during this century and a half, Rome came to dominate the Italian peninsula, Sicily, and Sardinia, and not least in economic terms.

III FROM 200 TO 133 BC[69]

The First Punic War had little (or perhaps a slightly negative) influence on the Roman economy. By contrast, the Second Punic War (218–201 BC) was a turning point. It is difficult (and of secondary importance) to know whether the changes began before, during, or after the war. It is most likely that trends which had already formed before the war accelerated during or after it, and that the conflict itself created experiences or circumstances that favored change. Is it legitimate to speak with Toynbee – or as commentators summarize his view – of "disruptive effects," of a "catastrophic break," or of the "moment of deconstruction of the Italian reality both on the political and socio-economic level"?[70] Certainly, many communities were severely affected by the war and the long presence of Punic armies on their land, notably in southern Italy. With respect to the Roman economy in general, however, we are rather dealing with substantial change and significant restructuring. The extent of the "catastrophe" depends on our perspective. For most of Magna Graecia, for example, the crisis had begun before the Second Punic War. For cities such as Tarentum and Syracuse, it occurred or culminated during this conflict. And when we consider the broader picture in Greece and Carthage, the main crisis only came half a century later.

The Second Punic War marked the beginning of Rome's conquest of the entire Mediterranean, an ambition that was largely realized by 133 BC. In 206 BC, Spain with its rich mines, perhaps the real reason for the outbreak of the Second Punic War was reduced to a Roman province, as were Macedonia in 148 BC and Africa (modern Tunisia) and Greece in 146 BC. Within sixty years, Rome had established control over some of the richest regions of the Mediterranean. Further, Italian traders gained footholds and Italian goods likewise appeared in regions that had not yet been annexed, particularly in the east, Gaul, and Numidia. The presence of Italian *negotiatores* on Delos, and especially when the island became a free-trade zone and Athenian colony (166 BC), must have stimulated Roman trade.

[69] Nicolet 1977 is essential.

[70] Toynbee 1965: 1ff.; and the comments in Lo Cascio 2001d: 5 and Gabba 2001: 16. In general see also Lo Cascio and Storchi Marino 2001.

Additional factors included rich plunder from conquests, heavy tributes imposed on the defeated, and more generally the financial resources accumulated by the Roman state, by those in power, by businessmen and "wheeler-dealers" (one might speak of "robber capitalism")[71]; the influx of slaves as well as free specialists, artists, and technicians into an Italy and particularly a capital city where demand for manpower of all kinds and employment opportunities kept growing; and finally, the availability of new resources (e.g., silver and lead), new materials (e.g., marble), and new models for agriculture and crafts. Rome's absolute domination of the central and western Mediterranean stimulated exchange in this area and, in Italy itself, encouraged mass production for export. At that time Cato wrote in his practical manual for landowners, the *De agri cultura* (2.7), that the *paterfamilias* who owned land ought to be *vendax*, that is, to try to sell whatever could be sold. In reality, a whole part of Italy became *vendax*, combining commercial aggression with economic expansionism. In addition, in the domains of art and craft, the defeat of Asia and the annexation of Greece[72] opened a gap between elite "great art" and the declining crafts industry of the *plebs*, a gap between innovation and tradition. The gap would not be bridged until the Augustan era, and then only for a short time.

The most emblematic manifestation of these new developments was what has been called the "slave mode of production,"[73] forms of economic activity that fundamentally depended on slaves acquired by conquest in war, by piracy, or born to slave women. (Child abandonment and debt slavery provided additional sources.) From the first half of the second century BC onward, slaves came to constitute a significant proportion of the Italian population.[74] Delos, where "myriad" (literally 10,000) slaves were said to be sold per day (Strabo 14.5.2), was a hub of the slave trade. It was not by coincidence that Roman merchants were particularly active there, and the building known as the "*agora* of the Italians," where their presence is amply attested from the last decades of the second century BC onwards, was probably the island's slave market.[75] Slaves included appreciated specialists or technicians, artists, doctors, architects, secretaries, accountants, luxury domestic slaves, and so on. But most slaves were unskilled laborers for building, farming, or manufacturing. This had several consequences. The unskilled labor force needed strict supervision; production processes became standardized (evident in the large workshops producing pottery for export); and simple techniques spread, which could be used under the guidance of specialists (as in the new architectural methods of the period, particularly the *opus caementicium* discussed below).

[71] Lo Cascio 2001d: 7. [72] *Devicta Asia* (Plin. *HN* 34.34); *Graecia capta* (Hor. *Epist.* 2.1.156).
[73] *Società romana* 1981 is essential; see also Rathbone 1983.
[74] Dumont 1987: 71. [75] Coarelli 1982a.

Slavery certainly introduced formidable competition for free workers. This does not mean that the latter disappeared, but their working conditions grew more like those of slaves. In other words, the convergence of free and slave working conditions tended to transform craftsmen into workers (significantly, signatures disappeared almost completely from manufactured products in this period). The slave mode of production was commonest in central Tyrrhenian Italy, between Etruria and Campania, a region centered on Rome and characterized by mass-produced agricultural goods (signaled by the Greco-Italic amphoras). Elsewhere in Italy and beyond, more traditional – or even, notably in certain parts of southern Italy, "residual" (as described for the preceding period) – forms of labor and economic exploitation prevailed.

The new system undeniably stimulated the economy, but also entailed inconvenience and risk. By limiting skilled labor to slaves trained for this purpose, slaveowners destabilized the free labor market. It also muted competition between workers and machines, impeding technological progress. Finally, the slave supply depended largely on war and piracy.[76] Large concentrations of slaves also posed security risks. Polybius (*apud* Strabo 3.2.10) asserts that in his time, 40,000 slaves worked in the silver mines of Cartagena in Spain alone.

Infrastructural improvements such as roads, aqueducts, and warehouses continued to be made in Italy. The harbors were particularly important for an economy that came to focus on large-scale trade. In 194 BC, the Romans founded the colony of Puteoli (Livy 32, 1–3), revitalizing an old harbor in the gulf of Naples which they had used from the war years of 215/4 BC onward and where they established a custom post (*portorium*) in 199 BC. Puteoli became Rome's main sea harbor, retaining this position until the expansion of Ostia in the first century AD. But the transformations were most spectacular in Rome itself. One year after the foundation of Puteoli, the magistrates decided to replace the old river harbor of the Forum Boarium, exposed to fire and flooding and encumbered by temples, with a new river harbor outside the city limits, on the left bank of the Tiber downstream from the Aventine. This installation was named an *emporium*, which evoked a Hellenistic context despite its revolutionary and specifically Roman innovations. Between 193 and 174 BC, the authorities constructed a giant warehouse, the Porticus Aemilia, 487 meters long and 60 meters wide (i.e., nearly 30,000m²).[77] In its immediate neighborhood, the so-called "Monte Testaccio" – a hill-sized pile of discarded amphoras – began to rise. The censors of 179 BC gave the capital a new market (*macellum*). All these dates reflect the dynamism of developing maritime trade routes, and their extensions along rivers and on land, in the wake of Rome's victory over

[76] Vallet 1958: 210. [77] Gros 1996: 465–6.

Carthage. *Opus caementicium*, a typically Roman construction technique, was essential in these facilities: concrete needed only cheap (salvaged) raw material and low-skill laborers supervised by expert foremen or architects. This "molded architecture" made possible very large complexes at little cost, thanks to the reusability of the formwork, which could be dismantled and reassembled as the work progressed. It also allowed new boldness in architectural forms, such as vaults, cupolas, and curved walls. In the second century BC, a variant called *opus incertum*, characterized by facings made of rough stone, became most common in new construction projects.

More than ever, agriculture drove the Roman economy. In this period, it underwent important changes (reflected in Cato's *De agri cultura*) and a masked agrarian crisis, which came to a head at the end of our period as rural migrants swelled the ranks of the urban *plebs*, "landless farmers" claiming "farmerless land."[78] In large parts of central Italy in particular, where nature favored subsistence agriculture, landowners introduced olives and wine as cash crops. Elsewhere, intensive agriculture displaced extensive nomadic animal rearing: in the *elogium* of Polla (Forum Popilii), at the end of this period, a magistrate prides himself on having caused shepherds to make room for farmers on *ager publicus* ("*ut de agro poplico aratoribus cederent paastores*").[79] Techniques of foreign origin stimulated this change. After the defeat of Carthage, the Senate commissioned a Latin (and later a Greek) translation of the work of the famous Carthaginian agronomist Mago, the Romans' authority of choice on olive cultivation and viticulture, in a period when olive oil and above all wine spearheaded Italian exports. The underlying "idea of plantation"[80] is diametrically opposed to the subsistence agriculture which traditionally dominated central Italy, and which continued elsewhere. Recent surveys, excavations, and research projects finally permit us to draw a differentiated picture of land use around Italy. Some areas – particularly many mountain zones of southern Italy – were exploited in the "archaic" manner as outlined above (forestry, grazing, extensive agriculture, and even semi-desertification). In Etruria, the allied inland cities and the coastal Roman or Latin colonies witnessed dynamic agricultural development, and it was from this period that the agricultural potential of the Tuscan interior was fulfilled.[81] (In this context, it is hard to understand Plutarch's account (*Tib. Gracc.* 8) of a semi-deserted Etruscan countryside worked by slaves in 133 BC).[82] Finally, specialized high-yield agriculture gained ground in zones where the nature of the soil and access to transport and export permitted. Once again, commercial amphoras are a

[78] Nicolet 1977: 117–30. [79] *CIL* I.551; X.6950; *ILS* 23; *ILLRP* I.454.
[80] Carandini 1989b: 509. On the discontinuity represented by the "plantation" of post-Hannibalic Italy, cf. Toynbee 1965: 296–312.
[81] Cristofani 1986: 151–4. [82] Harris 1971: 203–4.

precious source of information. During the first half of the second century BC, just as in the preceding period, Greco-Italic amphoras continued to be the principal containers in which abundant Italian wines were exported across the west Mediterranean. Shortly before the middle of this century, however, they began to be replaced by a new type, the Dressel IA amphora, the first typically Italian vessel: less elegant than the Greco-Italic amphoras, but more solid and easier to handle and store on ships. In the late Republic, they were exported overseas – mainly to the west – in the tens of millions.[83] Confirming the specific character of the Adriatic zone of Italy, other types of amphoras soon appeared there and particularly in Apulia, to export its wine and oil to Gallia Cisalpina and the eastern Mediterranean.[84]

After the first and modest *villas* of the third century BC,[85] the second century saw a huge increase in the number of more or less large, intensively exploited estates, the slave *villas* that are often called "Catonian." They are mostly found in Tyrrhenian central Italy.[86] This was a gradual development, accelerating in the second half of the second century.[87] Overall, the general picture of Italian agriculture remained one of great diversity, including *latifundia* (still rare), large and medium *villas*, farms, and *vici* or hamlets (distinctions not easily made on the basis of archaeological evidence alone, given that a farm might either have been an independent unit of production or formed part of a large estate).

The craft industry also saw major upheavals, visible in potsherds, modest but imperishable witnesses of history. The foremost example is Campanian A, a black-glazed ware originating from Naples. Its production began in the third century BC, with modest diffusion toward Gaul, Spain, and Africa. After the Second Punic War, prodigious quantities were manufactured and exported. Around the Mediterranean, Campanian A was, at its peak (c. 250–50 BC), the most abundantly distributed type of terracotta vessel between Attic pottery in the fifth and fourth centuries BC and the African sigillated pottery of the late empire: estimates suggest that some nine million pieces were exported to Gaul alone during a century and a half.[88] These wares were mass-produced and abandoned artistic pretensions by narrowing the repertory to very utilitarian forms, standardizing the modest decoration, simplifying the manufacturing process, and imposing absolute anonymity. This broke the direct link between producers and consumers. The pottery was intended for export, notably overseas, and loaded as complementary freight onto ships carrying amphoras. This enabled it to compete successfully with local products in distant markets. These features were also essential elements of the slave mode of production. Campanian B, which

[83] Cf. Tchernia 1986: 85–7. [84] Cipriano and Carre 1989.
[85] Vallat 1987; Torelli 1981: 422; 1990. [86] Morel 1989: 496.
[87] Tchernia 1986: 57, 65–6. [88] Morel 1986: 344, and more generally on this pottery 335–51.

first appeared in northern Etruria (Volterra) in the first half of the second century BC, differed from Campanian A in technical characteristics but otherwise represents a substantially analogous case, especially once production moved to Cales in northern Campania, where this "B-oid" pottery documents increasing industrial and commercial dynamism. Later still, sigillated "Arezzo" pottery was partly produced in Pisa and Lyon. With the exception of Pisa, the Etruscan or Etruscanizing pottery workshops referred to above (Volterra, Cales, Arezzo, Lyon) were situated far from the sea, and this pottery, in contrast to Campanian A, was widely distributed inland in Italy and elsewhere.

These three large productions (Campanian A, B, and B-oid) came from regions where land use preferentially followed the new system of production (the high-yield *villae*), amphora factories allowed export of their products, and *opus caementicium* was used. They were located in cities of some importance: Volterra, Naples, Cales (just as the later "Arretine" sigillated pottery came from Arezzo, Pisa, and Lyon). At that time, Italy was the manufacturing center of the western world. In Carthage in the first half of the second century BC, the bulk of semi-fine pottery was Campanian A from Naples; the same was true throughout that century in Numidian Hippo, the *oppida* of southern Gaul, and numerous sites in Spain. (In Greece, Cyprus, Alexandria, and the Black Sea, however, these vessels are rare: despite the spread of Italian *negotiatores*, a commercial divide continued to separate the western and eastern Mediterranean.)

Large-scale trade was coupled with commercial agriculture and craft production: none was conceivable without the others. Italian wines and Campanian A were not sold because they had been produced; they were produced to be sold. It is with good reason that for this period, we speak of "a trade system based on slavery."[89] It is likely that the (freedmen?) supervisors of production were also behind the commercial enterprises.

Italy was full of workshops dedicated to various branches of craft production but more modest in scale than the large factories for Campanian A. Various indicators suggest that they too were influenced by the slave production mode, for example in the simplification of their products or anonymous production. We should note Italians' reluctance to adopt certain techniques that would have facilitated mass production, such as the use of moulds for pottery or lamps, which were fashionable in the Hellenistic east in the same period; but large-scale production, exceptional as it was, and the organization of maritime transport, certainly set the tone for this period, for Italian manufacture, and for Italy's relationship with the rest of the Mediterranean. This phenomenon contradicts claims that

[89] Schiavone 1977: 44.

"ancient transportation was too costly to make commerce in cheap wares profitable,"[90] that "even in cities situated near the sea an article produced on the spot was much cheaper than one imported from a distant place,"[91] or that "the prosperity of a pottery owes less to faraway markets than to those nearby."[92]

These developments, above all in Italian wine and Campanian A pottery, remind us *mutatis mutandis* of Marx's dictum that "the low price of goods is the heavy artillery of the bourgeoisie."[93] However, an important question remains to be settled: to what extent did this success in agriculture, manufacturing, and trade bring prosperity to their promoters, their workers, and their regions of origin? To whom did the profits go, and how?[94]

Transport on water played an essential role. However much land transport of people and goods was improved by Roman roads and the increasing use of mules (from the second century BC onwards) as packsaddle animals or to pull carts,[95] it is doubtful whether land routes ever competed with sea or river routes for cost or convenience. The Dressel 1 amphoras of the Tyrrhenian coastline were hardly ever transported toward the Adriatic coast, and Campanian A not at all. The massive diffusion of these wares toward central Gaul[96] owed much to regional river networks. In general, the growth of maritime trade (for agricultural and manufactured products) is attested by the spectacular proliferation of shipwrecks from 200 BC onwards: of 103 ancient wrecks found along the French coast before 1975, 48 come from the period from 200 to 50 BC,[97] and recent discoveries have barely affected this proportion.

Finally, two comments on coinage. From the Second Punic War onwards, Rome increasingly asserted its monetary hegemony. Silver *denarii* struck in Rome circulated throughout Italy, accompanied at times (until 161 BC) by other silver issues, the *victoriati*.[98] The exact role of this coinage is difficult to ascertain, and we do not know the price of a Campanian A plate, how the sale of an amphora of wine was arranged, or how transactions between producers, intermediaries, and buyers in Gaul or Carthage worked in practice. In other words, it is almost impossible to connect erudite and precise numismatic considerations with the concrete realities of everyday economic life.

Our analysis has arrived at a point where Roman society went through a grave crisis. The number of adult male Roman citizens, which had grown from 258,000 in 188 BC to 337,000 in 163 BC, dropped to 318,000 by 135 BC. The slaves were stirring and became a danger. The leadership was

[90] Frank 1927: 112. [91] Rostovtzeff 1957: 177. [92] Goudineau 1974: 109.
[93] Cited by Carandini 1979: 205. [94] See below, Chapter 22.
[95] Laurence 2001. [96] Tchernia 1986: 77–85.
[97] Lequément and Liou 1975; Morel 1998. [98] Crawford 1985: 52–74.

divided as to which measures to take. In 133 BC, the tribune of the people Tiberius Gracchus proposed a project to deal with the agrarian problem and to revitalize the countryside. He was assassinated. But the long period of factional strife that was about to commence would not change the economic structures that were formed during the period covered in this chapter: the heyday of the slave mode of production was not over yet.

CHAPTER 19

THE LATE REPUBLIC

WILLIAM V. HARRIS

I INTRODUCTION

Conventionally enough, this chapter will attempt to answer questions about economic growth: did per capita GDP grow in the late Republic, and what determined whether it did or not? Which features of the Roman world assisted growth, which impeded it? It should also be our aspiration to recreate the economic lives of flesh-and-blood people, peasants, slaves, craftsmen – and the rich (who bulk so large in the evidence). Economic history should tell us among other things who went hungry, what work was like, and who could afford every amenity (or, as economists say, utility).

Prime topics therefore will be the actual mechanisms of economic life (their degree of technical development) and their capacity for delivering a decent physical existence, and beyond that the standard of living of each social class or group. This is a fairly mainstream approach: when Douglass North set out his agenda, he included in his notion of economic "performance" the question of income *distribution*.[1] In addition, we should not neglect the field of "public goods": it may be important to consider the effects of the Roman habit of allocating plentiful resources to some public "goods," such as foreign wars and the water supply, and few to others, such as mass education.

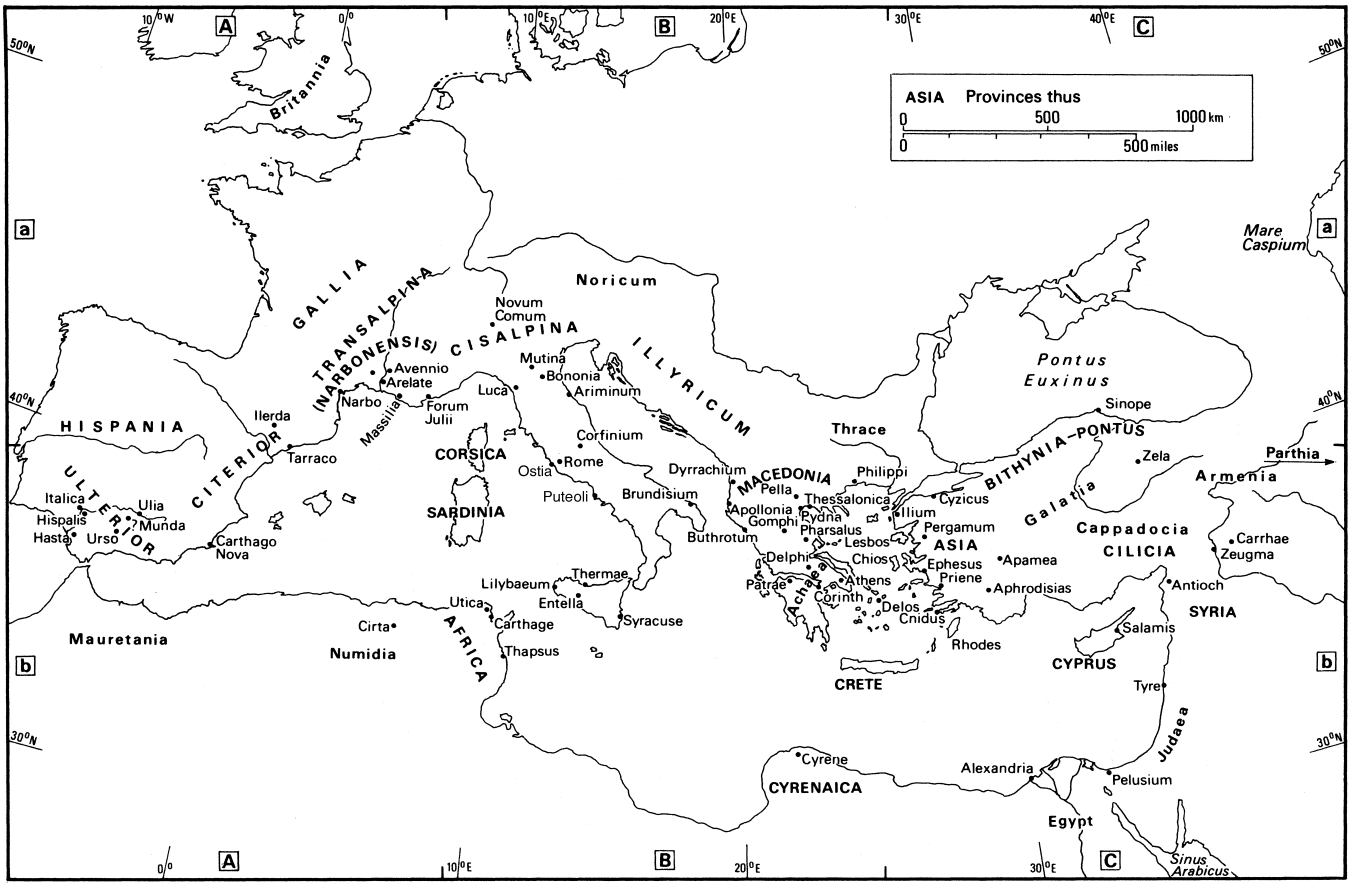
There can hardly be said to be one single accepted view of the late-republican economy. An experienced archaeologist has written, with quotation marks admittedly, of an "economic miracle,"[2] which may be an Italocentric view. Gelzer once wrote vaguely but not without reason of the "chronic unhealthiness" of the Roman economy in the period before the civil war of 49 BC,[3] a view which is hard to reconcile with the continuation through this whole century of a high volume of Mediterranean trade (cf. Table 19.1). A consensus view may hold that the period was one of sluggish and sporadic growth.[4]

[1] North 1981: 3. Nowadays some economists and even the World Bank realize the complete inadequacy of GDP as a measure of economic performance: see, e.g., Todaro 1997: 164–71.

[2] Manacorda 2001: 392. Cf. "swift economic growth" in Frier 1985: 270.

[3] Gelzer 1968: 221.

[4] Cf. Hopkins 1983b: xiv–xv, and from another perspective Persson 1988: 132.



Map 19.1 The Roman world in 50 BC.
Adapted from Crook et al. 1994: 566

II EXISTING CONDITIONS, THE *LONGUE DURÉE*, AND EMPIRE

There is no need to add much to what has already been said above about the ecology of the Mediterranean world and the adjacent regions, and about climate, though we shall bear in mind that the period may have been one of warmer temperatures,[5] with overall economic consequences unknown.

It is vital, however, to notice that well before 133 BC Rome, while it retained its agrarian-military economy, had also become part of a larger Mediterranean Hellenistic-Carthaginian economic system which was different in kind from the economy of Greece before 400 BC and from that of pre-Hellenistic Italy. The links between this world and that of Rome grew steadily stronger as Rome asserted its control over the Greek areas of southern Italy and over Sicily (we recall, for example, that southern Italy was one of the main areas of Hellenistic metal-working),[6] and even more of course as Roman power spread into the Aegean and Asia Minor. Among the many symptoms of this linkage are the eastwards movement of Italian amphoras,[7] the commercial settlement of Romans, Italians, and their freedmen established on Delos from 166 BC, and the presence of Italian merchants at Alexandria.[8] The most important result of all these Hellenistic ties was arguably the spread of Greek financial sophistication to Rome and Italy.

Let us define Roman imperial power as it was in 133 BC. It was never coextensive with the formal "provinces" ruled over – more or less – by Roman governors. The Roman conception of empire also included the Italian peninsula, Gallia Cisalpina and a number of places controlled by vassal rulers (hence the standard expression *provinciae et regna/ reges*). By 133 BC Macedonia was a province, Achaea too. King Attalus III of Pergamum, who had ruled in the shadow of the Romans, died at about this time and bequeathed them his wealthy kingdom. There were still no other Roman provinces in the eastern Mediterranean, yet no one would doubt that Polybius was right to say that Rome's victory over Macedon at the Battle of Pydna (168 BC) had effectively completed its conquest of the whole (Mediterranean) world. Outside the core area formed by Italy and the provinces, there was always a penumbra of Roman power, places where Rome received a degree of obedience – the "informal empire," we might call it. And outside that area, which was constantly being redefined, there was another area which was also to varying degrees part of the economic

[5] With regard to climate, however, one wonders what exactly led the respected agricultural writer Saserna (early first century BC) to assert that improved weather had in the long term made land more fertile (Columella, *Rust.* 1.1.5, with details). – Map 19.1 shows most of the places named in this chapter.

[6] Treister 1996: 320–2. [7] Will 1989.

[8] *ID* 1699 ("*Alexandreae Italicei quei fuere*", etc.) (= *ILLRP* 343); also a dedication at Puteoli, *CIL* x.1797 = *ILS* 7273 ("*mercatores qui Alexandr. Asiai Syriai negotiantur*").

world of the Romans. This shadow area will have included much of pre-Caesarian Gaul, and (to judge from the numerous hoards of Roman coins) much of Romania. The size of Rome's economic tentacles we can also judge from the career of the billionaire financier Rabirius Postumus, whom King Ptolemy Auletes had to put in charge of Egypt's finances, or from that of the senator Q. Ovinius, to whom Cleopatra VII entrusted the management of her kingdom's wool and textile production.[9]

The imperial character of the late-republican state will condition the whole of this account. Twelve major effects stand out:

1 The Roman state was becoming Roman-Italian, with numerous consequences: more of the profits of empire flowed to non-Roman Italy, and attempting to "colonize" Italy was now in one way or another a very costly business.
2 The Roman state was very frequently at war with foreigners, even in the 30s BC, at considerable expense but to its net financial advantage. Apart from plunder, the largest single exaction of this period was the 20,000 talent indemnity (equivalent to 480 million sesterces) imposed on the cities of the province Asia after the expulsion of Mithridates in 86.
3 Tax revenue flooded to Rome, perhaps reaching 540 million sesterces a year in cash (there were also revenues in kind) even before the addition of Gaul.[10] Most of it was spent on the army or in Rome and Italy, but after the profits of Pompey's eastern wars arrived at Rome even the Italian harbor dues (*portoria*) were abolished (60 BC). In civil war conditions in 43 BC direct taxation (*tributum*) was temporarily re-imposed on Roman citizens, but in ordinary circumstances income exceeded expenditure, and the Roman state had no long-term debt.
4 Their power and wealth enabled Romans and allies to acquire land in the provinces, as individual settlers and as more or less absentee landowners, and to build commercial enterprises. Meanwhile the Roman elite acquired more and more property in Italy, while the elite itself was being penetrated by Italians, both before and after the Social War of 91–89 BC. Roman and Italian merchants spread all over the Mediterranean world in the course of the second century. We first find members of the social elite (knights) owning land in Sicily in the 130s BC. By the time of Varro and Atticus (by their old age, at least), it was commonplace for a rich Roman citizen to own land in Epirus, Spain, or Illyria.[11]

[9] Cic. *Rab. Post.* 22. Ovinius: Oros. 6.19.20.

[10] The size of Rome's revenues is probably an insoluble problem; see among others Hopkins 1980: 116; Brunt 1988: 505. 540 m. derives from Plut. *Pomp.* 45, but some think that the total he alludes to was 340 m. Although we cannot believe in any ancient number which is a 4 followed by zeroes (cf. Scheidel 1996a), Suetonius' statement that Caesar imposed annual tribute of 40 m. sesterces on Gaul (*Iul.* 25) must have the order of magnitude right.

[11] The Sicilian case: Diod. Sic. 34.2.3. For the geographical range of Atticus' interests see Rauh 1986: 7–9.

The economic affairs of well-to-do Romans in both the formal and the informal empire were normally conducted with a certain level of support from the representatives of the political power.

5 The era of overseas colonization began slowly in second-century Spain, but such settlements could be popular, as in the cases of Iunonia (C. Gracchus' failed settlement at Carthage) and Narbo (118). Saturninus, Marius, and above all Caesar led in the same direction.

6 Romans believed that they had a right to exploit the provinces, and acted accordingly (sensible people recognized of course that the exploitation should not be overdone).[12]

7 Roman officials could sometimes change whole ecosystems, as in the Po valley.

8 The financial needs of peripheral rulers such as Nicomedes IV of Bithynia who bought favors from the Romans created enormous opportunities for Romans willing and able to lend to them.[13]

9 The labor market partly consisted of, and was entirely conditioned by, a prolific supply of slaves – still very much in demand even though the years 143 to 71 BC were the classic era of slave rebellions.

10 The capital city continued to grow, because tax revenues and private wealth made it an economic magnet; in spite of dangerous sanitary conditions, its population seems to have doubled in 100 years.

11 The Roman citizen body became more heterogeneous, ethnically speaking, at all levels, and hence its economic behavior may have changed too. Finally

12 the economy of the Roman empire achieved a level of economic integration – unmeasurable but not negligible. The price of grain in Egypt, of slaves in Ephesus and of iron ore in Spain must have been strongly affected by demand in Rome. In 63 BC, so it has been argued, high interest rates attracted funds from Italy to the provinces in the east.

III DEMOGRAPHY

This chapter must not fall into the trap of discussing simply the city of Rome or simply Roman citizens. Though we may find it difficult to gather evidence about economic conditions in, say, Spain or Achaea prior to 31 BC, it is the whole of Rome's empire that is under consideration.

Before we can even ask whether Roman population increased or decreased in this period, we have to say which population we are talking about. Rome had many more subjects in 31 BC than in 133, for Gaul, the Illyrian coast, sections of Asia Minor, Syria, Cyprus, Cyrenaica, and

[12] Cf. Brunt 1988: 63–4. For Strabo, the Gauls have been "enslaved" (4.195).
[13] See e.g., App. *Mith.* 11.

Numidia had accrued to the Romans' formal domain. And the number of actual Roman citizens recorded in the census increased dramatically, from 318,823 adult males in 131 BC to 4,063,000 in 28 BC.[14] Whether the latter figure, and the rather higher numbers from later in Augustus' reign, referred to adult males, or to women and children too, has been a classic problem of Roman demography. There is in fact no evidence whatsoever that the basis of the count changed, and Lo Cascio has argued that there is nothing demographically implausible about the increase (which included of course the promotion to citizenship of the entire free population of allied and Cisalpine Italy, not to mention the manumission of numerous slaves).[15] The figures themselves were no doubt highly approximate: 318,823 was an undercount, as is shown by the 24 percent increase at the next census in 125 BC, and the vainglorious author of the *Res Gestae* may be suspected of exaggerating.

Was the area Rome already ruled in 133 BC more populous a century later? There is no decisive argument on either side, but it seems likely that this number did increase, though modestly. The further growth of Rome itself, a cauldron of germs, will have had a mildly negative effect on the overall population,[16] but Roman citizens in general were probably less vulnerable now to Malthus' "positive checks," that is to say malnutrition and its consequences (including the abandonment of infants). And as we shall see below, historians may sometimes have exaggerated the amount of malnutrition in the late-republican city of Rome. Certainly many went hungry in late-republican Italy, but fewer perhaps, in peacetime, than was usual in antiquity.

Outside Italy there may have been grave nutritional problems, especially in times of civil war and in places which were constrained to contribute to Rome's own grain supply (Sicily and "Africa" particularly). There are places in Greece where the admittedly precarious evidence of survey archaeology indicates that the first century BC was a period of population decline. A relatively clear case is the Methana peninsula, where the number of sites reaches its lowest point in the first century BC,[17] and it is hard to resist the

[14] Liv. *Per*. 59; *Res Gestae* 8.

[15] Lo Cascio 1994a and 2001a: taking ample account of counter-arguments. Cf. also Morley 2001; but see above, Chapter 3. For the census figures of this period and their sources see Brunt 1971: 13–14, reproduced by Nicolet 1994: 603.

[16] See Morley 1996: 39–44, for a useful assessment.

[17] Alcock 1993: 42, reporting the work of Mee et al. 1991. More commonly even this degree of chronological precision is impossible. We are typically told that in southwest Boeotia "the Late Hellenistic and Early Roman period . . . experienced a very significant drop in site numbers" (Alcock 1993: 38, drawing on the work of Bintliff and Snodgrass 1985: esp. 145–7), but such are the difficulties of dating sites that the reference is to a period stretching from 200 BC to AD 300 (!). Alcock was duly cautious (e.g., 54), but she appears to conclude that Achaea did undergo some population decline under early Roman rule (154).

suspicion that this was typical of Greece and perhaps even of all the areas that Rome had annexed during the second century.[18]

Rome itself may have grown from about 375,000 people in 130 BC[19] to a figure between 800,000 and one million under Augustus. And in some other areas, northern Italy and Spain for instance, towns will also have grown much larger.

IV GOVERNMENT, LAW, AND THE PUBLIC SECTOR

The most important thing the Roman government did for the Roman economy was to conquer vast territories; the next most important thing, in this period, was probably to found "colonies." But as for economic concerns, it has been widely supposed that the Roman government's interest, in late-republican times, began and virtually ended with maintaining legality and taking care of the citizens' grain supply.[20] Closer attention to the economic aspects of Roman imperialism, and to problems of debt and credit, suggests a somewhat different conclusion.[21]

Governments, both central, provincial and local, concerned themselves with the food supply, with infrastructure, with a variety of economic actors including merchants, and with law (the maintenance of legality and the development of the laws themselves), with taxes and tariffs, with credit markets, and finally with the *publicani*, private businessmen who helped the government collect and spend its revenues. Most of this is reasonably obvious, and we need only make a few specific comments.

No one will deny that Roman governments sometimes had to think about the supply of cereals for the population of the capital. The chance discovery of an inscription revealing that about 129 BC an aedile solicited grain in Thessaly[22] simply added to the evidence that much official effort was already required to ensure the basic food supply of what was now a super-large city by the standards of the ancient world. A key moment in the politics, if not the economics, of the late Republic occurred in 123 BC, when a law of C. Gracchus introduced subsidized monthly sales of grain in the capital city. Sulla abolished them in 81 BC, but they were revived in 73 BC by a Lex Terentia Cassia (consular, be it noted, in other words the

[18] For some apparent depopulation in the middle Ebro valley in the first century see Burillo Mozota 1991: 41, while developments in coastal Catalonia are from this point of view ambiguous (cf. Miret et al., 1991). In Africa the overall trend is unclear; the population of southern Gaul probably increased.

[19] The reasonable conjecture of Brunt 1971: 384.

[20] See Andreau 1994, who may, however, overstate the officials' interest in the citizens' food supply.

[21] Harris 2006: 8–17: simply a sketch.

[22] The inscription: Garnsey et al. 1984. See further Garnsey and Rathbone 1985; Garnsey 1988: 187; *SEG* XXXIV.558.

possessing classes accepted that it was necessary).[23] As the city grew, it seems to have become increasingly uncertain whether the normal system – grain exactions in certain provinces, plus the free market, plus the aediles and the *quaestor Ostiensis* – could be relied on to keep the whole city supplied: in 57 BC another consular law (a Lex Cornelia Caecilia) gave Pompey "absolute power over the grain supply throughout the world" (as Cicero calls it) for no less than five years.[24] "Throughout the world" did not mean that he was to look after the feeding of the provincials; and while some Greek cities had grain reserves and grain funds, and officials whose job it was to take thought for the grain supply, the effectiveness of all this in the late Republic is doubtful.[25]

The late-republican capital city required a complex physical infrastructure, which included *basilicae* (commercial centers?),[26] *horrea* (warehouses), *macella* (food markets), porticoes, harbor works, aqueducts and long-distance roads (though the latter were built for mainly military purposes). Public Rome was transformed by public as well as private money in the second century (the pace may actually have slowed somewhat in the last generations of the Republic).[27] More critical for the overall economy was the physical infrastructure outside the capital, but our information is sporadic. The scale of what might happen in Italy is indicated by the vast extent of works in the Po plain, before 133 BC. Strabo describes an ambitious later program laconically: "much of Cispadana used to be marshland . . ., but [M. Aemilius] Scaurus [censor in 109–108 BC] drained the plains by running navigable canals from the Po as far as Parma."[28] Romans were now willing to give some help to provincials over such matters: Marius, for instance, canalized the mouth of the River Rhône to the benefit of Massilia.[29] Roman canals in Lusitania may belong to the first century BC.[30] But most such developments still lay in the future,

A number of incidents show Roman senatorial officials outside Italy giving assistance, unsurprisingly, to financiers and merchants, sometimes by means of military force. The young noble M. Brutus lent money, at usurious rates, to the city of Salamis in Cyprus. In order to collect the debt, one of his agents obtained some cavalry from the provincial governor

[23] The subsequent *leges frumentariae* of the late Republic are the Lex Porcia of 62 and the Lex Clodia of 58. See further Virlouvet 1994.

[24] Cic. *Att.* 4.1.7. The other sources: *MRR* II.200. [25] Cf. Garnsey 1988: 81–2.

[26] My view of the *basilica*'s primary function. For a full discussion and a different conclusion see Welch 2003.

[27] Coarelli 1977; Galsterer 1994.

[28] Strabo 5.217 (I have tried not to use Strabo's evidence without weighing the likelihood that he was referring to conditions earlier than 31 BC).

[29] Strabo 4.183. In characteristic pre-modern fashion, he sees the advantage in the additional tax revenue, not in any putative increase in the volume of trade.

[30] Cf. Strabo 3.143.

Ap. Claudius Pulcher and besieged the town councillors in their council house; five of them starved to death.[31]

That event leads nicely to the question of maintaining legality. In some ways the late Roman Republic did quite well: the numerous defects in its criminal justice system were partly remedied by Sulla, and in 67 BC Pompey very sharply reduced the volume of Mediterranean piracy – a problem which had admittedly long demanded a solution in vain. Twice in this period, on the other hand, legislation imposed degrees of debt forgiveness, in 86 BC (75 percent) and in 49 BC (in effect 25 percent); Caesar claims many had come to expect debt cancellations.[32] In 82–81 and again in 49–45 and 44–28 BC, many of the well-to-do lost their property for reasons of factional politics.

Roman law showed itself, in the course of the second and first centuries, to be more alert to the economic interests of some of Rome's citizens than might possibly be expected. As early as Cato's time, such ordinary people as those who harvested olives or grapes might find themselves in a world of formal contracts.[33] By the late Republic a number of legal developments had made commercial life more efficient. Above all, the creation of the so-called *actiones adiecticiae qualitatis* – the *actio exercitoria*, *actio institoria*, and other procedures for suing people who were de facto agents – was serious progress. This was the work of members of the senatorial elite, specifically praetors, carried out in the mid-second or late second century BC (the exact chronology is subject to argument).[34] The consensual contract of sale (*emptio venditio*) came in at the latest in the course of the second century BC.[35] The anomalous area was the law of insolvency, which was by modern standards (though hardly by ancient standards) harsh; but a very significant softening of these rules took place with the introduction, under Caesar (or possibly Augustus), of the procedure of *bonorum cessio*.[36]

It is also probable that within this period there was some development of the law regarding partnerships (*societates*). It always remained unsatisfactory from a modern point of view, in that only certain types of partnerships were able to claim legal personality. Those entitled to do so were those considered useful to the state, and it was the *publicani* who began to receive this special treatment, in all likelihood during the general period of C. Gracchus' tribunates.[37] But the law of *societas* was evolving in the very late Republic, in the direction of greater flexibility.[38]

[31] As we happen to know from Cic. *Att.* 6.1.6.

[32] 25 percent: Suet. *Iul.* 42.2. Caesar: *B Civ.* 3.1.3. [33] Cato, *Agr.* 144–7.

[34] Aubert 1994: esp. 70–100. For an overview of the development of private law see Crook 1994: 561–3.

[35] Johnston 1999: 79.

[36] Johnston 1999: 108–10. Cf. Frederiksen 1966: 128–30, who inclined (135–41) to attribute *cessio bonorum* to Caesar.

[37] See Nicolet 1979, whose chronology is preferable to those previously proposed.

[38] See *Dig.* 17.2.30, 2.52.18, 2.65.8, and other texts cited in Watson 1965: ch. 6.

Historians have probably not paid enough attention to the frequency with which politicians intervened in the late-republican credit-market, or at least threatened or proposed to do so. In addition to the two debt-forgiveness laws mentioned above, we should take note of the short-lived debt law of Cato the grandson of the Censor (118 BC?), the intervention of an aedile in the year 90 BC, the riot which killed the praetor Asellio in 89 BC, also of a law of the tribune Sulpicius Rufus (88 BC), a consular law of the same year, not to mention the agitation of Catiline. It was probably in order to contain interest rates that the Senate banned the exporting of gold and silver from Italy in 63 BC, something which it had also done on previous occasions. Once again in the winter of 51–50 BC the Senate apparently attempted to impose a ceiling on interest rates.[39]

Finally, for this section, a note on the *publicani*, private entrepreneurs who lived in large part on the state. Our concern is less with their political and social history than with their structural role in the economy. They contracted with the state to supply goods (such as military clothing) and they gathered revenues (*vectigalia*) from Italian land, harbor dues, state-owned mines and various other sources, and this meant a great deal of active management. Their great profits from empire expanded still further in 123 BC when a law of C. Gracchus gave them the right to bid for the huge tithe of the province Asia. Pompey bestowed on them the same privilege in the provinces he had created. They commonly operated as partnerships, and in the very late Republic these *societates* sometimes, it seems, attracted investment from senators (who were theoretically supposed to be above the more commercial profits of imperialism).[40] On the other hand there is no adequate reason to endorse the common view that the *publicani* became more and more of a cartel at the end of the Republic: Nicolet seems to have demonstrated the survival in the 50s BC of independent *societates* and genuine auctions.[41] We should rather think of large networks, sometimes overlapping, which reached out into the furthest provinces, where we find, for example, *publicani* running the realgar mines in Paphlagonia.[42] But the most intriguing development was that the companies of publicans, because they accumulated funds and moved them around, became in a sense banks, and rather large ones. It would be of great interest to know how they invested. Sometimes of course we do know: they lent the equivalent of nearly half a billion sesterces to the cities penalized by Sulla in "Asia," and in a few years the sum had multiplied by six (and so became unrepayable).[43]

[39] Cato's law: the entire evidence is contained in an allusion in *ORF* no. 41 fr. 2 (cf. *MRR* 1 527). The aedile in 90 and the decree of 51–50 BC: Cic. *Att.* 5.21.13. The ban of 63 BC: Cic. *Flac.* 67 (how recent these other occasions had been we are not told), with *Vat.* 12.

[40] See Cic. *Vat.* 29. Owning *partes* in the companies was part of high financial life: Cic. *Rab. Post.* 4.

[41] Nicolet 1979. [42] Strabo 12.562.

[43] The sources on this affair include Cic. *Q Fr.* 1.1.33, Plut. *Luc.* 20, App. *Mith.* 63 and 83.

V MONEY AND FINANCE

Orthodoxy holds that the Romans' only money was coinage.[44] In my view, this is a grave over-simplification. Let us start with a large late-republican transaction: how did Cicero transfer the 3.5 million sesterces he paid for his famous house on the Palatine (by no means the largest property price we know of in this period), at a time when Rome had practically no gold coinage? His slaves did not load three-and-a-half tons of silver coins. Without much doubt, it was at least for the most part a paper transaction. The commonest procedure for real-estate purchases was probably the one casually alluded to by Cicero on another occasion: "*nomina facit, negotium conficit*," "he provides the credits [or "bonds"], <and so> completes the purchase."[45] It was of course possible to pay quite large sums in coin, and when Cicero was contemplating another purchase on the same scale, he reported to Atticus that he had 600,000 sesterces "at home," which could form part of the payment.[46]

Money, to adapt a standard definition, is anything that serves as a unit of account, a means of exchange, or a store of value.[47] The financial instruments available to prosperous Romans were hardly less complex than our concepts M-1, M-2, M-3. In the Roman case both commodities and debt are crucial. Commodities were regularly used as methods of accounting and saving.[48] As for debt, it was the lifeblood of the system: *nomina* (i.e., outstanding loans) were a standard part of the assets of people of property, and an everyday fact of life for great numbers of others.[49] Proof positive that the traditional understanding of Roman money is mistaken appears in 49 when the credit system tottered under the impact of civil war: nervous creditors began to seek payment *even* of the principal "in silver," i.e. coin, and part of Caesar's reaction was to "forbid anyone to hold more than 15,000 drachmas [i.e. 60,000 sesterces] in silver or gold,"[50] which would have meant red revolution – most emphatically not Caesar's purpose – if silver coins had really been the only form of money. There was a considerable array of

[44] For statements of what is practically a universal dogma see Nicolet 1988: 157; Williams 1998: 173. Howgego 1992 gives a more nuanced account.

[45] Cic. *Off.* 3.59 (where the purchase is made by a Roman knight in Sicily). It is commonly imagined that large payments were made in gold bullion, and there was indeed bullion in circulation; but there is no evidence in Cicero's extensive writings or elsewhere that gold was a regular means of payment before Caesar's dictatorship. Howgego 1992: 10 sought for evidence that individuals made commercial payments in bullion under the Republic, and found none; of the roughly 226 relevant hoards catalogued by Crawford 1969 for the years 150 to 27 (hoards with more than 25 coins that were dominated by Roman coins, i.e. belonged to the Roman economy), exactly two (nos. 193 and 337) seem to have had a bullion component.

[46] Cic. *Att.* 12.25.1.

[47] Cf. Hawke 1980: 76, etc. On the whole matter see Harris 2006.

[48] As demonstrated in full in the published version of Hollander 2002.

[49] Cf. Howgego 1992: 13–15. It will be admitted that not all debt increased the money supply.

[50] Dio Cass. 41.37.3, 38.1.

financial mechanisms: you could make a payment by transferring to the recipient a debt you were owed by a third party (*delegatio*).[51] You could sell a debt you were owed (a *nomen*) at a discount.[52] And there is much more: commentators will continue to dispute exactly what was going on when Cicero telegraphically pointed out to Atticus the three possible methods of realizing a *nomen* which was in some way due to him from Caesar in 46 BC,[53] but the main points are that he had a choice, and that we do not fully understand the mechanisms in question.

This is not to deny that gold bullion and silver coinage played large roles: the provincials who paid their taxes in money paid them in coin, and when the consul Cicero, in syntony with the Senate, wanted to intervene in the credit market to stem the flow of funds out of Italy, he banned the export of gold and silver and sent a quaestor to Puteoli to put the regulation into effect.[54] The big innovation in coinage in this period was the introduction of gold coinage, briefly by Sulla in 84–80 BC and then with permanent effect by Caesar in 48 BC. This change greatly improved liquidity[55] and thus in the long term favored growth.

Since we have not the faintest idea how much money resided in callable deposits in Roman banks (already in regular use by the Roman elite at the beginning of our period), we have no chance of calculating the size of the money supply. What is most interesting about the aggregate stock of silver coinage is that it apparently starts to decrease after the early 70s BC, after rising steadily for generations;[56] in ordinary circumstances this evidently caused no inconvenience to the well-to-do.

There could hardly be such a thing as Roman monetary policy in a modern sense: throughout this period, there were other currencies in existence besides Rome's, especially of course in the Greek-speaking provinces, and Rome evidently had no policy of replacing them.[57] Rome's own mints coined what was thought to be necessary for the state's immediate needs. Magistrates were, however, occasionally constrained to take action with respect to coin purity: in about 85 BC Marius Gratidianus earned enormous popularity by testing the coinage and eliminating debased coins.[58]

There were undoubtedly areas of the Roman empire which remained unmonetized; there may have been peasants even in Italy and Greece

[51] Rauh 1989: 55, 65–6.

[52] Rauh 69. Howgego 1992: 3 cannot be right to say that "there was no negotiable paper."

[53] Cic. *Att.* 12.3.2; cf. D. R. Shackleton Bailey's edition (Cambridge, 1966), vol. v, Appendix 1; Rauh 1989: 72–3.

[54] For bullion in private hands in this era see Cic. *Clu.* 179, and Lucil. 456–7 Marx. In Cic. *Att.* 13.45.3 *argentum* may well be "plate."

[55] Cf. Howgego 1992: 10–11.

[56] Hopkins 1980: 109, who is necessarily puzzled (111). The numbers have been disputed (Buttrey 1993; *contra* Hopkins 1995–6: 53), and it is possible that the decrease began earlier.

[57] For the spread of Roman currency to the republican provinces, as seen by a numismatist cf. Harl 1996: 61–72.

[58] For the sources see *MRR* II 57.

who lived outside the money economy. When Roman power arrived in an unmonetized region, the change might possibly be slow in coming: Strabo considered the deep interior of Lusitania to be unmonetized; on the other hand, he found the phenomenon strange and marginal.[59] It cannot plausibly be held that a low level of monetization was a serious brake on growth, indeed the spread of coinage use probably lowered transaction costs.[60]

The banking system had its strengths and its weaknesses. It operated in an unregulated fashion, and most banks apparently consisted of a single principal, usually – one must suppose – with quite limited capital. On the other hand, bankers were able to make payments at a distance,[61] and there were bankers where we might not have expected them, such as Herennius of Leptis.[62] Capital markets depended much more on personal ties than modern ones do (usually you borrowed from your acquaintances, not institutions) – as indeed was inevitable in a pre-print or early-print culture in which economic information was scarce and unreliable.[63] But the complexity and sophistication of late-republican finance has been wilfully ignored by the Finley school,[64] no doubt partly for the innocent reason that the sources often allude to procedures which they do not explain. And there are many real obscurities, for instance about the full range of activities of the *coactores* (auction financiers).[65]

With all this we are of course far away from the mass of the population. Could an Italian, or a Spanish or Macedonian, farmer borrow money on reasonable conditions? How were the wool-producers of Patavium or the ship-builders of Gades paid, and how did they pay their bills? That is all hidden from us, but it is very suggestive that the numerous shipwrecks of this period, unlike some late-antique ones, have never so far produced enough coins to suggest that big cargoes were paid for in cash.[66]

VI OWNERSHIP AND SOCIAL CLASS

We might like to talk about income, but the evidence is altogether lacking and the best we can do is ownership. A tribune from a noble family said in

[59] Strabo 3.155 (not necessarily from a recent source). In 7.315 he reports that in Dalmatia they use no coinage and identifies this as a barbarous characteristic; but there are enough coin hoards there to show that he was at least out-of-date or exaggerating. The Caucasus Albanians have no coins: 12.502. The view taken here is consistent with the number of provincial coin hoards of the late Republic (for which see Crawford 1969).

[60] Cic. *QFr.* 2.15.4, *Att.* 4.15.7.

[61] See, e.g., Cic. *Fam.* 2.17.4. In Cic. *II Verr.* 1.102 it is implicit that the banker P. Tadius at Athens can make payments at Rome. Cic. *Att.* 7.18.4 shows that in ordinary circumstances it was possible to make payments from Italy to Greece. A good deal is known about Ptolemaic banking (Bogaert 1998–9), but how much it had in common with practices in the rest of the Hellenistic world is obscure.

[62] Cic. *II Verr.* 5.155.

[63] Early industrial England was similar: Pomeranz 2000: 179–80.

[64] See instead Rauh 1989.

[65] Concerning whom see Rauh 1989: 52–4.

[66] Cf. Parker 1992: 30.

104 BC that there were not 2,000 persons who owned property ("*qui rem haberent*"), and he was probably right in a sense – but what did he mean?[67] As for trends, the rich most definitely grew still richer during these hundred years – it is enough to recall Pliny's remark that the house of M. Aemilius Lepidus, consul in 78 BC, which was the finest in Rome, was not among the finest one hundred houses 35 years later;[68] meanwhile the expansion of slave labor may lead to the conclusion that the free poor were actually worse off than before.

Can we know much more than that about changing inequalities in distribution? Can we generalize about the wealth or otherwise of the various classes or social strata? Nothing significant can be measured: we can calculate no Gini coefficients of inequality. We are on the other hand helped a little by the fact that most wealthy Romans still held a good proportion of their assets in a relatively visible form, namely land. Crassus had 200 million sesterces "*in agris*,"[69] which on a very hypothetical price basis of 1,000 sesterces a *iugerum* (but the price of improved land was probably higher than this) would have meant 50,460 hectares, a large area by the standards of any western European aristocracy in any period. The late-republican freedman C. Caecilius Isidorus, who according to Brunt's daring guess may have gathered up the fortunes of the last of the Caecilii Metelli, was famed for his wealth and seems to have owned some hundreds of thousands of hectares.[70] But by the end of the Republic, in any case, the fortunes of the rich normally included other large assets too: slave *familiae*, loans made to friends, freedmen and others, and urban real estate, simply to name the principal categories.

A long controversy has centered round the concentration of landed property in Italy in the second century and later. Sallust saw it as one of the main features of the period after 146 that the families of serving soldiers were deprived of their farms by the men of power. Appian for his part seems to see the growth of large estates as a trend affecting "public land," i.e., land that had been confiscated from the Italian allies, and there are ample signs that such land had been the subject of dispute well before the issue came to a head in Ti. Gracchus' tribunate in 133 BC. That Italian land was sometimes seized by violence or stealth in these times is also a possibility envisaged by the author(s) of the *Lex agraria* of III BC.[71] For some time those historians

[67] L. Marcius Philippus' remark: Cic. *Off.* 2.73 (Cicero was of course most indignant). For Frank (1933–40: vol. I, 253) this "was a wild exaggeration made by an excited agitator."

[68] Plin. *HN* 36.109–10.

[69] Plin. *HN* 33.134. This was perhaps his own evaluation.

[70] The basic text is Plin. *HN* 33.135; see Brunt 1975: 625–6. As has often been pointed out, Isidorus must have made much of his fortune before 31 BC, even though he did not die until AD 8.

[71] Sall. *Iug.* 41.8, App. *B Civ.* 1.7.29–8.32; for other references see E. Gabba's commentary on 7.29. For second-century conflict about public land prior to Ti. Gracchus' tribunate see Livy 42.1.6 (173 BC), *Lex agraria* (*FIRA* 8 = *RS* 2): line 18.

who knew of the results of surface survey (many small farms identifiable as republican, for example in south Etruria), and knew of the evidence of social continuity which is sometimes visible in the funerary inscriptions, liked to reject what the sources say about the concentration of ownership – for no adequate reason.[72] There were regional and intra-regional variations in landowning, that is obvious and is confirmed by the material evidence, which also shows, though not with much precision, that the second century was the time when the well-organized large "villa" started to be an important part of the Italian landscape. Settefinestre near Cosa is the most famous example but there were others scattered up and down the peninsula.[73]

The near-cessation of "colonization" (in the technical Roman sense) in peninsular Italy after the 150s BC created a pent-up demand for land and hence a need for redistributions such as those provided by the Gracchan laws of 133 and 123 BC. But apart from a handful of colonies in Italy, the laws of the Gracchi did not in the long term change patterns of landholding: when fifteen years had elapsed after C. Gracchus' reforms, the poor, says Appian, had been dispossessed again and were worse off than before.[74] Between 104 and 60 BC at least seven tribunes of the people attempted to pass agrarian laws.[75] But the only person who succeeded in benefiting civilians was Caesar, first as consul in 59 BC (about 20,000 fathers of families received allotments in Campania), then as dictator, in which role he founded a limited number of Italian *coloniae* and put into effect a programme of unprecedented ambition for sending others to the provinces.[76] This programme probably created as many losers as winners – the provinces had not been empty.

Not content with expanding their Italian landholdings, the rich (senators, knights, and others) had already begun to acquire land in the provinces, a trend that probably gathered speed at the very end of the Republic.[77] They had meanwhile become a more diverse group: by the end of the period, a freedman such as Isidorus could be as rich as virtually any senator. There could now be large fortunes based on commerce. When a forensic orator, to

[72] The best statement of what used to be the unorthodox view is Frederiksen 1970–1; but his position seems to have changed somewhat by the time he wrote 1981: 270. *Contra*: see Gabba 1979: 24–5 and 37; and Nicolet 1994: 617–19. Cf. also Rich 1983: 296–8.

[73] Settefinestre: Carandini 1985. For some newly studied examples see Giancola near Brundisium (Cambi 2001) and Termitito near Heraclea (De Siena and Giardino 2001: 153–6; this was allied territory).

[74] App. *B Civ*. 1.27.121–4. Most of the *complures coloniae* of C. Gracchus referred to in Livy, *Per*. 60 did not materialize.

[75] See Brunt 1988: 240–1. [76] Brunt 1971: 255–9, 589–601.

[77] Shatzman 1975: 34. For some further evidence see Aubert 1994: 162 n. 153. Cf. Crawford 1977a: 48–9. Rawson 1976: 90–1 (and 1994: 446–7), perversely attempted to deny the evidence that refers to senators (arguing *inter alia* that *II Verr*. 5.45 means that it was illegal for senators to own land in the provinces; but the obvious meaning is that the *governor* of the province was not meant to own property there; cf. 4.9). Non-senatorial Romans farming in Narbonese Gaul in the early first century: Cic. *Quinct*. 12.

make a point, said that "many slave-dealers and merchants" had surpassed in wealth "men like Africanus and Laelius,"[78] he is not to be taken literally. But there is more sober testimony: it is implicit in Cicero's evaluation of the comparative standing of investments that *mercatura* could produce very healthy results even from the point of view of a well-to-do senator.[79]

Between the wealthy few and the propertyless poor lay other groups. One will have consisted of more or less prosperous farmers, some of them farming with slave labor, others, definitely poor (*pauperculi*), "with their own children."[80] De Ligt has rightly stressed the stratification of the peasant population.[81] Town professionals, artisans, and shopkeepers will have run the whole range from near-wealth to grinding poverty. It is not clear that any of these groups had any shared experience in the late Republic. Some people certainly prospered, especially in towns; at the top end they will often have been town councillors, or prosperous freedmen such as the late-republican *sagarius* (cloak-merchant) Sabbio whose residence at Capua was excavated not long ago.[82] But one's livelihood could be insecure: a mistake or ill luck and you could lose your land. One scholar has estimated that no fewer than 130,000–150,000 veterans were settled in Italy between 47 and 14 BC.[83] The dire insecurity that resulted is to be heard in Vergil's *Eclogues*, literary conventions notwithstanding.[84]

We have no way of knowing how many people lived at a subsistence level or sank below it. But we do know that some provinces were severely exploited by Rome and its officials, that child-abandonment was commonplace in many regions and that the poor had no economic safety-net. In the countryside, in particular, the job opportunities for the landless man were seasonal and sporadic, and in towns they will also have been grim: these *mercenarii* and *obaerarii* were at least as vulnerable, economically, as the worst-treated slaves. None of this is likely to have changed much during the century we are considering.

In these conditions we may regard the introduction of tenancy as an improvement – it at least allowed free men to make a livelihood on the land. It is first known from the lost writings of Saserna,[85] father or son, probably in the early first century.

VII LABOR

The conditions of labor, at least in the central parts of the Roman world, were dominated by slavery. The form of labor relations might vary (according to Varro, there were still indebted serfs, *obaerarii*, in "Asia," Egypt and

[78] Cic. *Orat.* 232. [79] Cic. *Off.* 1.151. [80] Varro, *Rust.* 1.17.2.
[81] De Ligt 1990: 49–56. [82] Pagano and Rougetet 1987.
[83] Keppie 1983: 127. [84] E.g., *Ecl.* 1.3, 11–12, 70–1; 11.4–6.
[85] Quoted by Columella, *Rust.* 1.7.4; see De Neeve 1984a: 40–62, 91–2, 124.

Illyricum),[86] but chattel slaves were always a key element. Slave numbers are admittedly even more elusive than those of the free population. In 167 BC the slave market had absorbed 150,000 new Epirot slaves without difficulty; Caesar's Gallic Wars overshadowed this effort, producing more than 400,000 prisoners.[87] Yet there was no hint of a glut. My guess is that in the very late Republic there were always four to eight million slaves and serfs in the Roman empire; but no accurate figure is obtainable.[88]

Cato and Varro explain in detail how to make the best use of slave labor on the land. Tenant farmers might also own slaves. Slaves made up a large proportion of the skilled craftsmen of republican Italy.[89] Wealthy first-century Romans, accustomed to owning a number of residences, numbered their domestic servants by the hundreds (and if there were 12 million free people in Italy in 31 BC, comparative figures suggest that there may have been two million or more domestic servants).[90] Slaves could already possess or could receive education, and during the second century they probably came to dominate the managerial level of the Roman economy still further, working as *vilici* (estate managers), *actores* (financial managers) and private secretaries. The logic of this system is obvious: the owner has far more power over his slave subordinate than he could ever have over a fellow citizen.

It is futile to discuss whether slave labor was "efficient": we are in no position to second-guess the slave owners on this point. It may be sufficient to record the surprisingly candid view of a historian of economic growth: the underlying advantage of technological improvement is that it allows a nation "to control and manipulate nature and people for productive ends."[91] Slavery did that quite well, and it did not prevent its victims becoming, in selected cases, consumers.

While avoiding the common tendency to soften the life conditions of Roman slaves, we should pay attention to the very noticeable differences. Many were violently mistreated: chain-gangs and vicious punishments, including execution on the mere say-so of the owner, were commonplace. Cato lists the work which farm slaves ought to do on "holidays." Child slaves could be put to work at an early age. Though it has been suggested that eventual freedom was the prospect of large numbers of slaves, and manumission was indeed a regular part of the system which probably grew more common in the late Republic, the evidence for readily available manumission is insufficient,[92] and it was ordinarily available only to those who were judged to be especially meritorious – which excluded the average farmhand, porter, and quarry-worker. But slavery was a legal, not an

[86] Varro, *Rust*. 1.17.2 (with Lo Cascio 1982). Aubert (1994: 130–1) seems too sceptical on this point.
[87] Vell. Pat. 2.47 (with the reservation implied in n. 10).
[88] For the overall total cf. Harris 1999: 65. [89] Cf. Morel 1983c: 25–6.
[90] Cf. Cipolla 1994: 66, for domestic servants as a percentage of total population in Italian cities, 1448–1696.
[91] Mokyr 1990: VII. [92] See Wiedemann 1985; in my view, Nicolet 1994: 605 has this wrong.

economic, category, and the most vital question concerns "low-wage" labor, whether it was slave or free.

Wage laborers (*mercennarii*), who were almost equated with slaves by upper-class authors,[93] were often still worse-off economically, as already mentioned: on the land they were often seasonal laborers, hired for hay-making or the harvest or the vintage.[94] None of this will have changed much in late-republican times.

It is only recently that the work of Roman women has emerged from the historiographical shadows,[95] and much remains unclear (see above, Chapter 4). As in most traditional societies, they will have worked at cloth- and clothing-production (but the slave owner, even in Cato's time, was recommended to go to market to buy clothes).[96] In towns, women had more economic possibilities than in some other pre-industrial worlds, such as classical Athens. On the land, peasant women undoubtedly joined in special outdoor tasks such as the vintage, and probably did other outdoor work as well in many regions – which ones exactly, it would be worth trying to define.[97] Slave women were probably outnumbered by the males, especially on large slave-farmed estates, though perhaps less heavily so as our period progressed; here their work will mainly have been in and around the house.[98]

As to the experience of work, no one, it seems, attempted to calculate work by the hour, there being no mechanical clocks, but that no doubt often meant toil from dawn to dusk (before dawn is when the peasant Simylus gets up in the *Moretum*). It may have been within our period that an agronomist, namely Saserna, first propagated the notion that certain agricultural tasks ought to be accomplished in a fixed number of days. There were holidays, but they affected different classes in different ways: on festive days Simylus works his garden.[99]

VIII CAPITAL AND CAPITALISM

One scholar has suggested that we might call the developed Roman economy a "capitalist market economy without factories,"[100] but experts on

[93] Harris 1988: 608 n. 29.

[94] Varro, *Rust.* 1.17.2. He recommends using *mercenarii*, not slaves, in unhealthy districts, *ibidem*. See further Treggiari 1980; De Ste. Croix 1981: 179–204.

[95] See Scheidel 1996b; Dixon 2001: esp. 113–32.

[96] Cato, *Agr.* 135. Columella, *Rust.* 12.3.6 assumes that the clothes for ordinary slaves will be purchased.

[97] Cf. Scheidel 1996b: 2. The best testimony might appear to be the *Moretum*, in which the poor farmer's wife seems not to work in the fields (119–24), but the literariness of the whole work must put us on our guard (cf. Horsfall 2001). For Illyricum see Varro *Rust.* 2.10.7.

[98] Harris 1999: 69–70. Scheidel 1996b: 3 seriously misreads Columella *Rust.* 12.3.6 on this subject.

[99] Saserna and the days per task: Varro *Rust.* 1.18.2 and 6; cf. Columella *Rust.* 2.12.7 and Kolendo 1980: 48–50. Simylus in the garden: *Mor.* 67–9.

[100] Millar 1981: 73; cf. Love 1991.

capitalism and experts on Rome have on the whole been very reluctant to bring the two concepts together. It is all too obvious that even the capitalism of the nineteenth century differed greatly from the Roman system.

There were rich people regularly on the look-out for good investments, and people who helped them; conversely, a reputable borrower could borrow on a very large scale.[101] Much of the borrowing will have been conducted through patrons and friends, but less so probably as our period progressed. Such relationships were *not* what brought Brutus and the Salaminians together, or the late-republican Cloatii with the people of Gytheum to whom they later generously forgave their 48 percent annual interest.[102] A banker such as Pythius of Syracuse could have such wide contacts that he was said to be "*apud omnes ordines gratiosus*," "esteemed by high and low alike."[103] And Andreau has established that there were loans for productive purposes as well as for consumption.[104]

In a capitalistic system, investment is supposed to be guided by expectation of returns, without inhibitions (the real world is more complicated). Members of the late-republican elite show no sign of embarrassment about large-scale money-lending. Even when Cicero is ranting on moralistically in a philosophical work, the only kind of lending he pretends to disapprove of is extortionate lending to provincials through freedmen.[105]

What differentiates the late-republican Roman system from a simple form of capitalism was not that it lacked markets in capital, in goods, in land or even in labor, for it did not, but that its urban production was carried out by households rather than firms.[106]

IX CONSUMPTION AND LIVING CONDITIONS

We can consider this matter from both a macro- and a microeconomic direction, from the point of view of aggregates and from the point of view of households. Aggregates are admittedly all a matter of conjecture, and the consumption choices of individuals are also hard to get at.

It makes little sense to divide Roman commodities into "luxuries" and "staples" – there were far too many major items that were neither one nor the other.[107] But there were of course luxuries recognized by the Romans as such. It was Pompey's defeat of Mithridates, we are told, that first turned Roman customs to pearls and precious stones; and the surviving jewelry can make a vivid impression, for instance the items made of gold buried

[101] We have been told that capital markets "were almost entirely absent from the ancient world," Millett 2001: 24. It depends what you mean by a capital market, but this is more false than true.

[102] *SIG*[3] 748. [103] Cic. *Off.* 3.58.

[104] Andreau 1999: ch. 12. But there may not have been enough productive outlets for capital (cf. Braudel 1981–4 [1979]: vol. II, 248; Pomeranz 2000: 179).

[105] Cic. *Paradox.* 46. [106] Cf. Persson 1988: 68, on the mediaeval European economy.

[107] Harris 1993b: 12.

in a house on Delos in 88 or 69 BC.[108] The late Republic sustained a lively trade in works of art.[109] The 50s BC, apparently, were the years when rich Romans acquired a taste for the use of marble in private houses.[110] On the other hand there were still sumptuary laws, and some real hostility may have been felt towards luxury spending.[111]

But let us turn to everyday life, beginning with cereals. In mediaeval and early-modern Europe, according to a widespread view, "the lower orders lived in a chronic state of undernourishment and under the constant threat of starvation,"[112] and that may be what we should expect to find in the Roman empire. We suppose after all that in any given Mediterranean region the wheat crop failed at least one year in every four. Recent scholars have argued that shortages of grain were very common in the late-republican city of Rome[113] – but they have largely been looking in the wrong place. The capital was obviously subject to serious distribution problems – and people died of starvation there if civil war cut off supplies.[114] But Italy was relatively well-off, and chronic and severe malnutrition must have been more common in the less-talked about world of the provinces. In Sicily, the tithe exacted by Rome must sometimes have caused serious shortages. Garnsey has argued that in the late Republic some three million *modii* of wheat came as tax from Sicily in an average year, perhaps some eight million from "Africa."[115] Three million *modii* would have weighed on average 20,460 tons, and hence at a reasonable net yield of 400 kg./ha. would have corresponded to the entire production of some 51,150 ha.; no more than half a million of Sicily's 2.5 million ha. can be supposed to have been under grain cultivation at any given moment.[116] Even in good years, Roman exactions must have been burdensome for the places most affected (they were not shared equally), and during slave rebellions and after bad

[108] Plin. *HN* 37.12. Delos: the exact date is unclear – see Siebert 2001: 133–47 (most of it came from Syria).

[109] Coarelli 1996; Galsterer 1994. [110] Plin. *HN* 36.48–50.

[111] When the censors of 125–124 BC expelled a consular from the Senate for spending too much to rent a house (Vell. Pat. 2.10.1, cf. Val. Max. 8.1 damn.7), that was a pretext. But the censors of 97–96 expelled the tribune Duronius (*MRR* II 7) because he had repealed a sumptuary law. By the end of our period, it may be that only extreme extravagance was criticized (cf. Sall. *Cat.* 7.4, 13.1) – but there were at least two more sumptuary laws between Duronius and Caesar's dictatorship, and Pompey proposed one in 55 (Dio Cass. 34.37). See further Gowers 1993: 70–3.

[112] Cipolla 1994: 23.

[113] Virlouvet 1985; Garnsey 1988: 195–217; Cherry 1993 ("food crisis . . . is attested about one year in four," 433).

[114] Actual starvation in republican Rome seems only to be attested during the war against Sex. Pompeius (numerous deaths, Dio Cass. 48.18.1), but the sources may very well have missed something.

[115] Garnsey 1988: 182.

[116] However Coarelli 1981: 13, following Scramuzza, conjectured that there will only have been about 250,000 ha. under grain each year. For the weight of a *modius* of wheat see Rickman 1980: XIII. I am assuming alternate-year fallow (with Morley 2001: 56). Note that there were normally compulsory purchases in Sicily in addition to the tithe (Duncan-Jones 1990: 147).

harvests, the effects will have been dire. In short, the extraction of large quantities of grain from Sicily, Africa, and Sardinia must sometimes have had very negative effects there.[117]

Since there is no space to consider all other significant commodities here, we may concentrate on five especially important ones, olive oil, wine, metals, slaves, and textiles.[118]

Consumption of olive oil must have been noteworthy in all the provinces that existed in 31 BC except Gallia Comata, as well as in Italy.[119] It has been supposed that average consumption in the Mediterranean parts of the Roman empire is likely to have been about 20 liters a year per head.[120] Cato's ration for farm slaves was one *sextarius* a month,[121] equivalent to 6.47 liters a year, but that was in a production area. Even if consumption was only at the level of five liters a year in a population of, say, 25 million – a quite conservative guess – that would have required 125 million liters a year, which would have been the product of, say, 34 million trees or the contents of 5.68 million amphoras[122] – impossibly high numbers, one might say. Yet the dossier of olive-oil trading intensifies greatly in the course of the late Republic.[123] Much the most interesting number we have concerns Caesar's exaction of three million pounds (one million liters) of olive oil a year from Leptis.[124] That means that the Leptitani possessed at least 273,000 olive trees (much of whose product they must previously have been exporting). It also means that they had a fairly reliable market share and that someone had invested heavily.

Wine consumption in the city of Rome has been analyzed well by Tchernia, who estimated consumption in the range 146–182 liters per head per annum, having increased, so he argued, in the course of the second century.[125] Once again, rural consumption is a conundrum. Cato recommended something like 200 liters a year, sometimes mixed with

[117] C. Gracchus insisted that some Spanish communities be paid for their grain, Plut. *C. Gracch.* 6.

[118] This selective approach runs the risk of simplifying an increasingly complex economy. Ideally we would also consider the full range of consumption choices, services as well as commodities.

[119] At Rome itself it was certainly considered, by 74 BC, to be an essential commodity: Plin. *HN* 15.2. There were parts of other provinces besides Gaul where little oil was consumed: see e.g., Strabo 3.155 on inland Spain.

[120] Mattingly 1996: 239. It has been argued that in classical Attica oil consumption had been at the level of between 15 and 28 liters a year per head (Amouretti 1986: 177–96; she included two to three slaves per family).

[121] Cato, *Agr.* 58.

[122] In truth the matter of average yield is obscure. The best discussion known to me is Mattingly 1994a, but the figure of 5 kg. of oil per tree used here is my own extrapolation. Late-republican amphoras: Peacock and Williams 1986: 52 give the capacity of Dressel type 1B as 22 l.

[123] Two of the earliest surviving dedications by specialist merchants at Delos were made by the oil dealers, in the 90s: see *ILLRP* 344. There are ample signs of Italian exports in this period: Strabo 5.214, Plin. *HN* 15.3. But much is obscure; cf. Lafon 1993.

[124] Caes. *B Afr.* 97; for the equivalence see Frank 1933–40: vol. 1, 193.

[125] Tchernia 1986: 21–7; 58–60.

sea-water (!), for his in general harshly treated farm slaves, once again in a producing region.[126] It is difficult at all events to imagine that empire-wide consumption was less than 10 million hectoliters a year in the late Republic. Production probably increased notably during that period, for the export of wine-filled Dressel 1 amphoras from Italy to Gaul and Spain was only beginning in 133 BC, and the market continued to grow;[127] it will have been damaged, obviously by Caesar's massacres in the 50s BC.

If demand for wine is hard to measure, aggregate demand for metals is a real mystery.[128] But the Greenland ice-cap shows that copper production increased sharply, and several general considerations suggest that this will have been true of all other metals (cf. Chapter 20). Better-capitalized agriculture was one factor, and sources of ore improved as imperial power expanded. An underlying trend was leading towards the world of Flavian Pompeii, which teemed with metal household vessels and utensils of every kind, with metal implements and tools, with statuary, with locks, nails, water pipes – and so on.[129] Now merchant ships carrying metals are as common in wrecks of around 100 BC (cf. Table 19.1) as they were around 79 AD. Arms-makers must have made fortunes during the civil wars of 49–30 BC. When wrecks are well preserved, they tend to be rich in metal artifacts: in the fairly modest Valle Ponti wreck, for instance, were found lead ingots, bronze strainers, metal ladles, baking pans and plates, metal boxes and clasps, votive models made of lead, carpenter's tools, fish-hooks, a bronze balance, a gridiron, strigils, a sword, and an iron anchor.[130] Yet the history of the metallization of the Roman economy has still to be written.

The numbers of slaves we have already mentioned will give some impression of the demand for new slaves. At the end of the Republic it will have been in the hundreds of thousands a year, empire-wide.[131] It was probably in this period that someone coined the Greek word *statarion* for a specialized market place given over to slave dealing.[132] Yet it is not certain that the demand for market-purchased slaves was continuing to rise at the very end

[126] Cato, *Agr.* 57; cf. Tchernia 1986: 24.

[127] Gaul: Laubenheimer 1993: 59–61. Spain: Nolla and Nieto 1989: 381.

[128] The two most interesting early-imperial sites, Pompeii and the town on the Magdalensberg, have been no more than marginally helpful, at least so far, for the republican period. For metal artifacts at Pompeii see esp. Frederiksen 1970–1: 353. The occupation of the Magdalensberg site began about 50 BC (Schütz 2002), but how many of the metal finds go back to the earliest years is unclear. For Aquileia cf. Nonnis 1999: 86–7. For a peak in lead production in the area of the Roman empire very roughly around the end of the first millennium BC, detected through lake sediment in Sweden, see Renberg et al. 1994. By means of a peat bog in Switzerland, Shotyk et al. 1998.

[129] No publication gives a full account of this matter, but see esp. Gralfs 1988 and Ciarallo and De Carolis 1999.

[130] Parker 1992: no. 1206, 25–1 BC. On the variety of objects recovered at the Magdalensberg: Schütz 2002.

[131] Harris 1980b: 121; 1999: 75. The best explanation of the presence of so much late-republican coinage in Romania is still that the region exported slaves to the Romans (Crawford 1977b); but see Moisil and Depeyrot 2003: 11–13.

[132] The earliest instances are in *I.Magn.* 240 and in *MAMA* 6.260.

of our period, for slave reproduction may have gained some importance (though of course one who was born into slavery might easily be sent to market).

As for textiles, while some poor people in the country dressed in skins, and linen was also a factor, most people dressed in wool. The evidence as to whether demand shifted from wool to cloth to clothing as urbanization intensified is confusing (cf. above). According to one account, there was no kind of "mass market" for clothing in the Roman world, except for the military market.[133] That there was no kind of mass *production* is obvious, but as we have already seen family autarchy was not the only alternative. In a well-to-do republican household the family's cloth and clothes were made by the slaves,[134] whose own garments will have come from specialized suppliers.[135] As for the less prosperous, we can only guess – the urban-rural divide may have been crucial, with country women most likely producing their own cloth as well as their own clothing. The topic remains wide open for some informed speculation.

X DISTRIBUTION AND TRADE

This is not the place to criticize Horden and Purcell's recent revival of a purportedly Polanyi-esque view of exchange in the ancient world,[136] all the less so (a) because it is unclear how much they would disagree with the claims made in this chapter, and (b) because I have no wish to deny the social "embeddedness" of the transactions alluded to here. In so far as these authors deny us the right to use the terminology of modern economics, they seem misguided (and this practice is no barrier to studying the conceptual world of the late-republican Romans). But the real disadvantage of the Horden–Purcell immobility model is obviously that it makes it difficult to grapple with good evidence for change. The remains of some 220 wrecks of Mediterranean merchant ships (or redistribution ships) are known from our period (a selection of them is described in Table 19.1) – whereas many earlier and later one-hundred-year periods have produced hardly any.[137] The inscribed objects found on these shipwreck sites bear the names not of officials or plutocrats, with one or two exceptions, but those of obscure individuals, who are none other than traders of one kind or another. In short, Mediterranean trade accelerated rapidly in the mid-second century.

It should also be considered significant that Roman trade included inexpensive goods that could easily have been substituted for locally in most

[133] Frayn 1984: 154, 163. [134] Cf. Asc. *In Milonianam* p. 38 Stangl = p. 43 C.

[135] Cf. Varro, *Rust.* 1.2.21 for weaving shops on large estates.

[136] Horden and Purcell 2000 *passim* (esp. 606). See Harris, 2005. Polanyi's actual view of the Roman economy (1977) was an alarmingly "modernist" one based largely on Rostovtzeff.

[137] Horden and Purcell 2000: 371, based on Parker 1992. See below, Chapter 21.

Table 19.1 *Selected Mediterranean shipwrecks, 130s to 30s BC arranged by date*

NAME	LOCATION	DATE	KNOWN CARGO	REFERENCE
Megadim A	near 'Atlit, Israel	130s or a little later	copper ingots, bronze, silver, and gold artifacts	Parker 689*
La Chrétienne A	near Agay, France	c.150–100	wine	Parker 302
Spargi	NE Sardinia	last q. of second c.	wine, pottery	Parker 1108
Dramont C	near Agay, France	late second c.	amphoras, iron bars, pine resin, etc.	Parker 373
Bagaud 2	Iles d'Hyères, France	c.110–100	ingots of iron and tin	Parker 77 ("Bagaud B")
Agde J	S. France	late second/early first c.	lead ingots	Parker 16
Cavalière	S. France	c. 100	meat (pig), amphoras, pottery	Parker 282
Sant Jordi 1	Majorca	c. 100	amphoras, pork, almonds, olives	Parker 326 ("Colonia de Sant Jordi A")
Mahdia	Tunisia	c.110–90 (?)	marble columns, sculpture and furniture, bronze works of art, lead ingots	Parker 621
Baratti B	near Piombino, Italy	c.120–80 (?)	amphoras, pottery, glass, spices	Parker 898 ("Pozzino")
Grand Congloué B	near Marseille	c.110–80 (?)	amphoras	Parker 473
Albenga	Liguria	100–80	wine, pottery	Parker 28
Antikythera A	between the Peloponnese and Crete	80	amphoras, pottery, glass, works of art, etc.	Parker 44
Punta de Algas	NE of Cartagena	100–50	amphoras, pottery	Parker 919
La Fourmigue C	near Juan-les-Pins, France	c.80–60	amphoras, Greek furniture	Parker 425
Punta Glavina A	Rab island, Croatia	100–25 (?)	amphoras	Parker 940
Madrague de Giens	near Hyères, France	70–50	wine, pottery	Parker 616
Palamós	N Catalonia	c.80–30	amphoras	Parker 776
Capo Testa B	NE Sardinia	c.75–25	iron bars	Parker 258
Mal di Ventre	W Sardinia	c.50	lead ingots	Africa Romana IV, 1992 (Parker 637)
Le Titan	Iles d'Hyères, France	c.50–45	preserved fish	Parker 1149
Cape Gelidonya B	Lycia	c.50–25	pottery, perishable goods	Parker 209
Santa Severa	S. Etruria	50–25 (?)	amphoras	Parker 1035

*All numbers refer to Parker 1992.

places, such as commonplace black-glaze pottery (see Table 19.1 again), wax, and honey.[138] The implication is that transport was efficient, that part of the economy at least was organized on the basis of trade, and that an entrepreneurial spirit was widespread.

To what extent peasants or pastoralists operated in a "natural" economy that was separate from the market economy is a delicate question. No doubt there were gradations, and the problem cannot be solved by reference to literary sources or to comparative material. It is suggestive, but nothing more, that amphoras were rather widely diffused far from their place of manufacture.[139] Further enlightenment could only come, I think, if we could establish a better typology of country-dwellers.

XI TRANSPORT

The notion promulgated by C. A. Yeo that land transport was never commercially viable under the Roman empire except for small-scale luxuries has largely given way to the realization that even quite bulky commodities constantly traveled by road when the market existed.[140] When both were available, water-transport cost less – hence the interest of all Roman agronomists in whether a farm has navigable water nearby. But Cisalpine pork must have come to Rome on the hoof, and as for land transport in Italy, "their roads can carry boat-loads."[141] If demand was strong enough, in fact, the costs of land transport could be accepted. Not that we shall want to ignore the system's technological limitations.

We are certainly not faced with full technological inertia in this sector. Ships' pumps are a clear-cut innovation (Table 19.2). Larger merchant ships were to be seen in the western Mediterranean.[142] But what made most difference may have been the further spread of high-quality roads, most of all in Italy but also to some degree elsewhere (Via Popillia 132, Via Egnatia c.130, Via Domitia c.120 BC, etc.).[143]

[138] Strabo 3.144.

[139] For the distribution of Dressel 1 amphoras see Panella 1981: 56–7, reproduced as Tchernia 1986: map 4. What is most striking perhaps is their diffusion in Gaul away from the great rivers.

[140] Meiggs 1982: 339–46; Hopkins 1983b: xx; Spurr 1986: 144–6; Sippel 1987b; Harris 1993b: 27–8; Laurence 1999: 95–108. See also Horden and Purcell 2000: 377.

[141] Strabo 5.235. Varro, *Rust.* 1.16.6, seems just as interested in road transport.

[142] Few ordinary merchant ships exceeded 400 tons burden, in order to limit risks (the Albenga wreck may have carried 500–600 tons: Parker 1992: 50). Many vessels carried 20–40 tons and no doubt stuck as close to shore as possible. On the capacity of such cabotage for shifting large quantities of goods see Horden and Purcell 2000: 140. On the rather high quality of the best ships, such as the one wrecked at La Madrague de Giens, see Pomey 1982 (for a comparison with what was possible in the seventeenth century see 153 n. 37).

[143] See Map 19.1. But it is important to consider the whole network, not just the famous long-distance roads. For the date of the Via Egnatia see *AE* 1973 no. 492.

Table 19.2 *Diffusion of technological improvements, 150–1 BC**

SECTOR	INNOVATION	TYPE OF EVIDENCE	DATE	REFERENCE
construction	*pozzolana* concrete	physical remains	mid-second c.**	Ward-Perkins 1970: 246
merchant shipping	ships' pumps	shipwreck remains	late second c.	Parker 1992: 28
agriculture	iron ploughshares (in Italy) (but there are only two of them)	physical remains vs. Cato	late second or early first c.	Frederiksen 1970–1: 352
luxury eating	oyster beds	literary	early first c.	D'Arms 1970: 18–19
food-production	wedge press	physical remains	early first c.	Above, Chapter 17
dyeing	blue dye	Vitruvius 7.11.1	second quarter of first c.	
glass making	glass blowing	physical remains	mid-first c.	Newby and Painter 1991
construction	*opus reticulatum* (in Italy)	physical remains	mid-first c.	Torelli 1980
food production	water mills	Strabo 12.556 suggests some diffusion in E provinces	from mid-first c.	Landels 1978: 16–21

*This table can be no more than illustrative, since so many changes are undatable.
**"This was not a sudden, dramatic discovery . . . each generation add[ed] its quota of practical experience until, by the last century of the Republic . . ." (Ward-Perkins 1970: 246).

XII PRODUCTION

The crucial question here is productivity,[144] and the most obscure variable is technological improvement, or rather the diffusion of technological improvements. What did it really amount to? It has been claimed that the Romans learned much about agricultural production from Greeks,[145] but it is hard to say precisely what they learned. The Roman rich have a rather bad reputation with the moderns – they were interested in social status more than in investment, and never gave any thought to more efficient means of production. But this stereotype is inaccurate. The only Punic literary work which the Romans kept for themselves after they had destroyed Carthage was the twenty-eight-volume farming handbook of Mago: the Senate had it translated.[146] Varro, admittedly not a typical landowner, specifically favors rational experimentation.[147] Posidonius caused some shock to Stoic philosophers by suggesting that technological innovators of the past had actually

[144] Horden and Purcell 2000: 269, were ill-advised, I think, to belittle this concept. Cipolla 1994: 97–108, offers a better example.
[145] Nicolet 1994: 612. [146] Plin. *HN* 18.22; see also Varro, *Rust.* 1.1.10; Columella, *Rust.* 1.1.13.
[147] *RR* 1.18.8.

displayed "wisdom."[148] To take all this as posturing would be the merest prejudice.

There were technical advances (see Table 19.2), but it will readily be admitted that none of them is likely to have made any radical economic difference within the period we are now considering. It gives the wrong impression to say that widespread literacy assisted technology transfer:[149] it may be true by ancient near-eastern standards, but by modern standards literacy was very limited, and even when the literate changed their methods of farming or building it can seldom have been because of what they had read.

There must always have been places that were well known for this product or that, but a feature of the late Republic suggests at least the potential for economic growth: certain towns grew famous for particular kinds of manufactured goods (they were no longer all-purpose ports or market towns); one thinks of ironmongery at Puteoli, for example, of ship-building at Gades, of Patavium and woolen clothing, Arretium and red-glazed pottery.[150]

XIII ECONOMIC ORGANIZATION

It would require a separate chapter to explore the full implications of the family, manumission, friendship, *clientela*, the partnership, and the *collegium* for the economic life of the late Republic. Three propositions may be offered. (1) The family – in the Roman sense, that is to say, with freedmen and slaves included – became a more flexible economic instrument in the second and first centuries in virtue of the legal developments already described. Thus the rich could more comfortably entrust their business affairs, which senators at least were supposed to keep at arm's length, to freedmen and slaves. Modest artisanal production was also to a large extent in the hands of *familiae*.[151] (2) The partnership (*societas*) was therefore less needed than it might have been, but in any case it gained more importance in the late Republic, and not only because of the growing power of the *societates publicanorum*. Witness among other things the presence of the *Societas* of the two Pontilienus brothers, engaged in sending ingots of lead from Spain to Rome, as we see from two shipwrecks (Agde J and Mal di Ventre: Table 19.1).[152] (3) The full economic effects of extra-legal *fides*-based

[148] Fr. 284 EK, from Sen. *Ep*. 90, who comments (s. 21) that modern cultivators also think of many ways of improving yields.

[149] Greene 2000: 44.

[150] Puteoli: Diod. Sic. 5.13. Gades: Strabo 3.168 (cf.140). Patavium: 5.213. For the beginning date of Arretine ware 40 now seems to be the canonical date: Oxé, Comfort, and Kenrick 2000: esp. 37.

[151] On slave managers: Aubert 1994: *passim*. Artisan production: Morel 1983c: 30, 35.

[152] Either one of the dates is wrong, or modern ideas about the short-lived nature of Roman *societas* are exaggerated (incidentally, the name Pontilienus is also probably to be understood in *ILLRP* 777 from Cartagena).

social relationships in the late Republic still need to be explored. People relied on each others' loans and on their expertise, for example in dealing with real property.[153] Should such ties be seen as backward substitutes for institutions, or a sophisticated way of doing without them?

XIV GROWTH

We glanced earlier at some of the conceptual problems, and decided to concentrate on the area which comprised the Roman empire at the beginning of our period. If we were going to discover whether per capita GDP in this area increased over the following century, we would have to average the experience of very diverse regions: one scholar has concluded that, for the eastern provinces, the late Republic "was probably catastrophic with regard to the prosperity of the native populations."[154] On the other hand, the copper residues in the ice of Greenland show that there was a major increase in production,[155] which powerfully suggests overall growth.

This chapter has shown that there were fewer serious obstacles to growth than is often supposed. It is true that if you make a comparison with the "first modern economy," seventeenth-century Holland,[156] one striking difference is the poor supply of information in the Roman world, which must have meant high transaction costs. Very limited literacy and no printing, combined with some rather long distances, made investing and trading very hazardous, even at times when there was no war and little piracy. But while it is common to cite the social elite's lack of interest in mechanical improvement as another impediment, it did in fact show some interest in the rationalization of what it understood, for example law: it was in these times that Rome developed a law of agency.[157] The most serious mental obstacle was a system of social prestige which deplored greed.

But were the necessary positive factors present? The most important are commonly thought to have been capital accumulation (to which we should add: willingness to engage in productive investment), growth in population, and the diffusion of technological improvements.[158] Let us take these in reverse order.

Some technological improvements did spread, but it must be doubted whether their impact was great.

Malthusian checks probably held down the population of the most exploited provinces, but Roman citizens were very fertile (if Lo Cascio is

[153] Consider for instance the help Cicero had from Vestorius, *Att.* 14.9.1, 10.3, 11.2.
[154] Andreau 1999: 134. [155] Hong et al. 1996.
[156] Described by De Vries and Van der Woude 1997.
[157] On the importance of which cf. North 1990: 126.
[158] See, e.g., Todaro 1997: 105; cf. Mokyr 1990; Millett 2001; and, on China, Deng 2000. Others emphasize investment in human capital (Becker 1993), or (Sylla 2002) the desirability of sound financial systems.

right[159]), and the total population of the empire as it was in 133 BC probably grew.

Capital was the real problem. It was serious enough that Rome's rulers showed virtually no interest in human capital or popular education (even Greek cities drew in their horns), and negative enough that raising liquid capital often depended on the vagaries of personal relationships. What makes it impossible to suppose that there was much ultimate economic growth in this period is the sheer destruction of fixed capital – and of people – in the civil wars.[160]

Archaeologists have been struck by the evident prosperity of the best-preserved Italian towns (Aquileia, Pompeii) in the last two decades or so of the second century.[161] There were, on the other hand, signs of unease, even in Italy: for instance some 4,000 slaves had rebelled at Sinuessa in 141 BC.[162] In the last years of the second century, the Gracchan reforms having been undone, plenty of free Romans and Italians were unemployed, even though much of the economic misery was being shifted to the provincials.

Then came the Social War of 91–89 BC, involving hundreds of thousands of men,[163] destroying great quantities of fixed capital, disrupting production and trade, and draining the treasury (which was not necessarily a bad thing). There ensued Mithridates' invasion of the Aegean provinces, a serious debt problem at Rome in 86 BC, the Sullan War in Italy, and then Sulla's colonization, the largest single disruption of rural life in Italy for over a century. Spain and Italy suffered seriously from war during the 70s BC.

The numerous signs of more or less intense social malaise in the late Republic are to a great extent attributable to the failure of the Roman elite to recognize and address the various economic problems that afflicted Rome, Italy, and the provinces.[164] The potential for modest economic growth was there, and liquid capital seems to have been abundant. But then civil war returned again in 49 BC, not to let up for more than a few months until 36 BC. And while warfare probably acted in some ways as an economic stimulus (we need a new model of how this might have worked), there was no chance of overall growth until Caesar's heir reimposed internal order.

[159] Lo Cascio 1994a; 1994b.

[160] Between 49 and 30 BC Italy and every province were the scene of warfare or at least of special exactions. On the vulnerability of fixed capital in a pre-industrial economy see Cipolla 1994: 80–91.

[161] See Verzar Bass 1983: 209–12, and Oleson 1996: 73 (cf. Frank 1933–40: vol. I, 288, etc.), respectively. Rome's recent wars had been fought elsewhere, and Asia Minor now contributed regularly to the imperial revenues. At Pompeii it was evidently the Social War that changed things.

[162] Oros. 5.9.4 (the apparent date).

[163] Brunt 1971: 439, discusses the numbers involved.

[164] For an analysis of these problems, as they were experienced by the *plebs* in Rome itself, see Purcell 1994: 678–9.

PART VI

THE EARLY ROMAN EMPIRE

CHAPTER 20

THE EARLY ROMAN EMPIRE: PRODUCTION

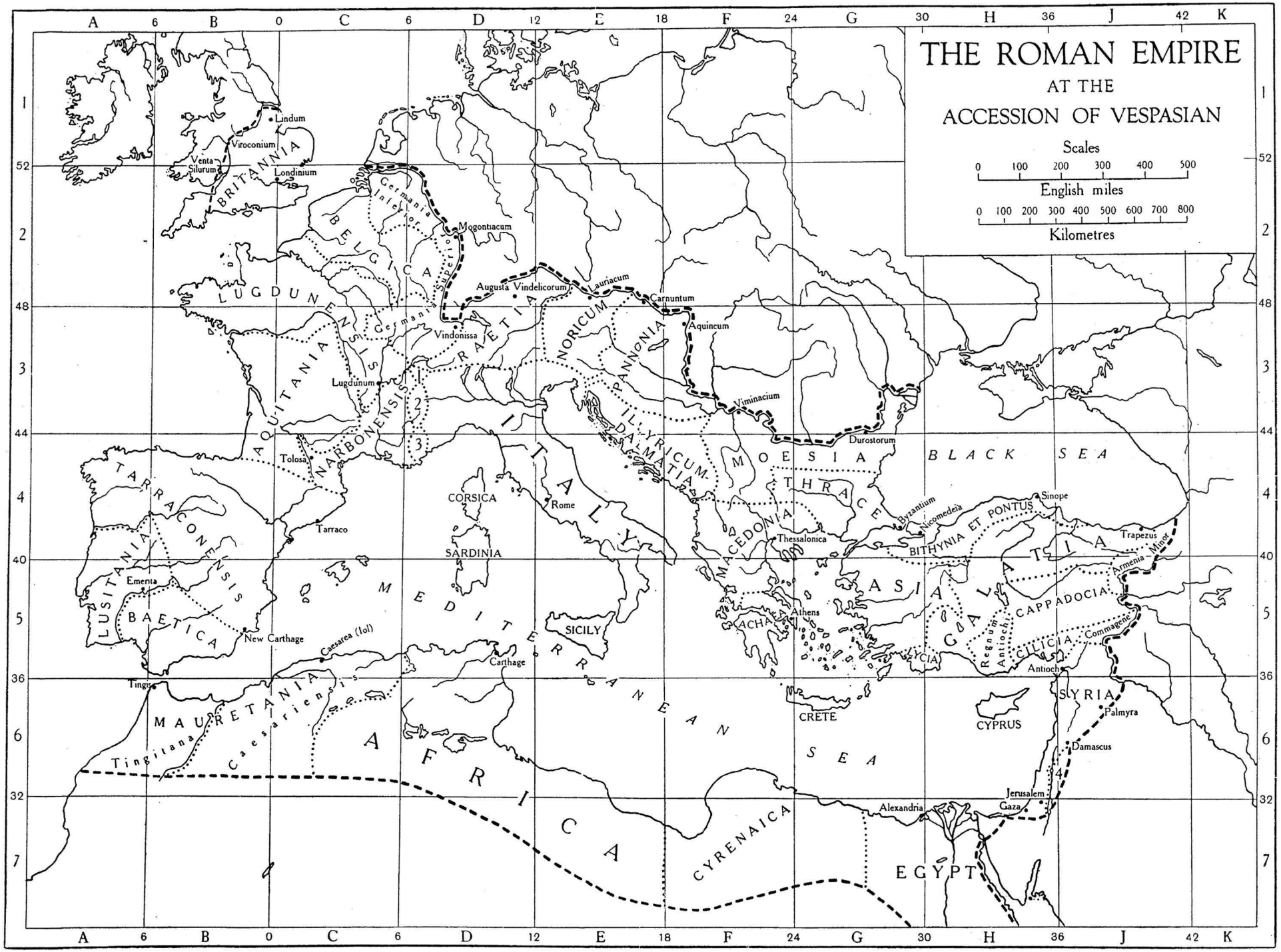
DENNIS P. KEHOE

I INTRODUCTION

The basic issues in evaluating the performance of the Roman economy in the early imperial period are to determine the extent of economic growth in aggregate and to assess the effects of economic change on various groups within Roman society, including wealthy aristocrats, urban residents, and peasant farmers.[1] The growth of the city of Rome and of other cities in the Roman empire created a demand not only for agricultural products but also for manufactured goods, including luxury items.[2] From the time of Augustus to the Antonine period, the population of the empire increased by about one-third, from some 45 to 55–65 million people, and much of this growth took place in the many cities of the empire.[3] The populations of Rome's largest cities exceeded those of the largest cities of Europe until the industrial revolution and were matched only in mediaeval China. Under Augustus, the city of Rome had, on most estimates, between 750,000 and one million inhabitants, while the early imperial period saw the rise of several provincial capitals with populations measured in the hundreds of thousands, including Alexandria, Antioch, and Carthage, as well as many more urban areas with much more modest populations.[4] At the same time, the maintenance of relatively peaceful conditions in the Mediterranean world and the development of a more uniform legal system under Roman rule fostered commerce for these products by lowering transaction costs.[5]

The task of supplying the Roman empire's urban population involved both the state and private producers in a complex network of exchange. Rome was fed with grain imported from Africa and Egypt. As the physical evidence of amphoras indicates, wine produced on Italian estates in the late Republic and early principate supplied Rome as well as markets in Gaul and in other provinces. Soon Rome's demand for wine was met by production from Spain, which also produced olive oil in large quantities for export to Rome and other destinations. Beginning in the second century

[1] Millett 2001. [2] Hopkins 1995/6: 57–63. [3] Frier 2000: 811–16.
[4] Morley 1996: 33–54; cf., for a much lower estimate of Rome's population, Storey 1997.
[5] North 1981.



Map 20.1 The Roman empire at the accession of Vespasian
Source: Bowman et al. 2000: XVI–XVII

and increasingly in the third century, north Africa emerged as a major producer of olive oil, which was exported from that region to markets all over the Mediterranean. Indeed, the same regions could both produce and export agricultural products and at the same time import them. For example, Africa emerged as a major producer of olive oil for export, but it also imported some oil from Spain. The evidence of amphoras alone does not allow us to reconstruct the mechanisms of this exchange. For example, the distribution of Spanish oil amphoras could indicate the operations of the free market. But it is also possible that other mechanisms were at work, such as the efforts of upper-class landowners to import to Rome and other cities the products of their own estates to meet their own domestic needs.[6] But the amphora evidence does point to substantial surplus production for the market.[7] This exchange of agricultural products also created a need to invest in the ships needed to transport foodstuffs as well as in the other infrastructure supporting commerce.[8] The evidence for substantial long-distance trade in agricultural surpluses, moreover, should not obscure the volume of exchanges of surplus foodstuffs on a much more local level as well.[9]

If the Roman imperial peace created opportunities for economic growth, it is still very difficult to assess the overall scale of the Roman economy. The urban economy in the Roman empire was to a large extent fueled by a transfer of wealth from the countryside, especially in the form of rents exacted by the landowning elite, whose economic and social dominance depended on their ability to exact a large share of the agricultural surplus produced in the countryside. In the "consumer city" model, much of the economic activity in the cities resulted from the elite's spending the wealth they gained from agriculture.[10] Since the growth of the urban economy was so closely linked to agricultural production, the possibilities for economic growth were limited.[11] One way to assess the scale of the Roman economy is to estimate the Gross Domestic Product of the Roman empire (GDP) as a multiple of the minimum subsistence of the empire's population. If the empire simply produced enough food to feed its population and nothing more, Hopkins calculates that the GDP would be on the order of nine billion sesterces (9,000 million), given a population of 60 million and a minimum subsistence requirement of 250 kg. wheat equivalent (worth about 120 sesterces). In all likelihood, in Hopkins' view, the GDP was substantially higher, perhaps 1.3 or 1.5 times the minimum subsistence,

[6] For this view of Roman trade, see Whittaker 1985. [7] Peacock and Williams 1986.
[8] Hopkins 1995/6: 59. [9] Horden and Purcell 2000: 205–9.
[10] For discussion of Rome and other ancient cities as "consumer cities," see now Erdkamp 2001, as well as Morley 1996: 13–32; Jongman 1988a: 15–62, especially 52–5; and, on the division of labor between town and countryside, Wrigley 1978, and Hopkins 1978b. Cf. also above, Chapter 3.
[11] Saller 2002.

resulting in a GDP of 12–15 billion sesterces, but it is not likely to have exceeded twice the subsistence level.[12] From this perspective, the earlier estimate by Goldsmith of a GDP of approximately 20 billion sesterces seems overly optimistic, since it assumes a per capita domestic product of three times subsistence.[13]

To approach this issue from another perspective, it seems clear that the scale of the Roman economy rivaled that of mediaeval Europe, to judge by the empire's production of silver. The relative level of silver production in the Roman empire can be assessed by measuring historical levels of atmospheric lead pollution, since lead is a major by-product of silver smelting. Atmospheric lead pollution in ice cores in Greenland began to rise substantially around 500 BC, reaching its peak around the first century AD. This increase seems to be the result of expanding silver production in the Greco-Roman world, especially in Spain. After a decline in silver production in late antiquity, atmospheric lead pollution levels begin to rise again around the year 1000 AD, as a result of increased mining activity in central Europe, but atmospheric lead pollution only matches its Roman levels in the Industrial Revolution.[14] This hypothesis of increased silver production in the Roman empire is confirmed by the level of atmospheric lead pollution measured in Sweden in the sediment at the bottoms of lakes, in peat bogs, and also in forest soils, as well as in peat bogs in Switzerland.[15]

The impressive level of silver production in the Roman empire raises the question whether the development of Rome's urban culture engendered growth in the economy beyond what can be accounted for by population increase alone. This economic growth would have resulted from an increase in the overall productivity of labor, both in agriculture and in manufacturing, which in turn would have required the development and dissemination of new technologies, as well as substantial investment.[16] The question is to what extent the transfer of wealth from the countryside to the cities in the Roman empire resulted in the development of urban manufacturing and commercial sectors that produced and exchanged goods with the countryside and other cities and so generated substantial wealth in their own right. In this scenario, the Roman economy would have shared many features with the economies of early-modern Europe, distinguished from the later

[12] See Hopkins 1995/6: 45–7. The value of the minimum subsistence is based on a price of 3 sesterces per modius (= 6.55 kg.). This model further assumes a fourfold agricultural yield, so that one-fourth of the yield would have to be set aside as seed.

[13] See Goldsmith 1987: 35: based on a population of 55 million at the death of Augustus, and per capita product of 350–400 sesterces. Hopkins 1995/6: 67 n. 29 criticizes Goldsmith's estimates as too optimistic.

[14] See Hong et al. 1994.

[15] For Sweden, see Renberg et al. 2000; 1994; for Switzerland, Shotyk et al. 1998.

[16] Hopkins 1995/6.

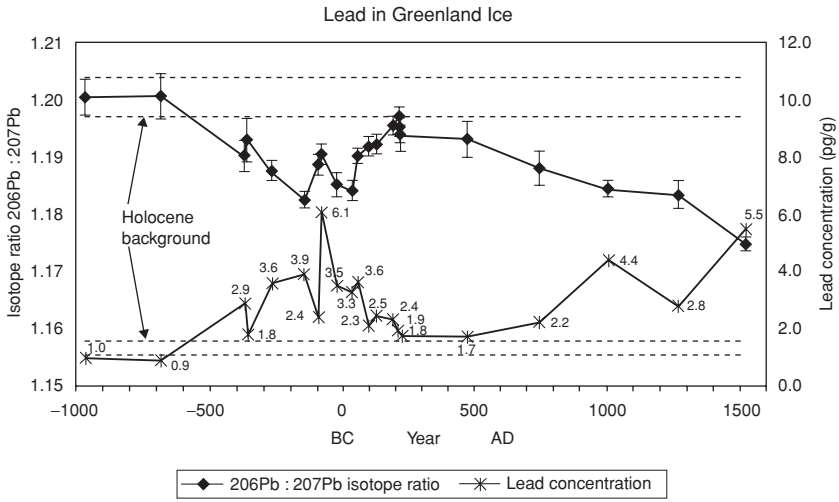


Figure 20.1 Variation over time in concentration and composition of of lead in ice core samples from Summit, Central Greenland
Source: A. Wilson, "Machines, power and the ancient economy," *JRS* 92, 2001: 26, after Rosman et al. 1997

Key: The lower line shows the absolute concentrations of lead in the samples (PG/G) measured against the right-hand vertical axis. The upper line shows the ratios of ^{206}PB:^{207}PB isotopes against the left-hand vertical axis, with upper and lower error limit bars (95% confidence). The dashed bands represent the range of variation in holocene background levels for each series, before anthropogenic activities affected lead deposition.

period mainly by the degree of involvement of the elite in commerce and industry and not by the basic structure of the economy.[17]

Answering this question is difficult, but the likelihood is that the economy of the Roman empire experienced at best a limited structural transformation over the course of the early empire. Throughout this period, agriculture remained the basis of the economy and of the empire's fiscal system. Employing the vast majority of the empire's population, agriculture provided the principal source of wealth of the elite classes.[18] Agricultural wealth was highly stratified and the elite's share only increased throughout the course of the early empire. Thus in the third and fourth centuries, the estates of senators were typically scattered throughout the empire, while several provinces, most notably Egypt and Palestine, saw the creation of large estates and the development of a landowning elite on a scale that had not existed previously.[19] As wealthy as the landowning elite was, its ability to use the wealth from agriculture to transform the economy was limited. Despite the favorable conditions for commerce resulting from the Roman

[17] Pleket 1990. [18] Garnsey and Saller 1987: 64–103.
[19] Vera 1986b; Safrai 1994: 322–64; Hopkins 1995/6.

peace, markets for agricultural products remained highly imperfect. The development of more efficient technologies for processing cash crops, such as the screw and lever olive presses, made it easier for landowners to reap the profits of urban demand for foodstuffs, but even with these developments the private market alone was not able to provide stable supplies of foodstuffs for Rome, Alexandria, and later Constantinople.[20] To protect these cities against the vagaries of the private market, the Roman state devised an elaborate system of reserving for its own use the production of grain, olive oil, and later wine and pork on imperial estates in Italy and in the provinces. In addition, the Roman state supervised the importation of these products into Rome and their distribution there.[21]

The ability of the Roman elite to respond to the opportunities for commercial agriculture was constrained by the "conceptual framework," to adapt a concept from recent research in neoinstitutional economics, within which they engaged in economic planning.[22] To some extent, economic planning in the Roman world was the result of an "embedded" economy, in which social factors, such as the prestige attached to the ownership of land, played a crucial role in influencing economic activity.[23] Certainly a great deal of rigor in management and accounting was possible, as Rathbone has shown in his study of the richly documented estate of Aurelius Appianus. Appianus was a member of the provincial aristocracy in Egypt in the third century and owned an estate in the Fayyum (the ancient Arsinoite nome). The managers of this estate had sufficient information to assess the profitability of various crops and allocate resources efficiently on that basis.[24] But the owner of this estate still faced basic constraints that limited the range of choices in investing wealth that all landowners faced. For upper-class landowners, land represented a resource providing economic security rather than an investment in the modern sense. In managing their agricultural wealth, many landowners were very risk-averse, preferring strategies that maintained economic stability and their social position to ones designed to maximize wealth.[25] In this connection, Simon's concepts of "bounded rationality" and "satisficing" decisions help to explain the economic planning by upper-class Romans. "Satisficing" decisions are ones that do not necessarily make the optimal use of resources – which would be impossible, because of the limits on our knowledge and freedom of action – but instead achieve a desired goal.[26]

[20] For a broad discussion of productivity in Mediterranean agriculture, see Horden and Purcell 2000: 231–97. The widespread view is that technological development in agriculture was slow paced: see Lo Cascio 1991a: 344–7; and Schneider 1992: 52–71. For a more optimistic assessment of the development of technology in the Roman world, see Greene 2000.

[21] Rickman 1980; Sirks 1991. [22] Mercuro and Medema 1997: 130–56.

[23] Veyne 1979; Wallace-Hadrill 1991; cf. Finley 1985; Frederiksen 1975.

[24] Rathbone 1991. [25] Kehoe 1997. [26] Simon 1983: 84–5.

Another factor affecting economic growth in the Roman empire was that much of the wealth generated from agriculture was spent on public building or other forms of conspicuous consumption. Such projects were funded either from taxes or from the savings of members of the elite, often at enormous cost. This type of spending employed large numbers of people and even made fortunes for some of them, but it could not have the same effect on the economy as investing in the development of new technologies that might increase productivity. We can gain a sense of the costs imposed on the Roman economy by public building programs by considering the large-scale quarry operations at the Mons Claudianus and the Mons Porphyrites in the eastern Desert in Egypt.[27] These quarries, which supplied marble and porphyry for monumental imperial building projects in Rome and later in Constantinople, remained under imperial control throughout the period of their exploitation. The task of quarrying granite columns and transporting them overland across the desert to the Nile valley and from there by ship to Rome involved the organization of enormous resources, including the requisitioning of draft animals and drivers on a vast scale.[28] This system of requisitioning must have had a significant impact on the economy of the affected areas in Egypt, since the wages paid by the government provided an infusion of cash. But the larger point is that monumental undertakings like the quarrying of granite columns came at a great cost, since they involved the redistribution of wealth that might otherwise have been invested in other more directly productive purposes.

Still, fortunes could be made in commerce and manufacturing, which certainly occupied a significant place in the Roman economy. But the chief beneficiaries of the opportunities that the Roman empire offered for generating wealth in these sectors were generally people of more modest social and economic status, from wealthy freedmen to independent artisans.[29] Upper-class Romans tended to be involved in these activities only indirectly. They might lend money, sometimes to their own freedmen, but more generally the involvement of the elite largely derived from their investments in agriculture, as they supplied the raw materials such as clay or wool for urban industries but were not directly involved in the production and marketing of manufactured goods.[30]

II AGRICULTURE

Both large landowners and small farmers depended for their livelihoods on the production of surpluses for the market in the face of substantial risks imposed by the Mediterranean climate. The most significant risk affecting

[27] Maxfield 2001. [28] Adams 2001. [29] Pleket 1983; 1984; 1990.
[30] On lending by aristocrats to freedmen, see D'Arms 1981.

agricultural production was the irregularity of rainfall. Although the average annual rainfall in much of the Mediterranean world was at least 300–400 mm., sufficient to allow for the production of wheat and other basic staples, the annual rainfall averages mask the extreme variability, both in larger areas and in micro-regions, that could allow one region to produce a bumper crop while causing drought and crop-failure in another.[31]

In regions characterized by a Mediterranean climate, the most common method for cultivating wheat, the basic staple crop in Roman agriculture, was the two-field system, sometimes called "dry-farming." This represented an adaptation to the hot summers and rainy winters of the Mediterranean area. In this system, crops would be planted in the fall and harvested in the spring. The soil was worked repeatedly with a light plough (the ard, or *aratrum*). This ploughing created a layer of soil that in more arid regions could absorb water, and in regions with greater rainfall, could help restore nitrogen.[32] After the harvest in the spring, the field would normally lie fallow for more than a year, when it would be replanted with a cereal crop. This type of farming resulted in modest yields, at least when measured in terms of the volume of crops produced from each unit of land. Yields varied considerably depending on rainfall, but a representative figure would be 500 kg./ha., a yield somewhat below those attested for mediaeval and early modern Europe.[33] In Egypt, with a more intensive agricultural system organized around the annual flooding of the Nile, we might expect production on the order of 1,000 kg./ha.[34]

Roman farmers pursued various strategies to avoid risk and enhance their security. These strategies tended to involve the diversification of crops rather than investing labor and resources in improving yields.[35] The most common strategy to reduce risk was to practice "polyculture," that is, mixing the cultivation of olives, vines, or other orchard crops with cereals. Since the harvests for cereals, vines, and olives occurred at different times, polyculture allowed the farmer to make more efficient use of the labor available throughout the agricultural year while at the same time raising the productivity of each unit of land. Vines and olives were costly to cultivate, since both require substantial investment in pressing and storage facilities, as well as time before a substantial crop can be realized. Roman farmers could also raise yields by practicing crop rotation, in particular the rotation of cereal crops with beans and other lupines. The lupine crop could be a source of food or ploughed back into the soil as "green manure" to restore nitrogen.[36]

Livestock-raising was of central importance to agriculture in the Roman world. Plough oxen, though costly to maintain, increased the productivity

[31] Horden and Purcell 2000: 175–203.
[32] Spurr 1986: 23–40; cf. Morley 1996: 118–21.
[33] Sallares 1991: 374–5; Spurr 1986: 82–8.
[34] Rathbone 1991: 242–3, 465.
[35] Horden and Purcell 2000: 175–230.
[36] Spurr 1986: 103–19.

of farmers, and the ability to maintain draft animals was surely crucial to a farmer's prosperity and independence in the Roman world.[37] In some circumstances, individual farmers might form partnerships to manage the costs of maintaining them.[38] The raising of livestock also allowed farmers to diversify their sources of income. Sheep, for example, could be raised for their wool, but raising livestock for meat allowed farmers to produce food from land that otherwise could not be used for agriculture, such as hillsides or marshlands, where cattle and sheep could be pastured, or forests, where pigs could be allowed to forage.[39] The problem was that it was difficult to integrate livestock-raising fully into agriculture. The dung from livestock represented an important source of fertilizer, but in many regions, livestock were kept in pastures separate and even at some distance from the cultivated area. Indeed, some landowners in Italy, including the imperial government, practiced an extreme form of this economy when they maintained large flocks of sheep that moved seasonally from lowland winter pastures to upland summer pastures in an annual pattern of transhumance.[40] Mediterranean dry-farming is to be contrasted with the three-field system that characterized the later agricultural revolution in northern Europe. This system made it possible to integrate livestock raising more fully into agriculture by cultivating oats or other fodder crops in rotation with cereals, but it required summer pasture not available in the areas of the empire characterized by a Mediterranean climate.[41]

The most important technological change affecting agricultural productivity involved the dissemination of olive and wine presses throughout the Mediterranean. Olive presses were quite expensive items, and, since they are not needed to produce olive oil in modest amounts, their presence in many regions of the Roman empire indicates investment on a substantial scale to produce olive oil for the market.[42] For example, the dissemination of the heavy and expensive lever-press in north Africa allowed landowners to produce and bring to the market much larger amounts of olive oil than would have been possible with less technologically sophisticated methods of pressing the olives.[43] As Mattingly argues, the impressive olive-pressing installations in north Africa suggest that cultivators there had the capacity to press olives well in excess of what could have been an average yield. This extra capacity allowed them to take advantage of occasional bumper crops to make substantial profits that would carry them through leaner years. Because of the frequency of drought, regions could be suppliers and exporters of basic staples more or less at the same time.[44] This

[37] Foxhall 1990. [38] Lirb 1993. [39] Horden and Purcell 2000: 197–200. [40] Frayn 1984.
[41] There is a range of views for how successful Roman agriculture was in developing more productive methods of farming than implicit in the Mediterranean two-field system: see Morley 1996: 115–21. Kron 2000 argues that the Romans integrated livestock and agriculture to a significant degree.
[42] Peacock and Williams 1986: 29–35. [43] Mattingly and Hitchner 1993. [44] Mattingly 1993.

intensification of agriculture in response to market forces continued in late antiquity in some areas. For example, in Syria, archaeological evidence indicates the development of olive orchards in the fourth and fifth centuries.[45]

At the same time, the speed with which such technology was disseminated should not be exaggerated. The introduction of a new technology did not necessarily supplant the old one. For example, the lever-press continued to be used for decades and even centuries in many locations after the more advanced screw-press was introduced.[46] Another invention that suggests the limited role of technological development in increasing productivity in agriculture is the Gallic reaping machine, or the *vallus*. The *vallus* made it possible to harvest wheat much more quickly than was possible by hand. But this device does not seem to have been adopted on a widespread basis; it was especially useful in Gaul, apparently, because the variety of wheat cultivated there, *siligo*, had to be harvested quickly to avoid spoiling.[47]

Investment in irrigation could also raise productivity substantially. But irrigation could be expensive, since it was costly to raise water from a source to an irrigated field at a higher elevation.[48] In Egypt, where agriculture was dependent on the annual flood of the Nile, artificial irrigation was generally limited to intensively cultivated vineyards, orchards, and gardens, which produced a higher income for each unit of land than land cultivated with cereal crops. The principal means of irrigation were the shaduf, a simple water-lifting device involving a container mounted on a pivot, and the saqiya, a water-wheel.[49] In other parts of the empire, underground passages, or *cuniculi*, might be used to channel water from springs into irrigated fields. In more arid regions, such as the pre-desert areas in north Africa, farmers would irrigate their crops by cultivating them in terraces or in wadi beds (seasonally dry streams) with elaborate systems to capture water from occasional but often violent rainstorms. The techniques for this type of irrigation had been disseminated in north Africa before Roman rule, but it seems clear that farmers in Roman times used them to establish flourishing agricultural communities in such arid areas as the frontier region in southern Africa Proconsularis and in Tripolitania.[50]

III PRODUCTION FOR THE MARKET AND THE ESTATE ECONOMY

Landowners in the Roman world developed various strategies to achieve marketable surpluses in response to these geographical and technological constraints. One strategy was to invest heavily in slave labor to produce cash crops. This is the approach toward investment that characterized the

[45] Horden and Purcell 2000: 274–5; Pollard 2000: 13, 201–2.
[46] Mattingly 1988b: 158. [47] Sallares 1991: 355; Morley 1996: 115–16.
[48] Horden and Purcell 2000: 237–57. [49] Bagnall 1993: 17–18, 311–12.
[50] Shaw 1984; Mattingly 1988c.

development of the villa-economy of late Republican and early imperial Italy, which saw the spread of a unique type of agricultural enterprise in the Roman world throughout the coastal regions of Campania, central Italy, and Etruria.[51] The villas developed as an increasingly wealthy landowning class responded to the opportunities for commercial agriculture represented by the growth in the city of Rome and its increasing power in the western Mediterranean. These estates, such as the carefully excavated Villa Settefinestre at Cosa, were relatively modest in size, comprising perhaps several hundred ha.[52] They regularly included a *pars urbana*, an often lavishly adorned farmhouse that was to serve the needs of the landowner during his or her visits on the estate. The agricultural part of the estate, or the *pars rustica*, included facilities for pressing grapes and, to judge by the evidence of the Villa Settefinestre, buildings that could have served to house a substantial workforce, which in most cases consisted of slaves, managed by a slave-bailiff, or *vilicus*. Archaeological remains of presses indicate that wine was generally the principal cash crop. These estates were organized in such a way as to take the greatest advantage possible of careful management and intensive cultivation. The relatively modest sizes of the estates helped landowners keep the size of the slave staff under control. The evidence provided by the writings of the Roman agronomists, in particular Cato, suggests that we should expect to find on the order of fifty to one hundred slaves working on an estate comparable in size to the Villa Settefinestre. The chief advantage that landowners achieved by employing slaves in large numbers was to have a workforce that they could employ intensively as they saw fit and avoid the need to compete for labor. But employing slaves can only be advantageous for the landowner if they can be kept busy year round. Thus it seems likely that most villas produced a variety of crops, including wheat, which could be used to feed the staff but was also sold on the Roman market.[53] Indeed, the seasonal nature of much agricultural work meant that it was impractical for landowners of large slave-based estates to use slaves to perform all agricultural tasks, and such estates hired additional labor at the busiest times, such as the harvest.

The owners of Roman villas in this period were able to generate substantial wealth by marketing wine in Rome, in other Italian cities, and, to a lesser extent, in Gaul. Roman villas were generally located in close proximity to the coast, which made it possible to ship their products by sea at relatively low cost to Rome and to other coastal cities. The archaeological remains of Dressel-1 amphoras, the vessels in which wine from Italy's Tyrrhenian coast was transported, indicate that wine from this region was marketed not only in Rome but also in Gaul beginning in the last third of the second century BC. From the time of Augustus the Dressel 1 amphoras

[51] Morley 1996: 108–58; Purcell 1985. [52] Carandini 1989a. [53] Scheidel 1994b.

were supplanted by Dressel 2–4 amphoras, which continued to be shipped to Rome and to Gaul.[54] The villa system became a dominant form of agriculture in early imperial Italy, employing numerous slaves.[55] At the same time it must be recognized that this form of agriculture was largely confined to coastal regions, and that other forms of production, including small-scale peasant agriculture, coexisted with villa agriculture. The labor hired on a casual basis could be recruited from small-scale peasant cultivators in the vicinity or also from farm tenants.[56]

By the beginning of the second century AD, however, this type of estate organization in Italy was giving way to another type, one that was probably more representative of the empire in general. At this time, the Dressel 2–4 amphoras that attest the wide distribution of wine produced on these estates fade from the scene, while the archaeological record of the villa estates in Italy changes considerably. During this period, most of the sites identified by archaeologists as villas were abandoned or transformed. Many richly adorned villas were replaced by far more modest residences. The intensive concentration on viticulture apparently was succeeded by a more mixed regime with cereal culture and livestock-raising playing more prominent roles. One factor contributing to the apparent decline of viticulture on these estates seems to have been competition from other parts of the empire. To judge by the evidence of amphoras found at Ostia and Rome, Spain and later Gaul became important producers of wine for Rome, while Spain and Africa exported olive oil on an increasing scale to Rome. But the decline of the villa system in Italy is not likely to have been the product of a "crisis" in the slave mode of production, with the numbers of slaves gradually exceeding the capacity of Roman landowners to supervise them effectively. Rather, the increased competition from the provinces and changes in the rural population in Italy eroded the comparative advantage that Roman landowners gained from employing large numbers of slaves in a concentrated fashion. Simply put, the profits that could be made from producing wine on these intensively cultivated estates no longer justified the costs of maintaining and supervising large numbers of slaves.[57] Indeed, the decline of Italian viticulture should not be overstated; Rome and other Italian cities continued to be consumers of wine, and vineyards in Italy, now organized in a different manner, in all likelihood continued to provide much of this wine, especially the ordinary wine for the broad market. Some of this wine may have been transported in wooden casks or in other containers that leave no trace in the archaeological record.[58]

From the second century onward, it seems likely that estates in the areas of Italy characterized by intensive villa agriculture increasingly resembled

[54] Tchernia 1986. [55] Harris 1980b; 1999. [56] Scheidel 1994a: 153–224.
[57] Patterson 1987; Morley 1996: 133–42. [58] Tchernia 1986.

estates that were coming into being in other parts of Italy and in the provinces. The estates were typically much larger than the classical villa. Typically these estates, or *latifundia*, were not unified or contiguous holdings, but rather represented agglomerations of individual farms pieced together over the course of time through bequest or purchase.[59] Landowners commonly solved the problem of overseeing the cultivation of fragmented and scattered estates by leasing the individual farms out to tenants. It must be emphasized, however, that farm tenancy and the use of slaves are not mutually exclusive. Even after the decline of the villa economy of Italy in the second century AD, slaves continued to constitute an important element in the labor force on Italian estates.[60]

In the provinces, upper-class landowners also took advantage of the commercial opportunities offered by the Roman empire by investing in the cultivation of cash crops such as vines and olives, and the production of these crops for the markets on a large scale helped to generate the wealth that supported elite landowners in Gaul, Africa, and Spain.[61] In Gaul, during the first century AD, villas inspired by Italian models dotted the landscape.[62] In Africa, substantial oil factories with large presses have been discovered in such diverse locations as the Kasserine plain and the Gebel region of coastal Tripolitania, in particular, in the extensive territory of Lepcis Magna.[63] The hinterland of Lepcis Magna was marked by substantial investment in olive culture. There are numerous rural sites with multiple olive presses, some of which were among the largest discovered in north Africa. Olive oil was certainly a major cash crop in this region, which supplied Lepcis Magna and markets overseas. It is likely that the production of olive oil provided much of the wealth of the elite of Lepcis Magna, as is suggested by stamps on oil amphoras from the late second and early third centuries.

The nearest analogue in the provinces to the intensively cultivated and rigorously managed villa is the estate of the third-century Egyptian magnate Aurelius Appianus. The organization of this estate was a product of the peculiar economic geography of Roman Egypt, where land was divided up into relatively small parcels. As is indicated by the evidence from the Heroninos archive, the portion of the estate of Appianus in the Fayyum consisted of a series of divisions, or *phrontides*, organized around individual villages. The *phrontides* themselves were comprised of a diverse array of parcels of varying sizes devoted to the cultivation of a wide range of crops, including principally wine, wheat, and fodder. The individual divisions of the estate were under the management of *phrontistai*, who reported to the central administration of the estate, located at the nome capital.

[59] Vera 1995a; 1995b. [60] Vera 1992–3. [61] Mattingly 1988b; Hitchner 1993.
[62] Woolf 1998: 148–68. [63] Mattingly 1988c.

The key to the profitability of Appianus' estate, and the advantage that he enjoyed over smaller-scale landowners, was achieving economies of scale by organizing the cultivation of a vast array of individual parcels under one unified system of management and sharing resources.[64] These economies depended on the careful management of labor and other productive resources, in particular, draft animals, which were maintained by the central management of the estate and shared out among the divisions. The labor force in each village-based division of his estate was provided by a relatively small number of permanent laborers, termed *metrematiaioi* and *oiketai*, as well as by numerous people hired on a daily basis. The management of this estate involved considerable costs, since careful control had to be maintained over labor costs and over the allocation of centrally maintained livestock and other resources.

IV TENANCY

The type of management associated with early imperial villas or the estate of Appianus depended on the coincidence of a number of factors: the ownership of a critical mass of land in one area to make the sharing of resources feasible, and the availability of a labor force that could be organized and employed on a daily basis. When such circumstances did not obtain, many landowners used the institution of farm tenancy to organize the management and labor on their estates. These considerations applied equally to the Roman state, which was by far the largest landowner in the Roman empire. State or imperial property included estates that were originally the private property of the emperors but that, with the changing of regimes, became incorporated with other state-owned properties under the general administration of the imperial treasury, or Fiscus. Imperial properties also included lands that were always classified as "public," including the *ager publicus* of the Republic. In the empire, state-owned land was an especially important feature of the Egyptian agrarian economy, where two categories of state-owned land, namely, public land, or *ge demosie*, and royal land, *ge basilike*, were to be found in virtually every location and in some nomes may have represented as much as half of the total land.[65] The portion of land controlled by the state surely grew in the course of the early empire, since property confiscated from those condemned for criminal offenses or for failure to pay taxes fell under the administration of the Fiscus, as did the property of people without heirs.[66] State lands in Egypt and in Africa, and probably in other parts of the empire as well, were typically leased out to small-scale tenants.

[64] See Rathbone 1991; and Kehoe 1992: 92–117.
[65] Rowlandson 1996: 70–101. [66] Crawford 1976.

Farm tenants on private and imperial land represented a wide range of economic and social statuses, including large-scale tenants who took upon themselves the task of managing entire estates. But the vast majority of tenants were small-scale cultivators, and even in this group, the range of resources that the tenant brought to the farm could vary considerably. Some tenants provided important resources, including draft animals, and even slaves. These tenants, who were more likely to be economically independent, were recruited to some extent from the small-scale landowners in the vicinity of the estate. This is not possible to document in most parts of the empire, but it does seem to have been the case in Egypt, where the lines between landowners and tenants were often blurred.[67] Other tenants, lacking these resources, were more or less laborers, economically dependent on their landlords.[68] Another important factor affecting the bargaining power of tenants was their access to the legal institutions of the state to protect their rights. Tenants with leases enforceable in Roman courts enjoyed much greater protection than those who cultivated the estates of landowners who, by virtue of their superior social and economic standing, could effectively dictate terms of tenure. Perhaps the best evidence for the bargaining power that some tenants enjoyed can be seen in the apparently successful efforts of tenants on imperial estates in Africa and Asia Minor during the late second and the third centuries AD to petition for redress against abuses by the large-scale tenants who collected their rent, imperial tax officials, landowners from neighboring towns, and soldiers.[69]

Tenants performed a crucial service for landowners when they invested their own resources in the cultivation of the land. This type of investment could be especially important with capital-intensive crops such as vines and olives, which were important cash crops but which also required considerable long-term investment of resources and labor. The Roman government relied on small-scale tenants to engage in this type of investment on state-owned properties. This can be seen in the case of the imperial estates in the Bagradas valley in Africa. There, on the basis of two regulations, the *lex Manciana* and the *lex Hadriana de rudibus agris*, the imperial government encouraged small-scale sharecroppers, or *coloni*, to engage in polyculture, in particular the cultivation of olive trees in tandem with grain.[70] It seems likely that many private landowners depended on the production of tenants much as the imperial government did.[71]

The extreme stratification of wealth in the Roman empire should not disguise the difficulties that landowners encountered in profiting from their estates. Many landowners depended on the efforts of numerous small-scale

[67] Rowlandson 1996: 124.
[68] Foxhall 1990; cf. Lo Cascio 1993; Capogrossi Colognesi 1992–3: 206–21; 1995: 220–45.
[69] Hauken 1998. [70] Kehoe 1988a; Kolendo 1991; de Ligt 1998/9; De Vos 2001.
[71] Kehoe 1988b.

cultivators to produce the cash crops that provided their incomes. The achievement of the Roman landowning elite was not so much to establish more efficient and productive methods of agriculture, but to extend their holdings so as to extract a modest income from a multiplicity of sources. But the constant problems that private landowners and the state encountered in keeping their land cultivated meant that the demand for food on the part of the empire's urban population was probably never fully met, with the resulting hardship and perhaps even intermittent starvation.

V URBAN AND RURAL INDUSTRIES

The next question to be answered is to what extent wealth generated from agriculture contributed to an expansion of production in the non-agricultural sectors of the Roman economy. To answer this question, we need to evaluate the economic role of cities in the Roman empire and their relationship with the countryside.

Certainly, the dominant role played by the upper classes in the rural economy meant that one important economic function of towns and cities was to meet the consumption needs of local landowners, who spent there much of the income that they derived from their estates. This is the economic model that Jongman has developed for Pompeii.[72] But it is unlikely that this was the only significant dimension of the urban economy. One stimulus to growth in the urban economy was the need of the landowning elite to market their surplus from the countryside. This created opportunities for generating wealth in supporting industries, most obviously in the production of ceramic vessels, but also in less obvious things such as shipbuilding or the construction of market facilities and other infrastructure to support commerce. At the same time, the aggregate demand of small landowners, tenants, and other agricultural laborers provided a stimulus to manufacturing. A key factor affecting the development of manufacturing, both in cities and in the countryside, was the level of wealth in the hands of small landowners and tenants. If these farmers produced a substantial surplus over and above what they had to pay as rent and taxes, then they would have income to spend that would support the development of industries. Thus Engels, in his analysis of the economy of Roman Corinth, develops the concept of the "service city," whose economy revolved around producing goods and providing services for a rural workforce that had much greater spending power than is generally assumed.[73]

The stimulus that agricultural production provided to manufacturing can most readily be traced in the ceramic industries that supported agriculture. A great deal of what we might term as industrial production is

[72] Jongman 1988a: 187–203. [73] Engels 1990.

associated with rural rather than urban sites, including *vici* and estates.[74] For example, the production of olive oil as a cash crop for export became increasingly important for Africa in the third century AD, when African olive oil began to be exported all over the Mediterranean. During this same period, ceramic production increased substantially in the countryside in which the olive oil was produced. Thus rural kiln sites indicate the production of amphoras on a substantial scale, to be used as containers for the oil to be sold on the market. At the same time, the production of fine ceramic wares for the local market shifted from the cities in north Africa to the countryside.[75] It seems likely that many of the same workshops producing amphoras also took advantage of the increased purchasing power in the countryside resulting from the production of olive oil by producing consumer goods as well.

The same forces that promoted industrial production in the countryside could also create opportunities in cities, especially in ports and other cities that served as entrepots for commerce in agricultural products. For example, a recent study of Leptiminus, a port city of modest size on the eastern coast of the Roman province of Africa, indicates the potential for industrial production in an "entrepot" city.[76] This city was a place in which olive oil produced in its hinterland was loaded onto ships and transported to more distant markets. A survey of the city reveals a number of kiln sites producing ceramic products, especially amphoras in the Africana I–II series, dated from the second to the fourth centuries. In addition, some sites indicate iron working, again on an apparently substantial scale, in close association with the production of amphoras. In early imperial Gaul, commercial agriculture also stimulated the development of a manufacturing sector. During this period, Gallic workshops supplanted Italian workshops as the major producers of fine ceramic ware, *terra sigillata*, for the western empire. *Terra sigillata* represents one of the basic consumer goods that a broad range of the population of the Roman empire purchased. What is striking about the production of Gallic terra sigillata is the diffusion of the centers of production, which is to be contrasted with the earlier more centralized production of Italian terra sigillata at Arretium. The principal centers of production included smaller towns or villages, such as La Graufesenque, Bram, and Montans, as well as the larger town of Narbonne.[77] Presumably, these production sites were associated with sources of clay.

At the same time, growth in the manufacturing sector of the Roman economy was limited by the reluctance of the upper classes to invest in it on a large scale. The initiative and rewards for investing in manufacturing went to people of much more humble social rank, including freedmen.

[74] Whittaker 1990. [75] Peacock et al. 1990.
[76] Mattingly 2001. [77] Guéry 1990; Woolf 1998: 190.

Industries tended to be organized on a modest scale, with independent artisans working in relatively small workshops. Upper-class investment in industries was limited primarily to the provision of raw materials, including clay, wool, linen, timber, and other commodities, in fact, most of the products used in construction or manufacture, with the likely exception of metals. In fact, upper-class involvement in the production of building materials confirms the dominant role of agriculture in the Roman economy, since bricks and timber were products of rural estates and represent production in the rural economy much like foodstuffs.[78]

We can appreciate the limited involvement of upper-class Romans in industry by considering the organization of brick production in the Roman empire. The humble brick was a basic material in the building industry in the Roman empire, and we can trace some of the steps in the production and distribution of this commodity from the stamps that various people involved in these processes placed on them. With the exception of certain notable cases, the ownership of the clay resources and the organization of the brick-making industry were separate. The upper-class landowner typically owned the land that provided the raw materials for making the industrial product, while another party, economically independent of the landowner, organized the actual production, providing the management and taking on the risk associated with it. The evidence for this comes from Helen's study of a sample of 9,000 stamped bricks from excavations at Ostia during the first two centuries AD.[79] Especially important for our purposes are the so-called binomial stamps, common in the second century, that record the name of the producer of the bricks, or the *officinator*, as well as the owner, or *dominus*, of the *figlinae*, which Helen convincingly identifies as the source of the clay used in the making of the bricks rather than the actual place of their production (although these might in fact be identical).

The evidence of the brick stamps indicates that the wealthy Romans who owned estates with important clay pits generally exploited this resource by leasing out the rights or otherwise alienating them to a third party, the *officinator*, who took the clay, produced the bricks, and sold them for construction projects. The brick industry involved members of the highest ranks of the aristocracy, including, in the second century, the emperor, members of the imperial family, and associates of the court, such as the praetorian prefect Plautianus, the father-in-law of the emperor Caracalla, who was also a large landowner and producer of olive oil in the region around Lepcis Magna.[80] But it is not likely that these people were directly involved in the building-supply industry. In some instances, the *officinatores* were freedmen of the owners of the clay pits. For example, the wealthy

[78] Cf. Horden and Purcell 2000: 182–6.
[79] Helen 1975; cf. Aubert 1994: 217–44.
[80] Mattingly 1988c.

brothers Cn. Domitius Lucanus and Cn. Domitius Tullus employed their own freedmen as *officinatores* in the late first century, but generally the pattern seems to have been for the *officinator* to have been independent from the owners of the *figlinae*. Sometimes the *officinatores* were of relatively high social rank, such as the Calpentani of the first century, or L. Faenius Rufus, who was praetorian prefect under Nero. But more often the *officinatores* were of lower rank than the *domini*. They were often independent entrepreneurs, who took upon themselves the task of securing the sources of clay to make the bricks and to supply them for the building projects.[81]

It is difficult to determine how the production of amphoras and fine ceramics was organized. The example of the rural sites in Africa suggests that rural estates may have provided the setting for the production of amphoras serving commerce in olive oil, but this is not certain. Certainly, we should expect that some landowners engaged in olive production also produced their own amphoras, as was the case in the late Republic with the Sestii, who owned wine-producing estates at Cosa, or the Laecanii, a senatorial family that produced amphoras on a large scale in the first century AD to support olive oil production in Istria.[82] But to judge by the evidence for ceramic production from Egypt, the production of amphoras was largely carried out by artisans who were independent of the estate producing olive oil or wine. The exact mechanism for this production may be suggested by a series of three leases for potteries on vineyard estates in third-century Oxyrhynchus in Egypt.[83] In these labor contracts, the lessees received wages and allowances of wine in exchange for delivering large numbers of wine vessels, some of which may have been sold to other estate owners in the area. In other cases, it is apparent that estate owners relied on skilled craftsmen in the community to produce wine and oil containers.[84] Thus the estate of Aurelius Appianus made payments to potters working as independent contractors; this was part of a general policy to rely on independent artisans involved in other trades rather than to retain them as permanent employees of the estate.[85]

Our knowledge of the organization of terra sigillata production is very sketchy, but again, such evidence as exists suggests that it was organized by independent artisans, and that the role of the elite was largely to provide the raw materials, and, possibly, the kilns used for firing the ceramic wares. Stamps and signatures on the terra sigillata provide some evidence for the organization of the ceramic industry at Arretium in the late Republic and in the early empire.[86] There the pottery industry was controlled by a group of seemingly autonomous workshops, generally operating on a modest

[81] Helen 1975: 131–50. [82] Bezeczky 1995. [83] Cockle 1981.
[84] Ruffing 1999: 104–6. [85] Rathbone 1991: 154, 167, 174.
[86] Pucci 1973; Guéry 1990; Aubert 1994: 276–302; Fülle 1997.

scale. These workshops were not pre-industrial "manufactories," that is, shops in which most of the work was done by hand, with a minimum of mechanization, but with some economies of scale realized from labor specialization. Rather, the basic producing unit was the small workshop, in which much of the labor was provided by skilled slaves.[87] Although it is very difficult to be certain on this point, the proprietors of these workshops were not members of the elite but rather skilled artisans themselves, in some cases, freedmen who had proved themselves by their skill in producing fine ceramics. To be sure, there were some artisans who had as many as fifty or sixty artisans of slave or freed status working with them, but there seem to have been few economies of scale.[88] Under this circumstance, many of these slaves and freedmen were probably socially dependent but economically independent artisans who leased workshops from their owners or patrons. The master artisan, then, would run his own workshop, but he could make additional money by training artisans who would eventually set out on their own, providing their owner or patron with some financial consideration for helping to establish them in business.[89]

Outside of Italy, the production of ceramics was likewise in the hands of individual workshops, but slavery seems to have played less of a role in production. In Gaul, the producers were in all likelihood individual artisans of free status, although they might also employ slaves in more menial tasks.[90] Some workshops producing goods for both local and distant markets would establish branch or satellite workshops in new locations that produced more or less the same wares. For example, the "Ateius" workshop producing terra sigillata at Lugdunum seems to have been established from a "parent" workshop in Arretium.[91] This example could be multiplied many times in the diffusion of the products of both the Arretine and the Gallic workshops. The same phenomenon is apparent in the terracotta lamp industry, the organization of which can be traced to some extent on the signatures in the bases of common lamps, or "Firmalampen," which were a common household item throughout the Roman empire.[92] Generally in the ceramic industry, there was probably little institutional supervision of quality or prices. Rather, such associations or *collegia* of potters that did exist served primarily religious or social functions.[93] In Africa, the production of African red-slip ware, or Terra Sigillata Africana, was likewise dispersed among a number of production centers, both in cities and in rural settings. This pottery was marketed all across the Mediterranean world beginning in the second century AD. The identity and the status of the producers of this pottery are uncertain, but it is noteworthy that the dominance of African

[87] Fülle 1997. [88] On the number of workers, see Pucci 1973: 266–7.
[89] Fülle 1997. [90] Pucci 1993; Guéry 1990. [91] Guéry 1990: 141.
[92] Harris 1980a; Aubert 1994: 303–18. [93] Pucci 1993.

red-slip ware coincides with the emergence of Africa as a major producer of olive oil and at the same time as a major contributor to the ruling class of the Roman empire.[94]

The entrepreneurial activity involved in organizing the production and marketing of ceramics was often distinct from the ownership of the raw materials. This can be traced in the terra sigillata industry at La Graufesenque, one of the major centers of production in southern Gaul. There, we gain some understanding about the organization of the industry from a series of lists of potters associated with a major kiln complex.[95] This complex had some ten kilns used in the firing of terra sigillata, and it had the capacity to produce hundreds of thousands of pieces in a given season. To judge by the parallel from the Egyptian lease contracts, it is likely that the individual potters at this site were specialized artisans who leased the right to have the kilns at their disposal for varying periods of time. The whole kiln complex, according to this reconstruction, was owned by another party, presumably a landowner who also owned the land that supplied the clay as well as the wood fuel for the kilns. It has been argued that this hypothetical owner organized the individual potters and marketed the terra sigillata ware that they produced.[96] But it seems more likely that the potters themselves were the ones who actually organized the production and distribution of ceramic products. The role that the owner of the kilns played in the ceramic industry was to invest in equipment that allowed him or her to derive revenue from a resource associated with an estate. In this sense, the owner of the kilns at La Graufesenque would be much like the owners of clay pits for bricks. But as was the case in the brick industry, the people who were actually involved in ceramic production were of a more humble social status.

The textile industry, in particular, the production of woolen and linen clothing, reveals a similar separation of the ownership and production of raw materials and the organization of manufacturing characteristic of other industries. The textile industry was certainly one of the very most important and ubiquitous industries in the Roman world. As we have seen, the raising of sheep was a basic aspect of agriculture both in Italy and the provinces, and providing the raw materials for the textile industry, an important source of income for landowners, including the imperial government, as well as for pastoral groups.[97] Even if there were no cities in the Roman empire dominated politically and socially by a commercial class deriving its wealth from textiles, it is still likely that textile production was a basic component of the economic life of many ancient cities.[98] The clothing prices in Diocletian's price edict indicate the existence of certain cities

[94] Carandini 1983b. [95] Strobel 1987: 100–13.
[96] Strobel 1987. [97] Frayn 1984. [98] Van Minnen 1987.

famous for the production of some high-cost clothing items; for example, Tarsus, Laodicea, and Alexandria were well known for the production of high-quality linen garments.[99] Indeed, about two centuries earlier, Dio of Prusa commented on the large number of linen workers at Tarsus and the political unrest resulting from their exclusion from full participation in civic life.[100] But many more cities and villages were involved in the production of more common items of clothing that could be purchased by a much broader buying public, much like the ceramic ware that is found all over the empire. To be sure, much of this clothing was produced domestically, but independent artisans were economically significant.[101] The archaeological evidence for fulling and dyeing works at Pompeii indicates the presence of a thriving wool industry in that city, even if the scale of production should not be overestimated.[102] In a recent study of the archaeological remains of Timgad, a city in the frontier zone in Numidia whose population included numerous veterans, Wilson detects a substantial concentration of fulling and dyeing workshops in the northeast quadrant of the city. These establishments, concentrated in one part of the city presumably because of the malodorous nature of their work, suggest the existence of a textile industry that turned local agricultural products into marketable manufactured goods.[103] The example of Timgad can be multiplied many times throughout the empire.

The basic unit of production in the textile industry was the individual workshop. This was certainly the case in Roman Egypt, where documentary papyri preserve contracts involving textile production as well as documents connected with the associations, or "guilds" of weavers and other artisans.[104] The major capital outlay for this industry, the purchase of a loom, was relatively modest, and it seems likely that many weaving establishments consisted of little more than a space within a private house. The typical weaving establishment in Egypt, then, might consist of between one and four highly skilled artisans, each with his or her own loom.[105] The artisans themselves were usually of free status, but they might also be slaves. Supplemental work was provided by family members, including women, skilled slaves leased out for that purpose or working independently, salaried workers, and apprentices. The other crafts associated with the textile industry, including fulling and dyeing, required specialized workshops and so demanded greater investment.[106] Clearly many of the people involved in weaving in the countryside also gained income from other sources, including agriculture. Skilled weavers and other artisans were likely to have been

[99] Jones 1960. [100] Dio Chrys. *Or.* 34.21–3.
[101] For the importance of domestic production, see Foxhall *apud* Mattingly and Salmon 2001a.
[102] Jongman 1988a: 155–203. [103] Wilson 2001a. [104] Wipszycka 1965; van Minnen 1987.
[105] Wipszycka 1965: 81 ff. [106] Wipszycka 1965: 58–73.

concentrated in much greater numbers in the cities than in Egypt's villages, and it is in cities where we should expect to find weaving workshops organized on a larger scale. Thus the proprietor or manager of a weaving establishment at Alexandria could be styled as the "manager of a workshop of linen weavers having many workers in the workshop."[107] Another possible way to organize textile production was on the so-called Verlagssystem or "putting-out system," in which a large-scale merchant would provide individual artisans with materials and pay them for each garment that they produced. In this system, the artisan would have no contact with the customers and would not play any role in the acquisition of raw materials. There is not much evidence for this type of arrangement in Egypt, although we might expect to find it in large commercial centers such as Alexandria or Tarsus. Weavers and other artisans were organized into associations, called *collegia* or *synodoi*, a term that is often translated as "guilds." These associations served social and religious purposes, often functioning as burial societies, as is indicated by dedications preserved on inscriptions in many parts of the Roman empire. In Egypt, at any rate, these associations do seem to have played some role in regulating trade and prices.[108]

The papyri provide little evidence of large-scale, "vertical" organization of the textile industry, with large landowners supplying wool or flax to their own weaving establishments. Rather, the production of the raw materials for the textile industry was generally distinct from the manufacturing process. For example, the estate of Appianus and those belonging to other landowners in his circle had large flocks of sheep, which were often leased out to shepherds in exchange for cash rents. These shepherds were responsible for securing pasture land and for shearing the sheep and marketing the wool.[109] Large estates in Egypt might include weaving workshops along with the other facilities involved in rural production, such as olive pressing facilities, mills, and even bathhouses. But these facilities were often leased out, as they were on the estate of Appianus, and so were not integral to the agricultural side of the estate.[110]

VI MINING

Mining was an industry significant to the Roman economy. Archaeological evidence indicates that mining was conducted on a widespread basis in many regions of the Roman empire, and mining generated significant revenues for the state and for private individuals. The principal products of Roman mining included precious metals such as gold and silver, as well as lead, copper, tin, and iron. The importance of mining to the Roman

[107] *P.Oxy.* XXII 23410, 192 CE; Jones 1960; van Minnen 1987: 47.
[108] Van Minnen 1987: 60 ff.
[109] Rathbone 1991: 202–9.
[110] Rathbone 1991: 196–9.

economy is suggested by the measurement of historical pollution levels of lead, a by-product of silver production (see above).

Roman mining involved some application of technology, especially in the use of devices to remove water, but more importantly, the organization of vast amounts of labor and resources, in particular, water and wood. The organization of such resources was crucial to both of the major forms of mining in the Roman world, surface and shaft mining. In the former, the ore is located close to the surface of the earth, often in alluvial deposits. The simplest method of surface mining involved panning river beds for precious metals such as gold. To mine deposits that were not in river beds, more elaborate methods had to be devised, which all involved using tremendous amounts of water. Ore deposits could be uncovered by a method called "hushing." This method involved storing large amounts of water in reservoirs, which might be supplied by aqueducts. The water would then be released in a torrent, which would wash away the earth and expose the ore. A similar method, called "ground-sluicing," involved washing the surface with a continuous supply of water to expose the ore. The ore might be gathered from collection boxes, or "long toms," which were basins with wooden cross-pieces, or riffles, on the bottom to catch the heavier ore as water washed the material over them.[111] When the supply of ore from surface deposits was exhausted, shaft-mining techniques might be used, which involved digging vertical shafts below the surface of the earth. In this method of mining, vertical shafts were dug to reach the level of the ore deposit, while horizontal tunnels or galleries would be excavated to follow the ore deposit and expedite its removal. Often tunnels, or "adits" were dug into a mountain side to provide a means to approach the vertical shafts. Adits and galleries would often be hundreds of meters in length but at the same time quite narrow, generally 1–2 m. in diameter, just large enough to allow access to workers and to pass the mined ore out by hand. Enormous amounts of wood were required to build supports for the tunnels as well as to provide fuel for the furnaces used in the smelting of the ore.[112] The extraction of ore was extremely labor intensive. The work was done by hand, with iron and copper shovels, axes, and buckets. The main application of technology was in the extraction of water, which tended to accumulate in subsurface mines. This could be accomplished by a series of Archimedes' screws or by water-wheels, which would be turned by human workers.[113] The systems of pumping out water that the Romans developed allowed them to mine at depths down to 200 m. below the water table.[114]

Mining was one industry that could have been practiced by the elite on a large scale, since it involved the application of existing technologies

[111] Woods 1987: 625–33; Shepherd 1993: 1–46. [112] G. B. D. Jones 1980.
[113] Woods 1987: 613–24. [114] Greene 2000: 38.

to extract ores for which there was apparently steady demand. Perhaps to protect its own control over precious metals, however, the state maintained direct control over the most important mining areas and exploited them in a kind of partnership with private enterprise. During the Republic, mines in Spain were sometimes in private hands, but many more were owned by the state and leased out to private individuals or to partnerships, *societates publicanorum*. In the empire, this situation gradually changed as the imperial Fiscus increasingly took over mines and maintained ownership over them.[115] It seems likely that some mines were worked directly by the Fiscus, but generally the task for actually digging for ore in the individual mines was divided among numerous smaller-scale operators. This is at least the pattern that emerges from the mining regulations from Vipasca in the province of Lusitania, where two bronze tablets from Aljustrel in Portugal attest the workings of mines in some detail.[116] In this district, the Fiscus would lease the rights out to individual contractors, or *coloni*, in exchange for one half of the ore that they produced. The imperial administration's role in exploiting the mines was not simply to regulate the *coloni*, since the inscription also includes provisions for the Fiscus to dig exploratory shafts that would later be assigned to *coloni*. In addition, the Fiscus raised additional revenues by selling off for cash payments mines that had once been worked but were no longer in operation.

The system of mining attested at Vipasca does not seem to have involved elite investment on a large scale. The Fiscus retained control over the productive resources, and it shouldered some of the most important capital costs, in particular, those connected with the smelting of the ore. It is difficult to determine what level of resources the *coloni* brought to bear in covering the costs of exploiting the individual mines. The main expenses that the *coloni* bore were to provide labor, which may have included many slaves, and to build supports for the galleries and shafts. Because these costs were considerable, the *coloni* might pool resources by forming partnerships.

VII CONCLUSION

Our evidence for the organization of manufacturing in the Roman world is limited, but it nevertheless seems possible to place it within a broader context of the Roman economy. The modest economic growth that characterized the early imperial period created an increasing demand for basic manufactured goods such as ceramic wares and textiles. This demand, in turn, created two types of economic opportunities. On the one hand, large landowners gained additional sources of revenues by supplying the raw materials for this production, including clay for ceramics and wool or flax

[115] Domergue 1990: 227–386. [116] Flach 1979; Domergue 1983: 115–80.

for the textile industry. But for the most part, the involvement of the Roman elite was limited to supplying raw materials, and it was left in the hands of artisans and workers recruited from more humble levels of society to undertake the actual production of manufactured goods. So it does not seem that the Roman empire experienced the development of a class of entrepreneurs engaged in manufacturing on a sufficient scale to rival the political and social ascendancy of the landowning elite. Recently Drinkwater has made the case that the textile industry did provide the basis of wealth for families accomplishing precisely this, such as the third-century Secundinii from Trier.[117] This Gallo-Roman family included large-scale merchants who organized a lucrative business involving the production of fine textile wares. They purchased raw materials from local and distant sources and organized a specialized workforce of weavers and dyers in and around Trier to manufacture garments that they could sell for immense profits in distant markets. Despite its wealth, however, the family never took its place among the elite in Gaul. It is difficult to know how common entrepreneurial families such as the Secundinii were, but it is likely that there were many such people who could take advantage of the business opportunities that Roman rule created. But the dismay of the linen weaver from Alexandria mentioned above (see at n. 107) over being nominated for a civic liturgy normally filled by a landowner suggests both the degree of wealth obtainable from manufacturing and the limits that this wealth could represent. Clearly it was not common for people whose primary income was from manufacturing to take their place alongside a town's landowners in performing the basic civic liturgies. Perhaps the wealth associated with such enterprises was too fleeting, dependent on an individual entrepreneur's organizing the skills of a highly trained labor force. An income that ultimately depended on the production of a lasting asset, such as land, was far more stable for the long term, and the Roman upper classes never shifted their resources away from the land. For elite landowners, the production of raw materials for manufacturing was economically more attractive than the actual production and marketing of manufactured goods.

[117] Drinkwater 2001.

CHAPTER 21

THE EARLY ROMAN EMPIRE: DISTRIBUTION

NEVILLE MORLEY

The mobilization and distribution of resources, human and material, was the key to Roman power. Effective distribution was a prerequisite for successful military campaigns and the maintenance of the frontiers. It underpinned the authority of the emperors, helping them to retain the support of the army and to avoid unrest in the capital by ensuring regular food supplies and occasional largesse. It permitted the elaboration in material form, in particular through large-scale public building in the city of Rome and other urban centers, of an elaborate symbolic system which promoted the legitimacy and ideals not only of individual emperors but of the imperial regime as a whole; indeed, the empire distributed ideas and symbols alongside goods and people. The Roman state was able to draw on the resources of a vast area, which encompassed regions rich in all the different goods required by the imperial project – metals, stone, grain, oil, and other foodstuffs. The task was to move these resources to where they were needed.

Successful distribution was equally important for the land-owning elite, especially as they too came to draw on resources from an ever wider area. The produce of their scattered estates needed to be collected together for consumption, sale, or redistribution in the cities of the empire, to provide for their dependents, support their chosen lifestyles, and further their political ambitions. To a greater extent than the emperors, they also relied on systems of distribution to provide them with goods that they could not obtain from their own holdings: materials for their building projects, for example, the "luxury" goods that played a vital role in the arena of social differentiation and competition, and slaves. As for the mass of the population, some experienced the expansion of Roman power and the concomitant development of systems of distribution as an opportunity; there were fortunes to be made in supplying the needs of the state and the aristocracy, and of the cities which prospered under their rule. The urban population was dependent on the efficiency of such systems, including the market, for its sustenance; even the rural producers, who supplied most of their needs from their own produce, were to some extent drawn, willingly or not, into the world of the traders and ship owners. The political and cultural integration of the empire went hand in hand with, in the broadest

sense, its economic integration, as widely separated regions came to be connected through the movement of goods.

I THE LOCATION OF DEMAND

Although it continued to be presented as a basic principle of the good life, complete self-sufficiency was always an unrealizable ideal in antiquity; goods were always being transferred in one way or another between individuals, households, and localities. The conventional picture of ancient trade as small scale, focused on "luxury" goods for the elite, and economically insignificant stresses the homogeneity of the Mediterranean environment and hence the ubiquity of its key crops, as well as the high cost of transport, especially land transport, in a pre-industrial economy. Both of these factors can easily be exaggerated. Recent studies have argued that land transport was perfectly economical for goods which were relatively compact and fetched a reasonable price per unit weight – not only spices and unguents but textiles and wine – especially when used in conjunction with other forms of transport (as Varro depicts mule trains carrying goods down to the coast).[1] Some geographers have rejected the idea of a homogeneous "Mediterranean" environment and climate altogether, but recent accounts argue that its homogeneity lies precisely in the extraordinary degree of variation, in terrain and weather patterns, at the micro-regional level: the Mediterranean evinces "unity in diversity."[2] Small-scale, local distribution of resources between the innumerable micro-environments that made up each region – above all between coast and hinterland, highlands and valleys, and arable land and desert – therefore provided a constant background to the patterns of growth and decline of more visible economic activity.[3] Distribution, whether organized through networks of kinship, friendship, or patronage, or through the market, was one means of managing risk in the face of a highly capricious environment characterized by glut and dearth.[4] Furthermore, a number of essential resources – metals, most obviously, but also products like pitch, and stone suitable for millstones – were clearly not distributed evenly throughout the Mediterranean, while certain "ubiquitous" crops (vines above all) were not cultivated in some regions until well into the Roman period: some form of distribution of such goods was always necessary.[5] The surplus production of an individual peasant household was small; the aggregate demand of the ancient peasantry was considerable. The key question for this chapter is not therefore whether

[1] Polfer 1991; Morley 1996: 63–8; Varro, *Rust.* 2.6.5; Laurence 1999.
[2] Horden and Purcell 2000: 10–25; King, Proudfoot and Smith 1997.
[3] Horden and Purcell 2000: 124–43.
[4] Horden and Purcell 2000: 151, 175–203; Garnsey 1988: 55–63.
[5] Horden and Purcell 2000: 344–51; Peacock 1980.

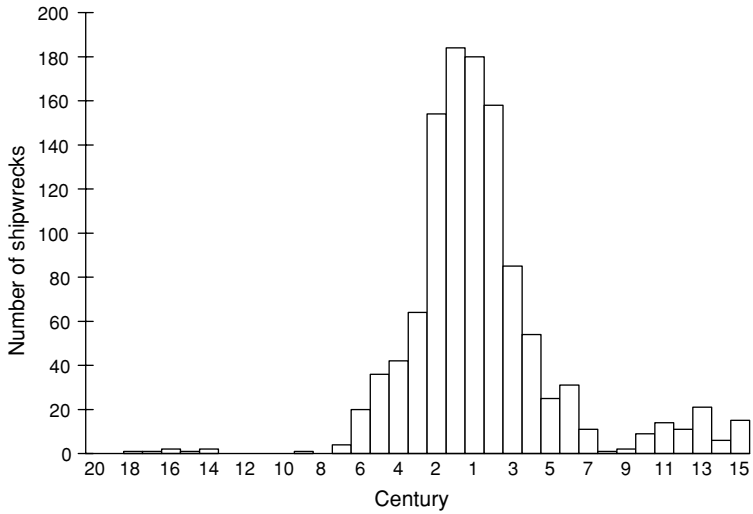


Figure 21.1 Distribution of Mediterranean shipwrecks, twentieth century BC to fifteenth century AD
Source: Parker 1992: 549 fig. 3

there was significant trade and exchange under the Roman empire, but how far distribution under the empire differed in volume and nature from the constant "Brownian motion" of *cabotage* and periodic rural markets that had long characterized the Mediterranean region.

Archaeology has provided striking and conclusive evidence for a dramatic increase in the volume of goods being distributed within the Roman empire, eclipsing anything that had gone before. Far more Mediterranean shipwrecks are datable to the period 200 BC – AD 200 than for any other period before the sixteenth century (see Figure 21.1).[6] These data cannot be taken wholly at face value. The geographical distribution of wrecks discovered so far shows a clear bias towards certain areas (the south coast of Spain and France, above all), which reflects the activity of archaeologists and other divers as much as ancient trade routes. The widespread use of amphoras in the Roman period also makes such wrecks more visible to prospectors than those which carried their cargo in more perishable containers. Nevertheless, the contrast between the numbers of known Roman wrecks and those from earlier and later periods, as well as literary and epigraphical evidence for Roman trading activities along the African coast and in the eastern Mediterranean, make it unlikely that more data from other regions would greatly alter the picture. Improved prospecting techniques,

[6] Parker 1992; cf. above, Chapter 19, Table 19.1.

to identify wrecks which did not carry amphoras, would probably discover as many if not more Roman ships (those carrying grain, for example) as ships from other periods. Since there is no evidence for a drastic decline in the quality of Roman shipbuilding, these figures imply a significant increase in the volume of activity on the Mediterranean.

In addition there is the sheer volume of amphoras and other pottery dated to the period, much of it recovered from shipwrecks but much more found on all kinds of sites throughout the empire.[7] The wide geographical distribution of certain forms is impressive; for example, Lamboglia 2 amphoras from Apulia are found throughout the western Mediterranean, while some African amphoras occur almost everywhere from Britain to Egypt.[8] Amphoras were specialized storage containers, designed for stacking in ships' holds, ideally suited to transporting goods over long distances. The extent to which the forms from a particular region became standardized is another indicator of the regularity with which goods were being moved – as are the occasional cases of amphoras from one area imitating the distinctive forms of another. Other types of container are less visible archaeologically, which does tend to exaggerate the contrast between the level of activity under the Roman empire and that of earlier and later periods which relied more on wood, cloth, or skin containers (a move to wooden barrels has been suggested as the explanation for the disappearance of Italian wines from the archaeological record in the second century).[9] However, the abandonment of mass-produced amphoras and the use of more perishable, less standardized containers might itself be taken as evidence for a decline in the regularity and volume of inter-regional distribution compared with the Roman period.

Amphoras were used mainly to transport wine, oil, *garum*, and other foodstuffs; relatively cheap, relatively bulky in relation to their value, relatively ubiquitous over much of the Mediterranean. The same may be said of the pottery, from Italy and later Africa, which is found throughout the western half of the empire and beyond; given the ubiquity of both raw materials and manufacturing techniques, the lack of any basis for a comparative advantage in pottery production for any given region, one would not normally expect such goods to be widely distributed beyond the immediate locality.[10] This does represent a change in the nature as well as the volume of inter-regional distribution. To describe this in terms of a distinction between "luxuries" and "staples" as objects of trade is, although conventional, generally unhelpful, carrying a great deal of baggage from the moralizing tradition: virtually any good might be defined as a "luxury"

[7] Paterson 1982; Peacock and Williams 1986; Panella and Tchernia 1994.
[8] Peacock and Williams 1986: 99, 157, 170. [9] Tchernia 1986: 285–99.
[10] Cf. de Ligt 1990 on Weber's theory of industrial location.

(even grain, in certain circumstances: fine bread wheats, for example), while ancient historians tend to use the term unthinkingly as a synonym for "economically insignificant."[11] We certainly cannot assume that the expansion of the trade in spices, incense, and other goods from Arabia and India during this period was devoted purely to the needs of the wealthy elite, while the scale of finance involved shows that this was scarcely an insignificant activity even if the number of individuals directly involved was relatively small.[12] Nevertheless, it is true to say that objects of high value per unit weight had always been traded through the Mediterranean, while the costs of transport tended to restrict large-scale trade in cheaper, bulkier goods like grain to special cases like Athens and to emergency famine relief.[13] What archaeology shows us in the Roman period is the regular, large-scale, inter-regional redistribution of foodstuffs that were staple but not essential and manufactured goods like pottery tablewares and lamps: products which were consumed by the mass of the population, but which in the past had generally been produced locally or not consumed at all by the majority.

The key to understanding this transformation is a study of changes in the scale and location of demand in this period; a greater number of people under the Roman empire chose or found themselves compelled to obtain a greater proportion of their needs (nutritional and social) from outside their immediate locality on a regular basis. In part this reflects changes in habits of consumption in many regions, which created a significant demand for goods that could not (at least for the moment) be produced locally, or which were desirable precisely because they were not produced locally; the development of an appetite for Italian wine in Gaul, for example, and changing tastes in fine pottery.[14] In the process of cultural change often referred to as "Romanization," many provincials articulated their new identity through new patterns of consumption.[15] This is most visible in the case of the elites who could afford to invest heavily in the process of acculturation and advertising their new allegiance, but it was not confined to them. Even if an individual peasant could afford wine only occasionally, and bought a single piece of fine pottery or a few pinches of incense every year, the resulting increase in aggregate demand would be sufficient to support a greater volume of inter-regional distribution.[16] In some cases this trade in "consumer goods" rode piggy-back on other systems of distribution, above all supplies to the army, which effectively subsidized the costs of transport.[17] In many cases local production eventually expanded to meet demand; Gaul provides a good example, both in the expansion of viticulture and in the

[11] Cf. Berry 1994; Morley 1999: 98–101. *Contra* e.g., Rostovtzeff 1957: 36; Jones 1974: 149–50.
[12] Young 2001. [13] Garnsey and Whittaker 1983; especially Hopkins 1983a.
[14] Tchernia 1983; Woolf 1997: 169–205.
[15] For a survey and critique of the concept of "Romanization," see Woolf 1997: 1–23.
[16] De Ligt 1990; 1991. [17] Middleton 1983.

way that Italian Arretine ware was succeeded by a series of local finewares (some of which briefly enjoyed extra-local distribution).[18]

The expansion of distributive activities may also reflect an overall increase in the population of the empire.[19] This is to assume that population increase was supported through increased production (above all through expanding the cultivated area by exploiting previously marginal land) so that per capita income remained steady and aggregate demand expanded. Insufficient work has been done – and most likely the evidence is inadequate – to explore whether the areas in which population growth was most striking during this period correlate with those areas with the greatest apparent increase in economic activity; the western provinces would seem the most likely candidates.[20] However, most of the needs of this expanding population could still have been met locally; we would expect an intensification of the small-scale, local distribution described above, rather than any great expansion of inter-regional distribution. The explanation for that change is found in the development – one might almost say creation – of centers of demand for foodstuffs and other basic materials that could never be fully supplied locally, necessitating the development of more elaborate systems for the inter-regional distribution of such goods. That development was the direct result of the ways in which the two groups that commanded the greater proportion of the surplus production of the empire, the state and the great landowners, chose to invest that surplus in their pursuit of power.

The first such center of demand was the army. Army costs were the most important aspect of imperial expenditure, absorbing perhaps 450–500 million HS (over half of the likely imperial budget) by the mid-first century.[21] Supplying 400,000 or so soldiers with food and pay was a prerequisite for the security of the empire as a whole, hence for the legitimacy and prosperity of the imperial regime, and was equally important for the security of individual emperors, fearful of revolts and discontent that could be exploited by potential usurpers. Most of these troops were stationed in the sparsely settled margins of the empire, where they could obtain at best only part of their basic requirements locally. It has been estimated that the four legions on the Rhine frontier would have consumed the equivalent of a tithe on 40,000 square miles of land, whereas the region comprised only 20,000 square miles; in the region of the Cananefates in southern Holland, meanwhile, 16–22,000 military personnel could scarcely have been supported from the surplus production of the 14,000 or so natives.[22] Logistics had played their part in determining the limits of imperial expansion; Roman frontiers tended to become established in marginal regions, towards the

[18] Woolf 1997: 189–202. [19] Frier 2000: 811–16; above, Chapter 3.
[20] See generally Curchin 1991: 130–53; Woolf 1997; below, Chapter 24.
[21] Duncan-Jones 1994: 36; Hopkins 1995/6: 46. [22] Whittaker 1983b: 118; 1994: 99–104.

limits of cereal agriculture, and were focused on lines of communication and supply rather than on ethnic divisions, natural boundaries, or ecological watersheds.[23] Over time, the army might hope to be able to obtain a greater proportion of its grain supplies locally, as domestic cereal production increased; this certainly was the case in Britain, to judge from the decline in volume of imported *terra sigillata* (generally agreed to be a "marker" for imports of food) by the mid-third century.[24] However, many frontier regions, especially in the east, were at the margins of successful cereal cultivation, and so it must always have been necessary to bring in supplies of grain from elsewhere.[25]

The army naturally consumed more than just cereals. The soldiers' diet included wine or *posca*, olive oil, and pork, not to mention condiments like *garum* and pepper; they needed horses, pack animals and animals for sacrifice, all of which required fodder; the replacement of equipment called for leather (the army of northern Britain needed 12,000 calves per annum simply to repair and replace its tents) and metals (a single legionary fortress in Britain has yielded 20 tons of iron nails).[26] Some of these goods presumably followed a similar pattern to that of grain; mass imports in the early years of occupation followed by a gradual shift towards local supplies as domestic production developed. Others – notably Mediterranean products like olive oil and wine – would always have to be transported to troops on the northern frontiers. Whether the state dealt with the problem by redistributing products collected through the *annona* to the frontier regions or by leaving local governors and military personnel to employ contractors, this represents a net transfer of resources from the wealthy, tax-producing inner provinces to the frontiers, and involved significant investment in the task of distribution. The same is of course true for the deployment of human resources, transporting recruits to where they were required.

The second center of demand was the city of Rome, whose population had grown dramatically in the last century of the Republic from around 200,000 – already an impressive figure for a pre-industrial city – to about a million.[27] The expansion of Rome had been due entirely to its role as the focus of the political activity of the Roman elite, who competed with one another for prestige and popular support through public and private building, largesse, patronage, public entertainments, and conspicuous consumption. The establishment of the Principate brought changes in the nature of the competition but not its consequences: the elite now competed for prestige and imperial favor, but continued to spend, while the emperors sought to establish a monopoly on large-scale public euergetism, and

[23] Whittaker 1994: 60–97. [24] Fulford 1984: 135–6. [25] Whittaker 1994: 102.
[26] Breeze 1984; Pitts 1985; Drummond and Nelson 1994: 80. [27] Morley 1996: 33–54.

spent still more lavishly. They continued to develop the city as a symbol and showpiece, magnifying the glory of the empire in general and individual emperors in particular through ever more spectacular public buildings, which were then advertised in their coinage.[28] These activities, especially the building projects, required an astonishing quantity of raw materials; some produced locally (brickworks in the immediate hinterland of the city), others transported hundreds of miles (marbles from Egypt and the Aegean, for example, not to mention thousands of tons of lead for aqueducts and bathhouses, thousands of slaves and animals, and a cornucopia of exotic foodstuffs, spices, and textiles).[29] These activities, especially the building projects, also employed a significant number of people and thus created a demand for all kinds of foodstuffs and raw materials; the task of supplying their needs gave employment to others, whose needs also needed to be supplied.[30]

Rome's demands for grain have been estimated at a minimum of 150,000 tonnes per year; its consumption of wine at perhaps 75 million liters per year, with a million liters of olive oil for lighting and 20 to 30 million liters for cooking and washing.[31] These demands could never be met from the city's immediate hinterland, which came instead to be dominated by the intensive and profitable cultivation of perishable foodstuffs for the urban market and by the leisure activities of the elite.[32] Rome drew in grain from Italy, Sardinia, Sicily, Africa, and Egypt; wine from Italy, Gaul, Spain, and the Aegean; olive oil from Italy, Spain, and Africa; other goods from every part of the known world. Ancient authors rhapsodized about the city's appetite:

> . . . merchandise of gold, and silver, and precious stone, and pearls, and fine linen, and purple, and silk, and scarlet . . . and wine, and oil, and fine flour, and wheat, and cattle, and sheep; and merchandise of horses and chariots and slaves; and souls of men.[33]

> Whatever the seasons make grow and whatever countries and rivers and lakes and arts of Hellenes and non-Hellenes produce are brought from every land and sea . . . Whatever is grown and made among people cannot fail to be here at all times and in abundance . . . Cargoes from India and, if you will, even from Arabia the Blest, one can see in such abundance as to surmise that in those lands the trees will have been stripped bare and that the inhabitants of those lands, if they need anything, must come here and beg for a share of their own.[34]

[28] Zanker 1988; Edwards 1993: 163–72; Purcell 1996: 782–811.
[29] Horden and Purcell 2000: 350; Fant 2001; D'Arms and Kopff 1980; Wiedemann 1992: 59–61.
[30] Brunt 1980; Whittaker 1993.
[31] Garnsey 1988: 191; Purcell 1985: 13–15; Mattingly 1988a: 33–4; 1988b: 159–61; generally, Pucci 1989. See also above, Chapter 19.
[32] Morley 1996: 83–107. [33] Revelation 18.11–19.
[34] Aristid. *Or.* 26.11–12, 13; generally, Morley 1996: 1–4.

Rome was the archetypal consumer city, the majority of its inhabitants employed directly or indirectly in the task of magnifying the glory of the Roman empire and its rulers, supported directly or indirectly from the revenues of the state and the produce of the landed estates of the elite. Its demand for goods was enormous, and it had the power and wealth to satisfy its needs and cravings. Part of these demands were met through state redistribution, but the *annona* did not cover all of Rome's grain requirements, let alone its demand for other goods.

The third center of demand was the urban population in the rest of the empire. It is generally agreed that there was an increase in urbanization under the Roman empire, in terms both of the establishment of new urban centers (whether founded deliberately, or developing out of other forms of settlement) and of an expansion of both population and infrastructure in many existing cities.[35] It is exceptionally difficult to estimate the size of the urban population at any date, but a rough order of magnitude might be 8–9 million out of a total population of 50–60 million. Perhaps 12 percent of the empire's population, therefore, lived in urban centers, with the greatest density in long-settled regions like Italy and Egypt. Not all of these people would have been involved in non-agricultural activities, but we might still estimate that approximately 10 percent of Roman subjects were dependent for their food and other resources on the agricultural labor of others and on the efficiency of systems of distribution.

Urbanization developed above all as a result of the decision of the elite to invest a significant portion of the surplus they controlled in centralization and the built environment. The city was a means of establishing and reinforcing political, ideological, and economic power.[36] It was the main venue for conspicuous consumption, the display of culture and newly acquired *Romanitas*; it was the arena for the competition between members of the elite for prestige, influence, and office that served at the same time to reinforce their collective dominance.[37] Incorporated into the Roman empire, the city gave access to higher orders of power; it became a node in networks of distribution and information, and served as a forum for mediation between local society and higher order powers, and as a stepping-stone for the ambitious, seeking to make their way to the great provincial capitals or to Rome itself.[38] The city became, or continued to be, the main location of elite expenditure; as in Rome, the demands created by their habits of consumption and their building projects gave employment to thousands of craftsmen and other workers, whose needs also had to be supplied.[39] The economic life of the cities was not of course wholly dominated by elite

[35] Hopkins 1978b; Rozman 1978–9; Jongman 1988a: 65–7, 108–12; Millett 1990: 65–126; Woolf 1997: 126–41; above, Chapter 3.
[36] Mann 1986: 1–28. [37] Patterson 1991; Woolf 1997: 124–6.
[38] Morley 1997; Purcell 2000: 423–32. [39] Hopkins 1978b.

consumption; the demands of the peasantry, individually small but sizeable in aggregate, made a significant contribution to urban incomes, though it is likely that the concentration of craftsmen in urban centers rather than diffused through the countryside reflects the greater spending power of the elite.[40] Certain cities also prospered because of their role in, or fortunate location in relation to, the major supply routes to the army and the capital; Ostia and Puteoli are the most obvious examples, but there are plenty of other cities in Italy, Gaul, and Britain whose development owed something to their proximity to such routes.[41]

Most of these cities would have obtained most of their basic supplies from their immediate localities, except when a poor harvest forced them to look for supplies elsewhere – which, as Hopkins has argued, implies that a considerable volume of grain was traded or otherwise redistributed every year, given the unpredictability of the Mediterranean climate.[42] Even in a normal year, however, the fact that the population was concentrated in a single location created the need for investment in the means for distributing goods between city and countryside; cities are always more costly to maintain than a dispersed rural population. In addition, there was always demand for goods that could not be produced locally, while the great cities like Alexandria and Antioch (and perhaps even the larger regional centers like Trier, Lyon, and Mediolanum) had to import food and other materials from a wide area on a regular basis. In earlier periods, trading activities were hampered by the unpredictability of demand and the costs of obtaining reliable information, while urban populations might suffer from the fact that the market could take so long to respond to a food shortage; a situation reflected in Cicero's discussion of whether a merchant should reveal that more grain ships were en route to a famine-struck Rhodes, or take advantage of the prevailing high prices.[43] Under the Roman empire, the possibility of such windfalls remained; but merchants might now choose instead the relative security of following a regular route to one of the great cities, perhaps specializing in particular products, with a more or less guaranteed market for their goods and the opportunity of building up connections and regular customers, rather than tramping from port to port with a mixed cargo in search of demand.

Unlike Rome and the frontiers, most cities both sent and received goods; some produce would be exported from the locality, whether just in times of glut or on a more regular basis (to Rome, or the armies, or a larger urban center). That is not to say that payments necessarily balanced; the surplus production of the region might simply be extracted, by the state or by an absentee landlord, to be spent elsewhere. Involvement in the

[40] Cf. de Ligt 1990; 1991; 1993a; 1993b.
[41] Morley 1996: 176–8; Woolf 1997: 133.
[42] Hopkins 1983a.
[43] Cic. *Off.* 3.50.

supply of larger centers of demand could be profitable, but it could equally be a disadvantage in times of local food crisis if the pull of more distant markets led to a shortfall for local consumers – just as urban demands might adversely affect the peasantry.[44] What must be stressed is that no part of the Roman empire was ever an isolated, self-sufficient cell; demand for goods that could not be produced locally, or not in sufficient quantity, and hence the necessity of systems of distribution, existed at all levels of the urban hierarchy.

II THE MEANS OF DISTRIBUTION

Goods were distributed through the Roman empire by a variety of means, determined to a great extent by the identity of the ultimate consumer (and how concerned the state or the elite were to ensure that they were reliably supplied) but also by the nature of the good and by the identity of the original producer. Some goods were exchanged directly between producers and consumers in the local marketplace; some never entered the market at all, but were simply moved from their place of production to the place where they were to be consumed (for example, the state's imports of grain and marble into Rome, and the elite's redistribution of goods between different estates and from their estates to their urban residences).[45] Other goods passed through the hands of one or more intermediaries, merchants, and shopkeepers. One of the key debates on trade in antiquity has focused on the relative importance, in terms of volume and value, of this latter category.[46] The theory that the movement of goods in antiquity was dominated by state and elite redistribution, and hence that traders were marginal in wealth, status, and economic importance, has been offered as both a symptom and an explanation of the limited economic development of the ancient world, in comparison with the conditions that nurtured the birth of capitalism and the modern European economy.

Archaeological evidence has proved of limited use in this debate; it can show that goods were being moved, but rarely by whom, or whether the movement represents trade or redistribution.[47] In a number of cases the pattern of distribution of particular forms, such as the Dressel 20 oil amphoras from Baetica, corresponds so closely to army supply routes and areas of military activity that it is almost impossible to interpret this as the result of free market trade – which is not to say that private merchants were not involved, merely that they were working under contract to the army.[48] This pattern

[44] Garnsey 1988: 29, 61; Gal. VI 749ff.; cf. Madeley 2000.
[45] Whittaker 1985: 58; Rathbone 1991: 265–78.
[46] Finley 1985: 59–60, 129–39, 158–63; Hopkins 1983b.
[47] Peacock and Williams 1986: 59–63; Tchernia 1989; Whittaker 1989a.
[48] Remesal 1986; 1997; Middleton 1983.

ties in with the distribution of inscriptions commemorating *negotiatores* in Gaul, the majority of which are found on the Rhône-Rhine axis.[49] Stamps on amphoras may indicate the name of the producer of the contents or the owner of the workshop that made the container (who might of course be the same person); the name on the stopper might be that of the producer or the merchant; *tituli picti*, where they appear, often include the name of the *navicularius*, the shipper.[50] The fact that in many cases there is little or no correspondence between the names appearing on different parts of the amphora implies a separation and specialization of roles – but still does not rule out redistribution, if the *navicularius* was simply a ship owner rather than combining that activity with trade on his own account.

The previous section emphasized the ways in which state and elite spending created centers of demand that depended upon and encouraged the development of systems of distribution; this section will argue that most of the actual task of distribution was entrusted to private individuals. For the sake of argument, I will distinguish between three stages of distribution: the initial "mobilization" of goods from their producers, their transport to the place of consumption, and their distribution to the consumer. In some cases, of course, the same individuals were involved in all three stages, especially when the producer consumed his own produce; in other cases the process was more elaborate and involved a greater number of intermediaries.

The state could acquire some of the goods it required for Rome and the army directly at the point of production, from its own estates and possessions (marble quarries, mines), by compulsory requisition, and by collecting taxes in kind. The extent to which taxes were collected in cash rather than kind is hotly debated: a crucial point in Hopkins' argument that Roman tax demands, levied on the "inner" provinces and spent on the frontiers and at Rome, forced the subjects of the empire to produce for the market and so helped to promote economic development and an expansion of trade.[51] If the bulk of supplies were requisitioned in kind, there would be little incentive for provincials to alter their farming practices, and little scope for traders; if peasant producers had to sell produce to obtain cash to pay taxes, they might be tempted to try to increase their marketable surplus through more intensive labor inputs or the cultivation of different crops. There is evidence for both systems in different areas of the empire, but with some indication that money taxes had become predominant in most regions by the second century AD. However, it must be noted that the amount of grain collected as tax in Egypt alone far exceeded the amount which the state required for its distributions to the privileged recipients of

[49] Middleton 1979. [50] Paterson 1982; Peacock and Williams 1986: 9–14.
[51] Hopkins 1980; Duncan-Jones 1990: 30–47, 197; Hopkins 1995/6.

the corn dole in Rome and for feeding the entire army.[52] In other words, the state did not simply consume all the goods it had collected as tax in kind; significant quantities must have been sold, mainly in the region of production (though there is a little evidence that some state grain may also have been sold in Rome) to local consumers or merchants.[53]

Having disposed of what was felt to be surplus, the state was left with various goods (marble, metals, grain, olive oil from the second century) that needed to be shipped from their place of production to Rome or to the frontiers. It obtained the rest of its requirements through the market or by employing contractors.[54] There is little indication of how far any calculation was made on the relative merits of redistribution and trade as means of obtaining army supplies. Certainly there is no evidence that the cost of transport was a factor.[55] The employment of *publicani* under the Republic, followed by the gradual extension of the *annona* in the later Principate, might be interpreted as showing that the state was happy to rely on traders and contractors until they proved unable to supply its needs reliably, whereupon it turned increasingly to requisition and redistribution of an ever wider range of goods.

Elite landowners were in a similar position to the state, looking to meet their needs by making the best use of the produce of their directly managed estates and of any rents collected in kind. Some of these goods were consumed by the owner and his dependants; the bulk was sold, to judge from the advice of the Roman agronomists on estate management, to obtain cash to buy goods and distribute largesse in the cities.[56] Landowners might market their produce themselves or through their dependants, and some certainly owned ships for this purpose.[57] They could also sell directly to merchants at the farm gate, choosing to make a smaller but more reliable profit by passing on the costs and risks of transporting and marketing the produce. The evidence of Cato's agricultural treatise and the legal sources shows that it was common practice to sell crops before they were harvested; the landowners passed on even the risks associated with an unreliable climate to the traders, preferring an assured income to the possibility of maximizing profits, as well as maintaining their social distance from the sordid activity of market trade.[58] The fact that such practices were common suggests that there was fierce competition between merchants for the produce of estates; the demand for goods like wine and oil in the cities, especially the city of Rome, was sufficiently large and dependable to offset the costs and risks involved for the traders, even on such unfavorable terms.

Such large estates aimed at producing a large marketable surplus. The majority of farmers disposed of only a small portion of their produce,

[52] Hopkins 1995/6: 55–6. [53] Garnsey 1988: 238–9. [54] Whittaker 1994: 106–10.
[55] Whittaker 1994: 100. [56] De Ligt 1993a: 163–5; Morley 1996: 160–1.
[57] Cf. Petron. *Sat.* 191; D'Arms 1981: 31–9; Aubert 1994. [58] Frier 1983a; Morley 2000: 217–19.

to obtain cash to pay taxes or rents and to obtain goods that they could not produce themselves.[59] Comparative evidence suggests that merchants might prefer not to invest time and effort collecting together such small surpluses from different farms; instead, the farmers shouldered the costs of transport and sold their produce in the local urban center, above all through the periodic markets, the *nundinae*.[60] They certainly made an important contribution to the food supplies of the local city; in one case in Italy, the municipal authorities apparently opposed the establishment of an estate market because of their concern for the likely effect on urban consumers.[61] Peasants would then sell directly to urban consumers or to merchants, some of whom might "bulk" their surpluses for export to more distant markets; a study of the development of the *nundinae* in Campania has suggested that they came to form a dendritic network, siphoning out produce for export to Rome as well as performing their more traditional functions of local exchange between country and city.[62] It is impossible to quantify the contribution which peasant farmers may have made to the supply of Rome and the other great centers of demand; it seems likely that the bulk of such supplies were purchased from the market-oriented estates of the elite, who invested a certain amount of time and resources in establishing personal relationships (and building up ties of obligation and dependence) with the traders.[63]

Finally, a few brief comments on the mobilization of goods from outside the empire. Northern regions produced furs, amber, leather, and above all slaves once conquest ceased to be a viable source of supply: Roman pottery, glass, metalwork, and coins are found in significant quantities outside the empire – though some of these were probably gifts or the spoils of raiding parties – while exchange might take place anywhere within the "buffer zone" to either side of the notional frontier.[64] Roman traders regularly headed east to Arabia and India to obtain spices, incense, perfumes, and other exotic items in exchange for various Roman goods (the *Periplus Maris Erythraei*, a guide to the route, includes information about what cargoes might be sold at different ports) and coins and bullion.[65] A temple of Augustus at Muziris in southern India points to the presence of some sort of permanent trading outpost, and there may have been another on the east coast. The goods were mainly imported in unprocessed form, and turned into usable products within the empire; rhetorical complaints that the "luxury trade" was draining wealth from the empire were probably based on the price of

[59] De Ligt 1990: 36–9, 47–9; 1993a: 136–42; Duncan-Jones 1990: 187–98.
[60] De Ligt 1993a: 106–54. [61] Pliny *Ep*. 5.4, 5.13; de Ligt 1993b.
[62] Morley 1996: 168–74; cf. Ziccardi 2000. [63] Plin. *Ep*. 8.2.6–7.
[64] Whittaker 1983b; 1994: 113–30; below, Chapter 27. On the slave trade, see Harris 1980b; 1999; Scheidel 1997; 2005a; forthcoming, c.
[65] Casson 1989; Young 2001.

the goods at Rome, whereas in fact much of the profits remained in the hands of Roman merchants and perfumiers, and of course the financiers who invested in such trading ventures.[66]

In general, the mobilization of produce reflected the interests of the powerful. The state commanded enormous resources scattered over a wide area; it retained control of certain essential goods for redistribution, and converted the rest into cash with which to buy other goods and employ contractors. The landowning elite were more concerned – obsessed, even – with making a regular profit while minimizing their costs, and so tended to pass on the costs and risks of transport and marketing to merchants. The latter held the inferior position in such exchanges, but could force peasant farmers to assume the costs of bringing their produce to market. For various reasons, peasants might be at a disadvantage in the market – in particular the fact that they might lack sufficient storage facilities and so would have to sell their surplus immediately, regardless of the state of the market – but it could still represent an opportunity for them as much as an unavoidable imperative.[67]

The second stage of distribution is transport. The picture here is of a great variety of different practices. As noted above, peasants generally moved their own produce. The elite might do the same, whether for redistribution or marketing purposes. They owned wagons, mules, and ships, and some invested resources (not necessarily their own: one magistrate was criticized for using state funds to build a quay near his own estate) in improving transport facilities near their landholdings.[68] Such developments might equally be intended to encourage merchants to visit the estate to buy produce. Some merchants owned their own ships, as can be seen when the same name appears on the anchor and the lids of the amphoras in the Dramont A shipwreck; the roles of *negotiator*, *mercator* and *naviculari*us could be combined, as seen in inscriptions from ports like Ostia.[69] Others hired contractors for overland transport and put their goods on board ships owned and managed by others, either hiring the whole vessel and its crew or contracting for the transport of their goods alongside those of other merchants.[70] A papyrus from the Fayyum, *P. Bingen* 77, is a fragment of a mid-second century register of the ships arriving at an Egyptian port (probably Alexandria): of nine cargoes listed, four belonged to the ship owner and five to someone else who had contracted his services. Inscriptions show that some ship owners concentrated on particular routes, just as many merchants specialized in particular goods or goods from particular regions; others, perhaps the majority but perhaps also less likely

[66] Young 2001: 23; e.g., *P.Vinob.* G 40822.
[67] On storage, de Neeve 1984b: 29–35; 1984a: 31–62, 130–42.
[68] *Dig.* 33.7.12.1; Livy 40.51.2; Potter 1979: 108.
[69] Paterson 1998: 160–1. [70] Martin 2002; Rathbone 2003.

to have become prosperous enough to afford epigraphic commemoration, continued the tradition of *cabotage* and short-haul tramping.[71]

The same papyrus offers some evidence of the size of Roman ships: of the eight ships for which the tonnage is listed, one was a local ship of 30 tonnes, five were seagoing vessels of 45 to 75 tonnes, one was of 210 tonnes and one, arrived from Ostia and so probably a grain transport, was of 375 tonnes.[72] Archaeological evidence and the requirements for ship owners contracted to the Roman supply (one ship of at least 330 tonnes or several of at least 65 tonnes) supports the idea that the majority of ships plying the Mediterranean were of medium size, mostly around 60 to 80 tonnes, not greatly different from those of previous centuries.[73] On routes which serviced large, dependable markets, however, especially the city of Rome, much larger vessels of 200 to 400 tonnes became relatively common. Ancient maritime technology was capable of constructing thousand-tonne monsters for special tasks (such as transporting an obelisk from Egypt), but these were clearly not economical for regular traffic.[74] The patchy ancient evidence for construction costs suggests that even a large ship cost no more than a modest agricultural estate in Italy, and a medium ship only HS 57,000 to 68,000, much less than the property qualification for municipal office; the typical shipowner was a man of only modest wealth and status, who might have sold a share in an estate or (if a slave or freedman) been set up in business by his master or patron.[75] Those who owned and managed mules or camel trains were doubtless of the same order of society, making a reasonable living but liable for significant costs if things went wrong: in Roman law, the contractor was held responsible if the cargo was lost through his fault, and there was no form of insurance in case of shipwreck.[76]

As noted above, landowners and merchants might own their own means of transport or rely on contractors. The one economic player that invariably relied on others to carry its produce was the state; there is no evidence of any state merchant fleet at any date. Papyri and other documentary evidence attest to the complexities of transporting stone from Mons Claudianus in Egypt, requisitioning camels and ships, and to the role of both requisition and civilian transport contractors in the supply of the army in Egypt and Britain.[77] Equally copious evidence covers the transport of the *annona* to Rome, and the range of incentives (privileges of citizenship, exemption from *munera* in the provinces) that were offered to encourage ship owners to enter into contracts with the state for the transport of its produce and to promote the building of new ships for the service of the emperor.[78] The attraction of some of these incentives is made clear by the laws issued to

[71] Harris 2000: 730; *CIL* XIV 409. [72] Rathbone 2003.
[73] Parker 1990: 341; *Dig.* 50.6.6.3, 50.5.3. [74] Plin. *HN* 16.201–2.
[75] Rathbone 2003; cf. Hopkins 1983a. [76] E.g. *Dig.* 14.2.6.
[77] Adams 2001; Mitchell 1976; *Tab. Vindol.* II 192, 218; *AE* 1956: 124. [78] Sirks 1991.

prevent people trying to claim them without having a sufficient portion of their fortune invested in shipping.[79]

This had enormous significance for all kinds of distribution in the Roman empire. The state effectively subsidized the cost and assumed part of the risk of transporting goods to many regions; there is no evidence that contractors were paid below market rates, and they could make additional profits by transporting private goods alongside their official cargoes (and occasionally attempting to claim tax exemption on such goods as well as on state supplies).[80] State demands for transport encouraged the building of more and larger ships, which could also be used for private enterprise.[81] The emperors also invested in the infrastructure, above all in developing the port facilities at the mouth of the Tiber.[82] All this created a more hospitable environment for the development of trade in the Mediterranean – but it should not be forgotten that the state's initial preference for contracting transport rather than building a merchant fleet presupposed the existence of suitable ships and navigational experience, if only those of the short-haul *caboteurs*.[83]

Finally, there came the distribution of goods to consumers. The smaller the city, the more likely it was that this process was simple and direct, transactions taking place in the market or in the specialized *macellum*.[84] Peasants continued to obtain goods above all through periodic markets, held in the local center or, on some large estates, set up locally by the landowner.[85] In a city like Rome the process could involve a succession of wholesalers (in areas like the Forum Vinarium), retailers, millers, and tavern owners, to say nothing of the complexities of the distribution and processing of *annona* grain.[86] Every additional stage involved extra costs; some could be passed on to the consumer, others would eat into the profits of the traders (note the Hadrianic law seeking to control fish prices in Attica by limiting the number of intermediate traders, to put an end to "shameful profit-seeking").[87] One explanation for the relatively low status of most traders in antiquity might be that the process of distribution was too fragmented, with too many intermediaries taking a share of the profits. The group which was involved in every stage of the process, profiting from production, trade, and the leasing of commercial properties, was the traditional landowning elite.[88] However, we should be wary of judging Roman distribution in terms of the absence of merchant princes and trading companies; for the high empire, the existing structures were clearly adequate for the purpose of keeping the army and cities regularly supplied. It is notable that the

[79] *Dig.* 50.6.6.8; Sirks 1991: 60–1. [80] *Dig.* 39.4.4.1; Mitchell 1976.
[81] Casson 1995: 171–2; Houston 1988. [82] Meiggs 1960; Rickman 1991.
[83] Paterson 1998: 157. [84] De Ruyt 1983; Frayn 1993: 12–55. [85] De Ligt 1993b.
[86] Van Berchem 1939; Rickman 1971; Kleberg 1957; La Torre 1988.
[87] *IG* II^2.1103; de Ligt 1993a: 214.
[88] On elite ownership of *tabernae*, Garnsey 1976 and Wallace-Hadrill 1991.

state was generally content to ensure Rome's supply through incentives to merchants and ship owners, rather than through the punitive regulation of traders, retailers, and millers that characterized many mediaeval and early modern cities with similar concerns about placating the hungry masses.[89]

III INSTITUTIONS

The same can be said of the institutional structures that supported distribution: the Romans lacked certain practices (limited companies, for example, and bills of exchange) that have sometimes been identified as prerequisites for the economic development of early modern Europe, but it is not clear that they lacked the commercial structures that they actually needed.[90] The money supply was more than adequate, supporting all levels of transactions: bronze and silver coinage circulated widely at regional level (and the expansion of the volume of silver coinage in the early empire suggests that more surplus production was becoming monetized), while the development of gold coinage and various forms of paper transactions (the transfer of debts, for example) made it easier to move significant sums of money between regions.[91] The evidence is inconclusive as to whether the state ever managed the money supply with the economy in mind, but whatever its motives the production of coinage certainly oiled the wheels of distribution.[92]

As far as the financing of trading ventures was concerned, the basic form of maritime loans had been established back in the fourth century BC.[93] A passage in the *Digest* provides evidence of development in this field during the Roman period. Money was lent to finance a voyage under the usual terms of *pecunia traiecticia* (the lender being liable in case of shipwreck, but therefore charging a much higher rate of interest), provided that the venture was completed within the "safe" sailing season; otherwise the borrower was liable to repay the whole loan and any expenses, regardless of whether the ship was wrecked.[94] It is impossible to say how common such an arrangement may have been, but its clear purpose is to reduce the risks involved for lenders by combining different sorts of loans in a single contract; such safeguards might have encouraged more people to become involved in financing trade as a profitable and not too risky investment.[95] Others may have followed Cato's example in lending money to *societates* of traders rather than risking all on a single venture.[96]

[89] Cf. Ringrose 1983; Kaplan 1984. [90] Harris 2000: 735, *contra* Finley 1985: 141.
[91] Duncan-Jones 1990: 30–47; 1994: 168–70; Howgego 1992; 1994; Hopkins 1995/6: 61–2.
[92] Lo Cascio 1981 and Chapter 23; Howgego 1992: 8–16.
[93] Andreau 1999; Sirks 2002a. [94] *Dig.* 45.1.122.1; Sirks 2002a.
[95] Cf. the notorious risk-aversion of many Roman texts; Cato, *Agr.* 1.1; Kehoe 1997.
[96] Plut. *Cat. Mai.* 21.6; Rathbone 2003.

The Murecine tablets from Pompeii show that some of the money was advanced by slaves or freedmen of the imperial household, and other members of the senatorial elite must similarly have been involved in lending money through intermediaries (though of course not every freedman was working on behalf of a patron).[97] There is little evidence for the existence of "merchant financiers" both operating and financing trade (the Sulpicii of Puteoli, who appear on the Murecine tablets, may be the exception). The financier in the Muziris papyrus, which records a maritime loan connected with a cargo from India valued at nearly seven million sesterces, closely monitored the enterprise through his agents but still preferred to leave the business to an independent merchant.[98] The vast sums of money that financed trade – ships were relatively affordable, but most cargoes were purchased using loans – remained largely in the hands of the landowning elite. Merchants regularly combined forces for particular ventures, but there is little sign of ongoing investment in commercial enterprises, which seem to have lasted at best for a few decades.[99]

There are more signs of significant development in the field of law.[100] The Roman state had long enforced standard weights and measures and played a part in settling disagreements in the marketplace, and the jurists developed increasingly elaborate and sophisticated guidelines to deal with the intricacies of exchange and contract, above all in the sale of wine.[101] Such measures might play a part in encouraging exchange through lowering transaction costs, as the state assumed the costs of policing and enforcing the contract. The jurists showed considerable ingenuity in adapting the precepts of Roman law to the sorts of problems that arose in the course of economic activity. It has been suggested that such regulations were developed with the intention of stimulating trade; but even if they are seen instead as reactive rather than proactive, as responses to the kinds of cases which magistrates had to deal with, this does imply that transactions were becoming more frequent and complex.[102] Of course, the elaboration of laws to cover every permutation of events created a problem of uneven access to specialist legal knowledge and associated costs; the compilers of Justinian's *Digest* themselves complained that earlier generations had rarely made use of the whole range of laws, either through lack of reference books or through ignorance.[103] As ever, we have evidence only for how the law was intended to work, not for its results; it is likely that extra-legal measures, such as traditional religious oaths and attempts at developing more personalized relationships between buyer and seller (as Pliny attempted to do in

[97] Andreau 1999: 71–9, 9–29; Crawford 1980; Casson 1989; Garnsey 1981. [98] *SB* XVIII 13167.
[99] Rougé 1966: 423–35; Andreau 1999: 50–7; Harris 2000: 734. [100] Johnston 1999: 77–111.
[101] Frier 1983a; Frayn 1993: 117–32. [102] Sirks 2002a: 136–7.
[103] See Chapter 5. *Dig. De Conf.* 17.

his scheme for compensating wine merchants who had lost money in their dealings with him), were equally important in promoting exchange.[104]

IV PATTERNS OF CHANGE

For the most part, the dynamics of distribution in the early Roman empire followed patterns which had become established under the Republic: the growth of the city of Rome, the expansion and defense of the empire, and the gradual urbanization of the provinces were made possible by and created the necessity for efficient distribution of different goods, underwritten by the purchasing power of state and elite. The rule of the emperors brought the benefits of peace, the unification of the Mediterranean and the development of the legal framework relating to commercial transactions, as well as new incentives to invest in shipping to transport goods on behalf of the state. In reducing some of the risks and subsidizing some of the costs associated with inter-regional distribution, the state had only its own interests in view, but its actions nevertheless created conditions conducive to the further development of market trade. The archaeological evidence – the number of shipwrecks, the sheer volume of goods distributed across the empire, the growth in the money supply – suggests that this period was the high water mark of commercial as well as state distribution.

However, the evidence also raises the question of why this growth was in the end so limited.[105] The numbers of shipwrecks from the period AD 1–200 are only slightly higher than those from the late Republic, and thereafter they decline rapidly. The fact that, as the distribution of amphoras and pottery shows, more goods were coming from Africa during this latter period, a region which is clearly under-represented in the shipwreck evidence, suggests only that the decline may have been less precipitous than it first appears.[106] There is no evidence of the sort of sustained year-on-year expansion of economic activity which is seen in the European economy from the early modern period. The economy of the Principate experienced some measure of growth (and one could argue that the establishment of Roman hegemony in the Mediterranean might have reduced the incidence of shipwreck in relation to the number of voyages and the volume of shipping), but the great expansion of activity had already taken place under the Republic.

This reflects above all the relative environmental uniformity of the Mediterranean, the absence of technological developments that might give a region a comparative advantage in the production of a particular good, and the limits on the expansion of demand. The stimulus of military and

[104] Rauh 1993: 129–50; Plin. *Ep*. 8.2.6–7; cf. Muldrew 1998.
[105] Saller 2002. [106] On African produce, Carandini 1983b.

urban demand in due course promoted the development of more localized production; goods which had of necessity been moved long distances in previous centuries could now be obtained more cheaply from nearby, and there were no alternative markets for the goods that had previously been exported other than local consumers. The most striking example is the development of wine production in Gaul, so that the region ceased to import Italian amphoras and began to export its own products to Rome (which could happily absorb them in addition to Italian supplies).[107] Similar patterns of local production replacing imports (and sometimes being exported in turn) can be seen in the pottery evidence from Gaul and Britain (where the disappearance of imported fine wares is taken as evidence of local self-sufficiency in grain production).[108] The frontiers became increasingly (if never completely) self-sufficient by the third century, and so one of the key drivers of inter-regional distribution declined in importance.[109] The cities of the empire could also rely on local production for a wider range of goods. The city of Rome continued to draw in goods from a vast area, but it ceased to expand, perhaps because the infrastructure (in particular the bottleneck of the Tiber) could not sustain a larger population.[110]

The patterns of distribution and the structures of inter-regional exchange in the Roman empire were not autonomous and self-supporting; they reflected the needs of the state and the elite. The emperors were concerned with supplying the army and the city of Rome, not with maintaining Italian agriculture and industry.[111] When it became clear that the incentives offered to ship owners to transport state goods were failing to attract enough contractors to ensure the reliable supply of Rome – something which may itself reflect the declining profitability of inter-regional trade – the state turned to compulsion, making the service of the *annona* a hereditary obligation by the fourth century.[112] More goods were included in the distributions, olive oil in the second century and wine and pork in the third, reflecting lack of faith in the reliability of market-driven supplies to the city as much as the emperors' need for popular support. Diocletian's Price Edict of the late third century, and the increasing reliance on requisitions in kind from the fourth century onwards, reveal a similar lack of faith that merchants can be trusted to further the state's interests.[113] When a single capital city became a less effective means of maintaining imperial power, the emperors had little hesitation in redirecting their expenditure to other centers like Arles, Milan, and Trier – each of which became, for a time, a significant center of demand, but far smaller than the concentrated demands of Rome

[107] Panella 1970; 1973; Hesnard 1980; Tchernia 1983; 1989; Carandini 1989b; Morley 1996: 135–7.
[108] Woolf 1997: 193–202; Fulford 1984.
[109] Wickham 1988: 191–2; Whittaker 1994: 103–4. [110] Rickman 1991.
[111] Cf. Tchernia 1986: 221–53 on Domitian's edict on vine-planting in the provinces.
[112] Sirks 1991; *Cod. Theod.* 13.5–7. [113] Williams 1985: 126–39.

and one that could be more easily satisfied from local sources. Similarly, as civic duty and benefactions became a less effective route to power in the later empire, the elite redirected their resources to their landed estates and to legacies to the church, regardless of the consequences for the urban centers.[114]

Effective distribution, whether inter-regional or local, organized through market incentives or directed through requisition and compulsion, underpinned the power of Rome and its ruling elite, and ensured the stability of the empire. It may also to some extent have undermined it. The elite profited greatly from the state's investment in maintaining the integrity and connectivity of the empire, through their involvement in both production and distribution, so that by the late empire elite power was restricting the ability of the state to raise taxes sufficiently to maintain that integrity and connectivity.[115] The economy of the Roman empire was integrated only to a limited degree. Goods moved between almost every part of the system, but the flows were clearly uneven; whereas in a more fully integrated "world economy" changes in one part of the system have an effect on every other part, in the Roman "world empire" events at local and even regional level might have little effect but changes in Rome or at the frontiers could shake the entire structure.[116] The degree of integration, of the movement of goods, people, and ideas, was sufficient, however, to promote the rapid spread of diseases (such as the Antonine plague) and potentially subversive ideas (such as Christianity). Connectivity had (and has) costs as well as benefits.

[114] Barnish 1989; Rich 1992. [115] MacMullen 1988: 122–97. [116] Woolf 1990; 1992.

CHAPTER 22

THE EARLY ROMAN EMPIRE: CONSUMPTION

WILLEM M. JONGMAN

I CONFUSING IMAGES

Mons Claudianus is a desolate quarry site in the mountains of the eastern Egyptian desert.[1] Dry, hot, and inhospitable, it looks like a settlement on Mars. It rains perhaps once a decade, but not in between. No one would ever choose to live there, if it were not for the grey stone (granodiorite) that was used in the grandest of Rome's imperial building projects. From the middle of the first century AD to the middle of the second century groups of workmen cut (mostly large) columns from the mountain face, and shaped them close to their final size – to reduce the travel weight as much as was practical. Then, these columns were moved to the Nile on huge carts, pulled by large numbers of animals, and perhaps also by even larger numbers of humans. From there they were largely or exclusively shipped to Rome. Those who worked on Mons Claudianus and the neighboring site of Mons Porphyrites were treated well, and like oil rig workers enjoyed a comparatively high standard of living, including a bath-house.[2] The last quarrying probably occurred in the reign of the emperor Severus Alexander (AD 222–35), after which the site appears to have been abandoned. When Diocletian wanted to celebrate his restoration of Roman power, it was precisely four reused or stockpiled columns of granodiorite from Mons Claudianus that he included in his baths in Rome and in his palace in Split.

Roman public buildings continue to impress even the modern visitor to Rome and other cities of the empire. Building on such scale and of such grandeur had not been seen before, and would not be seen for a long time. It included the use of exotic stone from all over the empire, often reserved exclusively for such imperial projects. Over a few centuries, Romans quarried more marble than any other civilization.[3] Aqueducts were a remarkable feat of Roman engineering, and supplied important cities with fresh water for drinking, but even more so for baths and fountains. The

[1] Peacock and Maxfield 1997; Maxfield and Peacock 2001.
[2] Van der Veen 1998. [3] Dodge 1991; Fant 1993; Jongste 1995.

expense was great and expressed the victory of Roman rule over an often arid nature.

Roman cities, however, were more than a few grand public buildings and the representation of imperial power. They were also a neatly ordered texture of well-built private houses. Wandering through the paved streets of Pompeii, the modern visitor cannot fail to be impressed by the great town houses.[4] They are significantly larger than almost any modern house. They are often stylish and architectural, with beautiful wall-paintings and mosaic floors adorning visually well-differentiated rooms. Low and high ceilings, the darkness of the more secluded rooms as opposed to the light of the atrium and even more of the peristyle – they added up to what surely were grand residences. All this impressed a young Michael Rostovtzeff so much that he would later write: "that as regards comfort, beauty, and hygiene, the cities of the Roman Empire, worthy successors of their Hellenistic parents, were not inferior to many a modern European and American town."[5] Outside the towns Roman villas, if well preserved, still impress by their size, construction, and finish, and by their luxurious beauty.[6] They often command a breathtaking view of the landscape so manifestly owned by their masters.

The Pompeian example, however, suggests that there may well be a darker side to the story, because there are precious few other houses apart from these mansions. Did all people live in such style? Were there no poor people? Of course there were: Roman households included many slaves and freedmen, and their presence as domestic and administrative servants was essential to the elite lifestyle. The absence of much separate lower-class housing only implies that there were few *independent* people of low status.

The best testimony to that darker side is provided by recent research on health and life expectancy (a long and healthy life is probably the ultimate scarce good).[7] Roman life expectancy was low. Great variation around the mean is a characteristic of such demographic regimes: some people get old, but many die young. Infectious disease is the big killer. Standards of hygiene were low and little understood.[8] Both geographically and socially Romans lived in quite close contact with each other, thanks to good communications, a high level of urbanization, and large elite households with numerous domestic slaves. Thus, rich Romans did not escape the Grim Reaper either.[9] The household of a senator, with many servants, a multitude of external contacts, and located in a city such as Rome was a dangerous place to live in. With the creation of a huge empire, the Romans had also created the first integrated disease regime of human history.

[4] Wallace-Hadrill 1994. [5] Rostovtzeff 1957: 143.
[6] Percival 1976; Carandini 1985 for the paradigmatic villa of modern historiography.
[7] See above, Chapter 3; Parkin 1992; Scheidel 2001b; 2001c.
[8] Scobie 1986; Scheidel 2003a. [9] Scheidel 1999.

All this serves to remind us that Roman society of the early empire presents a confusing and ambiguous image that we cannot easily situate in unidirectional accounts of European economic history. Clearly, public monuments in marble or other precious stone, military security, the urban food supply, roads, aqueducts and gladiatorial games testify to public consumption on a grand scale, and unsurpassed until modern times.[10] Compared to this, the Middle Ages were undoubtedly a period of decline. Private consumption by rich Romans was similarly exceptional.[11] On the other hand, the signs of poverty, misery, and destitution are no less obvious. Many inhabitants of the Roman empire only eked out a meager living, their skeletons grim testimonies to malnutrition and disease.[12] Health remained a scarce good, even for the rich.[13] How do we make sense of both grandeur and destitution?

II GROWTH, PAST AND PRESENT: SOME PROPOSITIONS

The purpose of all economic activity is to satisfy as many of our wants as possible.[14] That is not easy, because our wants often exceed the scarce means to satisfy them. The success of an economy, therefore, is measured by the extent to which this scarcity problem is overcome. Modern economies have become quite good at this. They are not only prosperous, but also increasingly prosperous. Thus, over a lifetime, many people have witnessed a tremendous rise in their prosperity. For the first time in history, moreover, prosperity has been shared by large parts of the population. In fact, prosperity increased even more than is suggested by rising incomes: technical advances introduced not only better made goods, but even goods that did not exist a generation before. Finally, national income grew even more than per capita income, because there were also ever more people. Thus, the modern western world not only experiences unprecedented levels of prosperity, but also unprecedented and sustained changes.

Such combined growth of population and per capita incomes has indeed been emblematic of modernity: in many countries it would only begin some time in the nineteenth century, during the Industrial Revolution.[15] From early Greece to the early modern Europe of the *ancien régime*, incomes had never been much more than three times subsistence, and often rather less.[16] If pre-industrial economies grew at all, it was only slowly and spasmodically. Analytically, the story of the successes and failures of the Roman economy to satisfy the needs and wants of the Roman population may be told along two different lines. The first is that of (changes in) per capita incomes. The second is that of income distribution. As a technical measure

[10] Adams and Laurence 2001; Laurence 1999. [11] Duncan Jones 1982: 343. [12] See below.
[13] See above, Chapters 2 and 3. [14] Robbins 1937. [15] Wrigley 1988. [16] Goldsmith 1987.

of the economy's performance, per capita income remains unsurpassed. Aggregate income is divided by the number of people in society. What was per capita income, and how much did it exceed the bare minimum of survival at subsistence? It indicates the maximum standard of living that could be enjoyed by many, if the cake was divided into equal parts. In pre-industrial societies that level was pretty low, because life was constrained by the niggardliness of nature and inadequate technologies.

As a measure of the real lives and experiences of the mass of the population per capita income leaves a lot to be desired, however: the cake was divided into very unequal parts. Analytically, that inequality originates from two distinct processes: changes in the functional distribution of income, and changes in entitlements. Let us first look at the functional distribution of income. Incomes are earned (and functionally distributed) because economic subjects contribute factors of production: land, labor, and capital. As for wages, not all labor is equally productive, and therefore wages vary. Socially even more important, however, is that not all people own land or capital. The Roman elite owned vast landed estates, and derived most of its income from those, rather than from working for a living. The functional distribution of income between factors of production may change over time, when the relative scarcity of factors of production and their productivities change. Changes in the land/labor ratio are crucial here.

Unlike modern economies, pre-industrial economies did not normally achieve both population growth and per capita income growth at the same time (and that is what real economic growth is about). Whenever their populations grew, labor productivity began to decline, and thus the incomes of the mass of the population. On the other hand, rents and elite incomes increased, and thus also social inequality. After a while, an epidemic might reverse this trend, and per capita incomes could recover. For many centuries, pre-industrial Europe oscillated between periods of expansion, with rising populations and deteriorating standards of living, and periods of contraction, with population decline and – sometimes – increasing prosperity.[17] Thus, economic changes were contained within a long-term envelope of stability. Population growth and increases in aggregate production and consumption were only possible at the expense of the standard of living of the mass of the population. Did the Romans escape from this Malthusian trap?

The functional distribution of income is not the sole source of social inequality, however. Inequality may also exist because people do not even receive what their productive contribution entitles them to in terms of market value. Slavery is the principal example here. The so-called second serfdom in eastern Europe is another case:[18] there, social and political

[17] Labor did not always profit from population decline.
[18] Brenner 1976; Aston and Philpin 1985.

conditions allowed the Junker class to deny labor a market rate that was high because labor was relatively scarce. Labor scarcity did not lead to a better standard of living for the mass of the population, but to increased oppression.

Thus social inequality matters for an understanding of the lives of many ordinary Romans. It matters for our understanding of the growth that did occur, because the wealth of the elite (often paraded by ancient historians as a sign of prosperity) may not have been a sign of a prospering economy after all, but instead of effective exploitation of the poor. Such income inequality also changes the pattern of consumption. What the poor bought differed from what the rich bought (the income elasticities of particular goods and services may vary enormously). Moreover, the poor had to spend almost all they earned, whereas the rich could save (what economists call the declining marginal propensity to consume).

III THE ARGUMENT

The National Income of the early Roman empire (i.e. per capita incomes multiplied by the number of inhabitants of the empire) was indubitably higher than for any pre-industrial European state up to the Industrial Revolution. That was primarily because Rome had such a large population: perhaps 60 to 70 million people in the early empire.[19] At the time, only China had a roughly similar population. Russia and the United States only reached comparable population numbers in the final quarter of the nineteenth century. If we follow the recent trend in scholarship to assume even larger figures for Roman population, the magnitude of Rome's GDP is even more staggering. Rome had such a large population because it had conquered a vast territory, and because it was densely populated. In many parts of the empire, population densities would not be surpassed until relatively recently. Were they higher because people were more prosperous?

Between them, per capita incomes and aggregate incomes reflect the productive success of the economy to satisfy demand. It is my contention that Roman National Income was indeed larger than that of any pre-industrial European state, and was only surpassed much later by then more populous empires such as pre-modern China. I also want to argue that for long periods Roman per capita incomes too were remarkably high for a pre-industrial economy. Rome may well have been what Wrigley has called an advanced organic economy, constrained by the Malthusian ceiling, but hugging it as closely as possible.[20] Roman material culture was far more advanced than anything that came before, and it remained unsurpassed for a long time after. For a while, I want to argue, this high standard

[19] See above, Chapter 3. [20] Wrigley 1988.

of material culture was even enjoyed by relatively large segments of the population. Here we have to add two qualifications, however. The first is that it did not continue to get ever better; on the contrary, it did not even last. Second, the benefits appear to have been increasingly unequally distributed. By the late empire, an ever smaller imperial elite controlled an ever larger share of the economy's surplus above subsistence. However impressive Roman economic achievement may seem it was not an aborted beginning of the modern world. In the late Republic and early empire, citizens were sufficiently empowered to claim their share of the pie. Even many ordinary citizens were moderately prosperous, and there were also many moderately wealthy people in between the masses of modest means and the rich but small political elite. Moreover, together they enjoyed the benefits of public expenditure on such things as roads, harbors, aqueducts, baths, market buildings, public distributions, and much more. In the late empire, all of this seems to change. We enter a bleaker world of greater social inequality, increased oppression, and the evaporation of civic solidarity.[21]

IV SUBSISTENCE AND SURPLUS

The first requirement for an economy is to provide enough subsistence for its population to survive. Analytically, therefore, subsistence is a useful baseline for pre-industrial societies that really lived dangerously close to this level. The economic and social achievements of such societies may usefully be measured by the extent to which they succeeded in providing the mass of their populations with a standard of living that exceeded bare subsistence.

The second intellectual advantage of the concept of subsistence is that we do not really need ancient sources to establish it with sufficient accuracy. Subsistence requirements ultimately depend on the biology of human survival.

Finally, precisely because it can be established with some accuracy, subsistence cost may be used as a unit of account for many other known costs: how many times minimum subsistence was the Younger Pliny's income – 10,000 times – or how many times subsistence for a year for one person was the construction cost of, for example, the Baths of Caracalla – about 500,000 times.[22] Roman prices are poorly known, but even harder to make sense of unless we have some fixed point to compare them with. Converting prices into weights of precious metal – a traditional way to compare prices over time and between monetary systems – is theoretical nonsense, as it measures the price of the metal, rather than of actual goods and

[21] Brown 2002 for a mesmerizing evocation of this new and bleaker world.

[22] For Pliny's income of some 10,000 times subsistence, see below. For the construction cost of the Baths of Caracalla (equal to subsistence for a year for about half a million people), see DeLaine 1997 and Jongman 2001b: 1080.

services.[23] Instead, the cost of subsistence food for one year may provide the pre-industrial historian's equivalent to the basket of consumer goods used by modern economists to construct a consumer price index. The best possible estimate of minimum subsistence cost, is, as I shall argue later, 115 sesterces. Comparing that figure to, for example, Pliny the Younger's estimated annual income of perhaps 1.2 million sesterces reveals much about Roman social structure.[24] Pliny's income was indeed well above subsistence. What we really want to know, of course, is to what extent this was also true of ordinary Roman citizens.

(a) *Subsistence as a base line*

In its simplest form subsistence may be equated with the calories necessary for the survival of an average person.[25] Thus, an adult male (age 30+) needs about 2,600 kilocalories per day to survive in decent health.[26] However, not all people are the same. Energy balance is the crucial concept here.[27] Humans use energy depending on who they are and what they do or have to suffer. As long as they do not expend more energy than they eat, all is well. If they do, their health and well-being are impaired. That shows in the incidence of various deficiency diseases and in their stature (badly fed and unhealthy people are notoriously shorter). In extreme cases, they may even die. Particularly important differences for food requirements are gender, age, and workload. Thus, men need more than women, adults need more than children or the elderly, and those who do hard physical labor in a cold climate need more than those who spend their warm days serving at the tables of the rich. Perhaps surprisingly, sick people also need more nutrients. Finally, stature itself is not only a function of nutrition, but in turn also affects how much one needs: tall people need more food. Thus, the question how much Romans needed is first of all a question about who they were.

It is here that high consumption estimates derived from literary sources are deceptive. Ancient sources are not only prescriptive, but they also refer to adult males. Roman life expectancy was low. Thus *average* subsistence needs could be low as well, given that high mortality created an age pyramid with a large base, and a narrow top. Thus, our estimate for subsistence requirements is sensitive to our assumptions about life expectancy and the age structure of the Roman population. Hopkins was the first to appreciate the complexities and subtleties of the problem: in the footsteps of the

[23] Baehrel 1961. [24] Duncan-Jones 1982: 17–32 for Pliny's finances.
[25] Clark and Haswell 1967 was the pioneering work.
[26] I note in passing that the calories of everyday language are in fact kilocalories. A twenty year old man even needs about 2,900 kilocalories.
[27] Fogel 1985.

Table 22.1 *Food requirements in kilocalories per day by age and gender**

Age	Men	Women
1	757	700
5	1323	1226
10	1984	1762
15	2700	2400
20	2903	2285
25	2683	2083
30	2683	2083
35	2600	2117
40	2600	2117
45	2600	2117
50	2600	2117
55	2600	2117
60	2600	2117
65	2200	1883
70	2200	1883

* Source: Van Laethem and Jongman forthcoming.

groundbreaking work of Clark and Haswell, he calculated an average subsistence requirement of 250 kg. wheat equivalent.[28] More recent research has failed to improve on this finding.[29]

Obviously, if there are many adults in a population, average food requirement is higher than when there are only few adults, but many children. A model life table with a life expectancy at birth of twenty five years (e_o = 25) provides the most plausible average for Roman society.[30] With it, we can calculate the relative proportion of the various age groups. The result is an estimated average daily requirement of about 2,000 kilocalories.

In real life, these calories were consumed in many different forms. They were consumed as bread, as wine, as olives and olive oil, as vegetables, or even as (quite expensive) meat. To estimate a base line of the cost of minimum subsistence, however, we need to calculate the cost of the cheapest calories: cereals. Thus, the average Roman's daily requirement of about 2,000 kilocalories is covered by the consumption of 250 kg. of wheat a year. The cost of this wheat varied greatly from time to time, and from place to place. A price of about 3 sesterces per *modius* appears to have been most typical in the early empire.[31] Thus, the minimum annual cost of average

[28] Hopkins 1978b: 66–7. [29] Van Laethem and Jongman forthcoming.

[30] See Chapter 3 for extended discussion. I have used the Model South life tables, as they take into account the impact of malaria, rather than the Model West tables (that do not actually refer to western Europe specifically, but are generalized tables); Sallares 2002 for malaria.

[31] Duncan-Jones 1982: 50–1; Jongman 1988a: 195 n. 2. The *modius* (*modius Italicus*) was a measure of capacity: 8.62 liters by our best reckoning. Specific gravity of wheat varies a bit, but just over 6.5 kg. per *modius* is about right: Duncan Jones 1982: 370–2.

subsistence may be estimated as 115 sesterces. Of course, this estimate of the cost of subsistence is no more than a rough indication – the margin of error is fairly wide. It is wide, however, because wheat prices are badly known and varied quite a bit, and not because we are unable accurately to estimate the underlying physical requirements.

(b) *Incomes*

Per capita incomes in any pre-industrial society were invariably low. The most authoritative estimate for the Roman empire puts them at about one and a half times subsistence, or at most two times.[32] That is a very pessimistic estimate. An alternative estimate, however, puts per capita incomes significantly higher, at roughly three times subsistence.[33] That higher estimate places Rome at the upper end of what could be achieved in pre-industrial economies, even if it is still very low by modern standards. The distribution of incomes also matters. We know that Roman society was characterized by vast social inequality. It really makes quite a difference if everyone had an income of twice subsistence, or, alternatively, if the mass of the population lived at subsistence while (almost) the entire surplus went to the state and a tiny elite. It makes a difference for the quality of life of the population, but it obviously also makes a difference for what this surplus was spent on.

The fortunes of Roman senators have been studied at some length, and with some success.[34] We have anecdotal evidence for the fortunes of some individual senators, as well as a base line for all senators in the form of the census minimum of 1 million (or more likely 1.2 million) *sestertii*.[35] Similarly knights (*equites*) had to own a minimum of 400,000 sesterces, and at least in some cities the town councilors (*decuriones*) had to reach a minimum of 100,000 sesterces.[36] Since returns on agricultural property were generally held to be about 6 percent, these property qualifications represented annual incomes of at least 72,000 sesterces for senators, 24,000 sesterces for knights and 6,000 sesterces for decurions. Thus, these minimum incomes for members of the political elite equalled 520 times, 208 times, and 52 times the notional minimum subsistence requirement for a year.[37] Clearly, even at these minimum rates, the political elite of the Roman empire was very rich. Many, moreover, owned and earned significantly more, and increasingly so.

[32] Hopkins 2002: 197–203.

[33] Goldsmith 1984. Kehoe (Chapter 20) prefers the lower estimates. Methodologically, Temin 2006 largely sides with Goldsmith, but is skeptical of some of Goldsmith's actual numbers. In particular, he argues that provincial wages and prices seem to have been lower than those from Italy and Rome that dominate in the estimates by Hopkins and Goldsmith. Thus, his nominal estimate for GNP is lower, but not the relative size of the surplus above subsistence, and that is what matters here.

[34] Duncan-Jones 1982: 17–32 for the most precise case study; also 343–4 for a survey.

[35] Talbert 1984: 10–11 for HS 1 million; Duncan-Jones 1982: 4 for HS 1.2 million.

[36] Mouritsen 1998 for nuances.

[37] Jongman 1988a: 196.

The Younger Pliny has been said to have been a middling senator of the late first and early second century AD, but his wealth has been estimated at 20 million, or over sixteen times the census minimum.[38] His annual income may thus be estimated at 1.2 million sesterces (i.e., 6 percent of 20 million sesterces), or about 10,000 times minimum subsistence. By all indications, late Roman senators were significantly richer still.[39]

Major public officials such as equestrian procurators earned substantial salaries. They were classified (from the late second century AD) by their incomes of 60,000, 100,000, 200,000, or 300,000 sesterces. Senior army officers (*primipili*) probably earned 60,000 sesterces. Working for a living may not have carried much social prestige, but at this level such prejudices had obviously evaporated.

Ordinary people had far lower incomes, of course. Wages for adult free males seem to have been in the range of 500 to 1,000 sesterces per annum, and base pay for a legionary soldier in Augustus' days was 900 sesterces.[40] Typical legionary pay has been estimated as 1,200–2,000 sesterces.[41] Three municipal scribes in the town of Urso earned salaries of 800–1,200 sesterces. Even if data on Roman wages are very incomplete, what the surviving data have in common is that these wages are obviously not only well above our best estimate of minimum subsistence for an adult male, but also seem to have provided an income that was significantly above subsistence for a family, particularly if a wife or a grown child also contributed.[42]

Further evidence for typical ordinary incomes is provided by the value of subsistence annuities as documented in legal sources.[43] These were small annuities left by will for the benefit of freedmen or foster children. The median of all documented examples (n=13) is 480 sesterces.

A different way to look at income above subsistence is to look at slave prices. It has rightly been argued that the price of a slave represents the income that the slave's owner can expect from not having to pay a market wage, but only minimum subsistence.[44] Slaves command a price precisely because they can be deprived of any surplus beyond subsistence. Thus, their price is a measure of the extent to which normal wages exceeded subsistence. If the price of slaves increased, as it did during the last two centuries of the Republic, this suggests strongly that the standard of living of non-slave labor improved. To judge from the Delphi manumission records, for an adult male slave the price of full freedom rose from about 3,500 kg.

[38] Duncan-Jones 1982: 17–32, and 343–4 for other data on the size of private fortunes.

[39] Hopkins 2002: 205–7 for annual incomes of 1,333–2,000 Roman pounds of gold.

[40] Goldsmith 1984: 269. Goldsmith 1987. I now recognize that my earlier review of his work was unduly skeptical: Jongman 1988c.

[41] Duncan-Jones 1982: 79. Roman soldiers clearly were a privileged group within society.

[42] Prosperity may have varied significantly during the family life-cycle.

[43] Frier 1993b.

[44] The classic economic analysis is Domar 1970. For more extended analysis of the Roman case, see Jongman forthcoming, b.

wheat equivalent in the first half of the second century BC to about 7,000 kg. of wheat equivalent in the last half of the first century BC.[45] These are clearly very considerable sums, and they suggest that normal wages were well above subsistence. If combined financing and depreciation charges amounted to something like 10 percent per annum, these numbers suggest that typical adult male workers' wages rose to some 700 kg. wheat equivalent per annum above minimum subsistence. The typical slave prices of one thousand to a few thousand sesterces in Italy under the Principate suggest something similar: 3,000 sesterces bought 6,500 kg. of wheat at the conventional wheat price of 3 sesterces per *modius*.[46] It is hard to imagine that anyone would have wanted to pay this much money for an ordinary slave if a wage laborer could charge little more than bare subsistence. The implied relevant wage is something like 500 sesterces.[47] In late antiquity, the trend seems to have been reversed (but the data are not nearly as good as the Delphi manumission records). In Diocletian's Price Edict the price of an ordinary slave has come down to 3,000 kg. of wheat, and if we believe Jones it came down even further in the subsequent period.[48] Thus, and for a while, slaves were attractive precisely because ordinary citizens were quite prosperous, and powerful enough to extract market prices for their labor. When citizens lost their power to withstand elite pressure, and when they could be exploited more easily, the value of slaves declined. Phrased in this way, this is, of course, Finley's classic model of ancient slavery.[49]

Given the many uncertainties in our evidence, and allowing for the imperfections of many markets, it is remarkable that these three estimations of the extent to which the incomes of ordinary citizens exceeded bare subsistence (documented wages, annuities, and slave prices) return such similar results. They all confirm that for many (though not slaves) standards of living were well above subsistence, at least for a while.

(c) *Diet*

The standard Mediterranean diet of the Roman population is supposed to have consisted mostly of cereals, supplemented by smallish amounts of oil, wine, and perhaps some vegetables, cheese and eggs, and occasionally a bit of meat.[50] Cereals were cheap calories, so their prominence would suggest a fairly low standard of living. Clearly, a diet of little more than cereals was deficient and thus unhealthy. On the other hand, a diet with all the extras

[45] From 405 drachmas to 827 drachmas: Hopkins 1978a: 161; ibid. 167 for a wheat price of 100 drachmas for 850 kg. wheat.

[46] Duncan-Jones 1982: 50–1; Jongman 1988a: 195.

[47] Subsistence cost would perhaps be 200 sesterces for a hard working adult male, plus 300 sesterces income above subsistence, here pocketed by the slave owner.

[48] Jones 1964: 448, 852. [49] Finley 1980. [50] Foxhall and Forbes 1982.

such as oil, vegetables, cheese, and meat was fine, even when these extras were far less abundant than in the modern diet. The question, therefore, is if the diet of the masses went much beyond cereals, and whether that could be sufficient to secure a basic minimum of quality as well as quantity.

Bread wheat was the most popular kind of cereals.[51] It could be used to bake leavened bread, rather than the porridge and unleavened bread made of barley or harder wheat. Bread wheat is a dangerous crop to grow, however, as of all Mediterranean cereals it is most susceptible to drought, that perennial curse of Mediterranean agriculture.[52] Therefore, leavened bread could only be enjoyed in favorable circumstances: it was not before Rome had consolidated its hold over Sicily that bread rather than porridge could become the staple food of citizens of Rome.[53] It was the taste of empire.

It is quite widely assumed in the scholarly literature that Romans drank a lot of wine.[54] An annual consumption figure of about 100 liters is often mentioned as an average for the population at large.[55] Since children did not drink wine, this works out at something like a modern bottle per day for adults, a serious but possible quantity. It is also of the same order of magnitude as documented consumption in other pre-industrial wine drinking societies. Higher estimates have been proposed, but they are mostly based on consumption by adult males, and do not adjust for the presence of women and children.[56] The caloric contribution of 100 liters of (sweet white) wine would be 165,000 kilocalories, or almost a quarter of annual caloric intake.[57] Since children did not really drink at all, the proportion would be even higher for adults. That may have been enjoyable, but it was certainly not healthy.

The olive is another often mentioned classic part of the Roman diet. Olive oil was used for many purposes, but one of them was in food. There seems to be a consensus that Romans consumed something in the order of magnitude of 20 liters per annum per head of the population.[58] If that is indeed a good estimate, it amounts to 162,000 kilocalories, or again, just under a quarter of energy requirements. The good thing about olive oil, however, is that it contributes more than just energy. It also makes up for some deficiencies of a cereal-dominated diet.[59]

[51] Rickman 1980: 3–7 for a survey. [52] Jongman 1988a; Le Houerou 1977.

[53] Jongman 1988a: 82. [54] Tchernia 1986.

[55] Jongman 1988a for a survey. [56] Purcell 1985.

[57] I have chosen sweet white wine because that is what Romans seem to have preferred. Red and dry white wines contained far fewer calories.

[58] It is worth mentioning, however, that this estimate is pretty insecure, and is not constrained by obvious biological limits.

[59] Apart from olive oil, we must also consider olives that were not pressed but eaten as fruit. They have been curiously neglected in the literature, probably because they are less archaeologically visible, and because they were probably more for local consumption than for trade. They may not have kept

We can see that the common view that the Roman diet largely consisted of cereals is incompatible with prevailing estimates of oil and wine consumption. That is all the more interesting as both wine and oil can be produced in large quantities on small plots. For both of them the calorie yield per hectare was about five times higher than for wheat in a two-field system.[60] Therefore, they were not only attractive (and quite expensive) food, but could also support high population densities when necessary. That is important because it has often been argued that some of the higher estimates for the size of Italy's population are impossible because the land could not have fed so many people. If half the calories in the diet came from wine and oil, and only another half from cereals, Italy could have supported a population of some 15–20 million people (what actually happened is, of course, a different matter).[61]

As with wine and oil, meat contributed to a better diet: it was both tasty and healthy. It was also expensive, however, so its consumption not only presupposes a preference for meat, but also the necessary purchasing power. Meat consumption is, therefore, a useful indicator of what we may call intermediate prosperity. It was too expensive for those living at bare subsistence, but a likely thing to spend money on if one lived somewhat above subsistence. Equally, it was not something one could or would consume ever more of: it is unlikely that the very rich consumed more of it than those who were merely rich. Therefore, changes in meat consumption are a useful indicator of the extent to which significant numbers of quite ordinary people attained standards of living above bare subsistence. Meat was expensive because, unlike wine and oil, its production usually requires the use of large amounts of land, involving as it does the wasteful conversion of plant calories into animals. That applied more to some animals than to others, but by and large in most pre-industrial societies an increased demand for food as a result of population pressure caused a reduction in the meat component of the diet. Rome was densely populated, so were Romans vegetarians?

As I argue in more detail below, Roman meat consumption rose dramatically from the late Republic onward. Meat, and pork in particular, became an acknowledged ingredient of the Roman diet, perhaps particularly in the

as well as olive oil, and they may have been more expensive to transport, but they also retained all their calories and nutrients. Moreover, just eating them as they were saved work and the need for an expensive press. Thus, we may expect peasants to eat their own olives, rather than, or in addition to, oil.

[60] A net yield of 250 kg. of wheat per hectare in a two-field system (i.e., 500 kg. every other year) contained 720,000 kilocalories. A yield of 2,000 liters of sweet wine per hectare contained 3,300,000 kilocalories, while 400 kg./440 liters of olive oil per hectare contained 3,402,000 kilocalories. For yield figures: Jongman 2003a: 112–16. Van Laethem and Jongman forthcoming for caloric content.

[61] Roman Italy had probably about 100,000 km^2 of agriculturally used land: Jongman 1988a: 67.

cities in densely populated western Central Italy.[62] That preference for pork may not be quite so unexpected: compared to cattle or even sheep/goats, pigs compete far less with humans for scarce resources. They could be fed on waste, and kept at urban sites. Pork consumption may have been the prosperous Roman alternative to the largely vegetarian diet of many societies with high population densities. Once pork had obtained this significant position, "Romanization" would facilitate the spread of pork consumption to other parts of the empire and to its cities in particular.[63]

Roman diet varied far beyond mere staples such as cereals. The caloric contributions of wine and oil were significant, and allowed for a more attractive and partly healthier, but also partly unhealthier (i.e., alcohol-rich) diet. The substantial contribution of oil and wine also permitted a far greater production of calories per hectare than was possible with cereals alone. But they were expensive calories, because these were labor- and capital-intensive crops. Meat consumption seems to have reached a level where it made a meaningful contribution to the diet of quite a few people. As we shall see later, it even increased dramatically in the late Republic and early empire. Although meat's heavy demands on land rendered it expensive, enough people were able to afford it.

(d) *Public support*

The later inclusion of oil, pork, and cheap wine in the public distributions to citizens in Rome likewise suggests that variety was not exceptional in the popular diet.[64] It is unlikely that emperors would have provided these goods if they had not constituted a common element of the diet of a significant proportion of the urban population. This largesse may have ensured a steady supply of what was otherwise less reliably available to most metropolitan consumers.

Public subsistence support was indeed one of the salient features of Roman life. The distribution of *frumentum publicum*, "public wheat," to the populace of the city of Rome was a remarkable achievement, and so were other forms of support such as occasional cash donations in the city of Rome (*congiaria*), *alimenta* (cash benefits to children) in Italy, and to

[62] MacKinnon 2004 for a very recent survey.

[63] King 1999. Roman meat consumption differed significantly between, roughly, the eastern and southern parts of the Mediterranean on the one hand, and the western and northern parts on the other. In the east and south, mutton and goat meat prevailed. In the north and west it was beef. Even in Italy, the difference between north and south is remarkable. By and large, people ate what their land could produce best. Interestingly, however, it was neither cattle nor sheep and goats that dominated western Central Italy, but pigs. The same was true of other highly "Romanized" and urbanized parts of the empire. King explains this by the Roman preference for pork, and the spread of this taste as part of acculturation. The provincial taste for pork may indeed be culturally determined, but its popularity in western Central Italy is likely to have been a function of high population density.

[64] Pavis D'Escurac 1976: 188–201.

a probably lesser extent elsewhere in the empire.[65] The *frumentationes* in Rome were generous indeed: from the late Republic they provided for the free distribution of about 33kg. of wheat per month to each of 200,000 adult male citizens.[66] Such rations were well in excess of the needs of a single recipient.[67] Giving too much to adult male citizens, and nothing to the others, was both administratively easier, and underscored the adult male's central position in Roman society and culture. *Frumentationes* and *alimenta* thus provided vital subsistence support for the whole family, meanwhile underwriting the urban population's power to purchase quality food such as wine, oil, vegetables, poultry, and meat.[68] They also provided powerful rituals of social and political inclusion. Each month, on their assigned day, men in Rome had to collect their ration at one of the forty-five *ostia* at the so-called *Porticus Minucia*, a building specially constructed for the purpose. They had to wait in line to receive their wheat, after their names had been checked from the lists of all those who were entitled to receive their ration on that particular day, and at that particular *ostium*. Once, when elections were still being held, citizens had queued up to vote; now they queued up to receive their free grain, grateful to their emperor. Each day, moreover, almost 7,000 men could be seen walking through the city, lugging home their 33kg. of *frumentum publicum*.

(e) *Variability and famine*

This brings us to the issue of the stability and predictability of the food supply. It is no good to be well fed nine years out of ten, but to starve to death in the tenth. Mediterranean harvests are notoriously variable and unpredictable.[69] Drought could ruin a harvest, and two successive years of drought could mean a famine. City-dwellers were particularly vulnerable. They had less access to alternative emergency food, and they suffered most from price fluctuations. The low price elasticities of both supply and demand for staple food mean that even small reductions in output created dramatic price rises.[70] Peasants were buffered from this because they were not only consumers (of their own crops), but also producers. What they lost, so to speak, as consumers, they gained as producers. As for the food supply of the (larger) cities, public intervention was necessary for both political and economic reasons. Emperors and local magistrates did not shy away

[65] Jongman 2000a; Jongman and Dekker 1989; Jongman 2002.

[66] This number was not quite fixed, and varied under the opposing pressures of popular demand and public resistance. Jongman 1997 for a recent survey.

[67] The *frumentationes* thus provided 80,000 tons of wheat. At a mean subsistence level of 250 kg. wheat, this represented bare subsistence for 360,000 people, or 50 percent of requirements for a free population of 720,000 people. Hopkins 1978a: 96–8 and Jongman 2001a for a discussion of the population of the city of Rome.

[68] Jongman 2001c for other food. [69] Garnsey 1988; Hopkins 1983a. [70] Jongman 2000a.

from their responsibilities, and when they did, they were in trouble.[71] The exceptional level of Roman urbanization was underwritten by systematic public intervention in the urban food supply.[72]

(f) *Biological standard of living*

Stature is no doubt the best generalized indicator of nutritional status. When children are better fed, they also grow better. Comparative evidence shows that stature is an excellent proxy variable for per capita income.[73] Interestingly, this not only applies at levels of per capita income near subsistence, but also at the levels of prosperity which prevail in the modern developed world: new generations are still getting taller all the time. Research has shown that the quantity and quality of the food intake of young people are of great importance, as is the nutritional status of the mother during pregnancy. Pregnancy increases the demands on the mother's nutritional status. Moreover, unhealthy dietary habits such as alcohol abuse during pregnancy can easily negate the benefits even of ample nutrition. Misconceived feeding habits may also endanger the health and thus the stature of children. An example would be the Roman habit of weaning children from a dangerously early age.[74] Thus, even the children of historic elites may have been short by modern standards. They also suffered the same exposure to infectious diseases, a major contributor to malnutrition and stunted growth.

Unlike modern historians who have been interested in stature for decades and collected a substantial body of evidence, Roman historians and archaeologists have only just begun to show an interest in this supreme indicator of welfare.[75] Clearly, many Romans were short by modern standards – that is not surprising. They may have been more prosperous than some of their ancestors or descendants, but they did not escape the constraints of life in a pre-industrial society, with a low standard of living by modern standards, periodic shortages of food, a dangerous disease regime, medical ignorance, and great social inequality. Yet it would also seem that they were at least sometimes at the upper end of what was current in pre-industrial European history.[76] Koepke notes, for example, that Roman stature in parts of Germany (169.4 cm. for men and 158.5 cm. for women) was higher than in the nineteenth century. Current research by Klein Goldewijk and Jongman suggests that the Romans of the early empire were very tall indeed, but also that average heights dropped from the late second century AD onwards.[77] Similarly, of the skeletons discovered on the

[71] Virlouvet 1985. [72] Jongman and Dekker 1989.
[73] Komlos 1996; Steckel and Rose 2002; Fogel 2004; Komlos and Baten 2004.
[74] Garnsey 1999: 106–7. [75] Garnsey 1999: 57–60 and Kron 2005 for recent surveys.
[76] Kron 2005. [77] Koepke 2002; Klein Goldewijk and Jongman forthcoming.

shoreline of Herculaneum, males measured on average 169 cm., and females 155 cm., a figure only achieved in England in the eighteenth century.[78] By the standards of modern well-fed and healthy populations, these people were short, but they were not in comparison to other pre-industrial populations. Even the people of Naples in the 1960s were shorter.

The discovery in 1982 of numerous skeletons on the shoreline at Herculaneum was a gruesome reminder of the horrors and suffering inflicted by the eruption of Mt. Vesuvius. Sheltering on the beach and in the arched chambers in the city wall along the waterfront, many inhabitants of the town had discovered that they could not escape the horrors of the eruption. So they huddled together, their backs to the lethal heat of the pyroclastic surge. We can learn a lot from their remains: Bisel studied the first 139 of these Herculaneans, and many more will probably be found.[79] Precisely because of the gruesome circumstances of their death, they also represent a unique cross section of a living ancient population.

Bone mineral analysis provides some interesting results. Zinc levels were low, and site-corrected strontium calcium levels were on the high side compared to modern Americans. Between them, these figures suggest that ancient Herculaneans ate more seafood and consumed more vegetable protein than modern Americans, but considerably less red meat.[80] That may have made them (the women especially) vulnerable to anaemia, and thus to various infectious diseases. That, or endemic malaria, may also have been responsible for the high levels of hypoplastic lines in dental enamel.[81] Skeletal development showed not only comparatively tall people, but also only limited signs of bone flattening and other signs of malnutrition.[82]

What these skeletons also show, however, is the great variety of health experiences which hides behind the various statistical averages. Compare, for example, the tall (172.4 cm.) and relatively well-nourished man in his forties known as Erc 86, with the wretched man of similar age Erc 27, but considerably smaller stature (163.5 cm.). The former had a well-trained and athletic body, but showed no signs of over-exertion or stress. He probably used his hands only moderately, and was likely to have had somebody else to do his writing for him.[83] The latter had flattish bones and pelvis, indicating prolonged periods of malnutrition. He also had large deltoid crests suggesting hard labor. Finally, he suffered from bad teeth and from what Bisel has diagnosed as Forestier's disease, an ankylosing hyperostosis of the spine.[84] Finally, there is the moving story of what appears to be a

[78] Bisel and Bisel 2002. See also Sigurdsson and Carey 2002 for a reconstruction of the eruption of Vesuvius and the circumstances of the deaths of these unfortunate people.

[79] Pagano 1999; Mastrolorenzo et al. 2001. [80] Bisel and Bisel 2002: 458.

[81] Sallares 2002 for extended discussion of malaria. [82] Bisel and Bisel 2002: 455–6.

[83] Bisel and Bisel 2002: 460–1. [84] Bisel and Bisel 2002: 468–9.

slave girl with her master's baby in her arms.[85] The baby had some pieces of jewelry, but the body of the fourteen year old girl tells a different story. There are deep grooves of hypoplasia in the enamel of her teeth, from when she had been roughly eleven months old. She must have been starved, or perhaps more likely, extremely ill at that age.

Late antique stature seems to have declined (but is still poorly known). Valentinian decreed in AD 367 that army recruits in Italy should be at least 165 cm. tall.[86] As Garnsey rightly argues, that must have represented the top of the range. Most men were probably shorter. For Germany, Koepke's data show a distinct reduction in stature in the later empire.[87]

(g) *Other goods and services*

Man does not live by food alone, even if life is impossible without it. Indeed, the consumption of other goods and services above and beyond food is one of the best indicators of a standard of living above subsistence (their income elasticity is relatively high). Transactions were facilitated by a high level of monetization of the economy, and the ample availability of coinage. Indeed, it would appear that the money stock was larger, relative to GDP, than in any other period of European pre-industrial history.[88] Roman coins were also well made. Such use of metal is also clearly documented elsewhere. Iron locks, hinges, and many other kinds of metal fittings were common in Roman building practice. Building a Roman legionary fortress involved a huge quantity of iron nails: at the briefly used Roman fortress of Inchtuthil in Scotland a stock of 12 tonnes of iron nails was left behind when the fortress was abandoned.[89] Its construction had involved at least 1.5 million iron nails of an approximate weight of 6.5 tonnes. These are massive quantities. The abundance of iron implements on farms is similarly striking, and so is the presence of metal vessels and knives in the kitchen. Roman surgeons had refined instruments, and Roman women employed metal utensils for cosmetic use. No Roman site is complete without large numbers of *fibulae*.

That brings us to dress. In most pre-industrial economies, the production and consumption of clothing is the most important non-agrarian economic activity after building. Archaeologically, however, textiles do not survive as well as pottery, metals, or buildings. Therefore, actual consumption levels remain elusive. It is striking, however, that textiles appear to have been manufactured in just about every town or village for which we have decent written or material data.[90] Agricultural slaves and peasants may well have

[85] Bisel and Bisel 2002: 464–5. [86] Garnsey 1999: 59.
[87] Koepke 2002. [88] Jongman 2003b.
[89] Shirley 2000: 169 for the hoard, 83 and 85 for requirements in construction of the fortress.
[90] Jongman 2000b.

worn rags (apart from coarse clothes), but domestic slaves and modest but not impoverished citizens seem to have owned new garments of some quality. The rich had access to a wide variety of exquisite clothing.

Finally, services. These represent an increasing part of modern economic activity, but it is often forgotten that they were also prominent in pre-industrial society. Without dishwashers, vacuum cleaners, or washing machines, domestic work is a heavy chore, and avoided as much as possible by anyone of any wealth. In modern western society, live-in domestic staff have almost disappeared, but until a century ago they were a common sight in middle class families, and accounted for a significant proportion of the working population.

With the growth of their empire, Romans of the later Republic had adopted a grand lifestyle that required many domestics. They were necessary to guard the door, clean the house, serve at the table, help with getting dressed, or write or read aloud the correspondence or the poetry that had become such a defining part of elite life style. When in a late antique exercise book, a little boy goes to school accompanied by his personal slave, it is only pretty late in the story that the presence of yet another slave is revealed: the slave who carries the writing kit.[91] Slaves were everywhere in elite households, but also in the households of those who were just well-to-do, but not quite as rich, respectable or prominent as to be a member of one of the *ordines*. These slaves were there to help with menial tasks, or just to add to their owners' prestige by their number. When the urban prefect Pedanius Secundus was murdered in his house, the Senate discussed whether custom had indeed to be followed, and all slaves in his house killed. Said to number 400, they were indeed all killed (Tac. *Ann.* 14.42–5). Roman cities were not only home to the Roman elite, but also to many slaves and freedmen and freedwomen.[92]

Consumption was not limited to private individuals. The state and local authorities generated significant demand. For the state, military services were probably the largest budget item: the cost of the army has been estimated at 450 (+/− 50) million sesterces in the early Principate.[93] The quantity and quality of public services and facilities was perhaps the biggest benefit for large sections of the population. We have already noted the distributions of food and money in Rome, but also in other cities. Roman public architecture remains one of Rome's lasting contributions to western civilization; much of it still stands as testimony to the quality of its construction. Paved roads do make life more comfortable than muddy tracks. Good harbors and roads facilitate transport of soldiers, but also of civilians. Public building was of practical importance, but (or therefore?) also an important part of the political dialogue between emperors, local elites, and

[91] Dionisotti 1982. [92] Jongman 2003a. [93] Hopkins 2002: 199; and below, Chapter 23.

ordinary citizens, or between Roman and indigenous culture. Roman levels of provision would not be matched for many centuries (and construction was sometimes a good way to put soldiers to work). The *aqua Marcia*, the first large aqueduct for the city of Rome, built around 144 BC, had already cost a reported 180 million sesterces; later aqueducts were even more expensive.[94] In many towns the Roman aqueducts remained the only means of water supply for another thousand years or more. They provided drinking water, but also water for fountains and baths, and were thus symbols of imperial victory over an often arid nature. Roman baths may have been pools of infections, but they were obviously much in demand. Their construction was expensive: it has recently been calculated that the Baths of Caracalla cost the equivalent of 120,000–140,000 tonnes of wheat to build; enough, therefore, to feed about half a million people at subsistence for a year.[95] Running them was also expensive. We only need to think of all the firewood, and the labor that was required to keep the fires burning. Similarly, Roman games may not be to our taste, but it cannot be denied that they were very popular. Finally, Rome guaranteed a measure of public order and safety that was probably more appreciated than hated. The aggregate expenditure of the Roman state allowed for unprecedented public facilities that would not be matched for a long time.

Unlike the cost of military expenditure (400–500 million sesterces), the aggregate size of other public expenditure is not really known, even if the best estimates seem to converge at a total for early imperial public expenditure (military and other) of some 700–900 million sesterces.[96] That is a low proportion of GDP, and all the lower if GDP was higher.[97] That is about the same as our best estimate of minimum elite income (800 million sesterces) if no member of the elite owned more than the census minimum.[98] In reality, therefore, elite income and expenditure were probably several times higher than state income and expenditure – and increasingly so with the growth of private fortunes in the later empire.

(h) *Change*

Much recent ancient economic history describes static structures, by focusing on the nature of "the" ancient economy. The narrative of change is left to historians of politics, and when economic changes occur, they are

[94] Aqueducts have drawn a lot of scholarly attention in recent years: Hodge 1992 is the modern standard work. See also De Kleijn 2001.

[95] Delaine 1997. [96] Hopkins 2002: 201. Cf. below, Chapter 23.

[97] For Hopkins 2002 this speaks against high estimates for per capita incomes. However, civilian public expenditure might have been larger than Hopkins estimated – the Roman state did rather more than many states in later pre-industrial Europe.

[98] Jongman in press.

often linked to the *histoire événementielle* of political life.[99] What we need, however, is a proper economic history of economic change. Such histories are usually constructed on two levels. The first of those is the narrative of victory over the Malthusian ceiling, and the emergence of the modern economy. Some histories of economic change in antiquity indeed try to connect to that grand theme. The problem is, of course, that modern economic historians increasingly emphasize the essentially discontinuous nature of the growth of the modern economy.[100] The second level is that of the narrative of the seesaw between population and prosperity below that Malthusian ceiling (see above): trends in population and standard of living usually moved in opposite directions. The problem for ancient historians is that the history of late Republican and imperial Rome does not fit this standard mediaeval and early-modern model.

It has become increasingly obvious in recent years that the Roman economy did indeed experience major periods of expansion and contraction. The expansion of Roman rule had increased the population in many parts of the empire. Even in Italy, population probably continued to grow for some time. That trend was reversed sometime in the second or third century, probably as a result of the Antonine Plague (from about AD 165).[101] In the early Principate, many parts of the empire reached unprecedented population densities. Did Roman standard of living decline during the late Republic and early empire, to improve again in the later empire?

The construction of time series of the archaeological traces of economic activity has permitted real advances (literary sources abound in litanies of decline, and are rather useless[102]). Thus, Hopkins' famed graph of dated shipwrecks from the Mediterranean suggested that "in the period of Roman imperial expansion and in the High Empire (200 BC–AD 200), there was more sea-borne trade in the Mediterranean than ever before, and more than there was for the next thousand years."[103] Similarly, deposits of lead and other metals in the Greenland ice-core indicate unprecedented levels of metal extraction that came to an abrupt end in the late second century AD, to be surpassed again only in the nineteenth century.[104] These series trace broad trends in trade and manufacturing that far exceeded the likely magnitude of changes in population: for a while, the per capita volume of maritime trade and metal extraction was greater than it had been and would be for many centuries.

Regarding the direct measurement of trends in consumption, what we really want to see is evidence of improvements in the consumption of goods and services above and beyond bare subsistence by significant numbers of

[99] Jongman 2003a. [100] Wrigley 1988; Jongman 2003c: 318–21.
[101] Duncan-Jones 1996; Jongman 2006. [102] Jongman 2003a: 120–1 for some comments.
[103] Hopkins 1980: 105–6. See above, Chapter 21. [104] Wilson 2002; Jongman 2006.

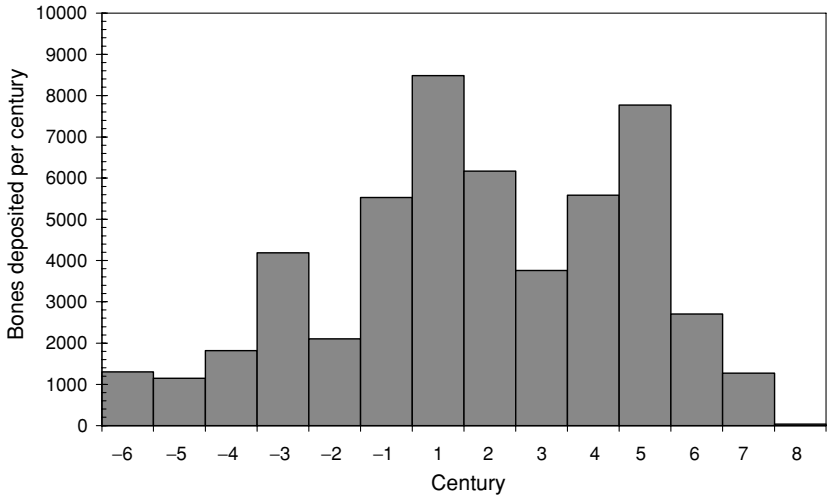


Figure 22.1 Mammal bones per century in Italy

ordinary people. A good example is the improvement in the diet offered by the introduction and increasing consumption of a wide range of new fruits and vegetables in north-western Europe in the wake of the Roman conquest.[105] Therefore, cereals are not a good indicator, since a decline in grain consumption might imply an increased standard of living (in that people ate less basic food instead).[106] Similarly, an increase in the consumption of expensive luxuries might indicate either a broad increase in prosperity or an intensification of social inequality. Therefore, we need to look at goods that are too expensive for the very poor, attractive and potentially affordable for those who lived somewhat above subsistence, but not something the very rich could consume in huge quantities. Meat is a suitable indicator of intermediate prosperity.

Interestingly, the trend in meat consumption resembles those in the distribution of dated shipwrecks and metal pollution. Over the past few decades, animal bones from Roman sites have been studied with increasing care, and site reports include them in far greater detail than before. Synthetic studies have also begun to appear.[107] This allows me to present graphs of Roman mammal bone deposition over many centuries of Roman history, based on a database constructed and published by King (Figs. 22.1–22.2).[108] While these deposits do not represent actual meat consumption,

[105] Bakels and Jacomet 2003. Much (though certainly not all) of this improvement in the diet disappeared again with the evaporation of Roman power in late antiquity.

[106] In economic theory goods with such negative income elasticities are called inferior goods.

[107] King 1999; MacKinnon 2004; Jongman forthcoming, a.

[108] King 1999, plus the earlier datasets quoted in the same article.

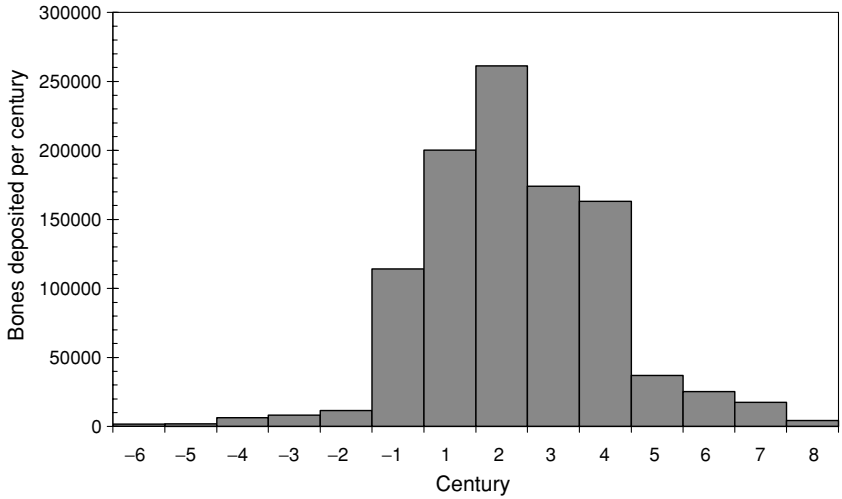


Figure 22.2 Mammal bones per century in the provinces of the Roman empire

these pigs, sheep, goats, and oxen were animals that regularly provided Romans with meat. Pigs in particular were kept for that purpose alone. Many animals seem to have been slaughtered at quite an early age, which indicates that they were primarily bred and kept for their meat.[109] The bone evidence suggests that meat consumption rose dramatically during the late Republic, to reach a peak in the early empire. That trend is even stronger when we superimpose changes in the size of Roman livestock.[110] Romanization resulted in the introduction of significantly larger livestock, with perhaps twice as much meat per animal. When Roman rule collapsed, these large animals rapidly disappeared again. Even Roman chickens were significantly larger than what came before or after. The observed rise in meat consumption seems to coincide with the growth of empire. It first occurred in Italy, especially for pork that was consumed in towns. In the provinces, meat consumption grew later, roughly coinciding with the beginnings of Roman rule. Almost everywhere, decline set in in the second century AD, and seems most pronounced in Italy and more generally in urban contexts. Subsequent recovery remained unimpressive. Italy is an exception: it recovered remarkably well, and maintained high levels of meat consumption well into and even after late antiquity. Was that a coincidence?

Finally, we may look at trends in state and elite spending for the benefit of larger sections of the population. Roman cities were the recipients of aqueducts, roads, buildings, statues, public banquets, alimentary

[109] Kron 2002: 60–1. [110] Kron 2002; Durand and Leveau 2004: 216–17.

schemes, games, and much else, donated by emperors, city authorities, and, most often, members of the elite of municipal office-holders. The expense involved was considerable, and undoubtedly reflects a measure of economic success. It also reflects a political preference, as it underscores and celebrates both state and elite power, and acknowledges the importance of Roman citizenship. The chronology of these outlays may thus reflect both the vicissitudes of the economy, and the value of citizenship, urbanity, and civic life.

Public building has been studied in great detail for Roman Italy and North Africa.[111] The chronology is striking. In Italy, the later republican and particularly the early imperial periods show a dramatic peak, followed by a sharp reduction in the reign of Marcus Aurelius, in the wake of the Antonine Plague.[112] Particularly striking is the apparent hiatus of some three decades in any imperially funded public construction in the period from AD 160 to 190. This was followed by some recovery in the Severan period, and mostly further decline thereafter. In North Africa, the peak in public building occurred later, and Severan efforts were particularly notable in scale. In that region, too, public building stagnated thereafter.[113] Similar patterns may be found in elite munificence in Roman Asia Minor.[114] In a large dataset of elite benefactions from that province compiled by Arjan Zuiderhoek, almost two thirds of all cases are dated to the second century AD.

(i) *Inequality and entitlement*

The better standard of living of at least part of the Roman population reminds us that standards of living do not simply depend on the performance of the economy at large, but also on the rules of entitlement to its benefits. If per capita incomes were, for example, twice subsistence, it obviously makes a big difference if this surplus was more or less equally shared, or if it was monopolized by a tiny minority. In the latter scenario, the vast majority of the Roman population may still have lived at or near minimum subsistence, even if average incomes were well above subsistence. However, many ordinary people were apparently able to afford new clothes, nice oil lamps, some tableware, glass, or personal apparel. Roman domestic material culture was impressive and was enjoyed in bulk, as a visit to any local archaeological museum will testify. Moreover, there were many people of intermediate means: early imperial Pompeii offers a good example, where those who occupied the grand urban residences of the town outnumbered

[111] Jouffroy 1986.

[112] Duncan-Jones 1996: 127, based on data from Jouffroy 1986.

[113] Jouffroy 1986: 461.

[114] I owe these data to the generosity of Arjan Zuiderhoek, whose forthcoming book on elite munificence in Roman Asia Minor will discuss them at greater length.

the political elite of (100?) members of the town council by a factor of four or five.[115]

The late Republic and early empire were a period of increasing population, but as we have seen, there are strong indications that the standard of living of the mass of the population was nevertheless improving at the same time. The only one explanation for this is that per capita incomes were increasing (since it is unlikely that popular standard of living improved because the rich became poorer).[116] Moreover, this implies that the mass of the population succeeded in securing its share of that increased prosperity. The tide seems to have turned in the late second century AD, possibly as a result of the Antonine Plague.[117] Population declined, but contrary to expectations and unlike after the Black Death of the fourteenth century, this did not provide ordinary people with the bargaining power to improve their incomes at the expense of the rich. For all we know, later antiquity was a world of increased poverty for the masses, and ever larger fortunes for the rich.[118] Ordinary citizens had lost the power to obtain the market value to which they were entitled, and entered a world of oppression and submission. The rich on the other hand grew increasingly wealthy. Late-antique villas may have been fewer in number, but they were enormous.

Collectively, a shrinking elite appropriated a growing share of GDP, to the extent that their incomes included an ever increasing proportion of GDP above subsistence. We can establish this relatively easily if we estimate aggregate elite wealth (and hence income). That is not as difficult as it may seem, since we have at least a base-line in the census minimum expected of members of the political elite. Senators had to own at least HS 1 million or 1.2 million, knights HS 400,000 and decurions HS 100,000.[119] By multiplying this by the number of senators, knights, and decurions, we obtain a minimum estimate for the aggregate wealth of the Roman political elite: 13 billion sesterces.[120] If they derived an annual return of 6 percent

[115] Jongman 1988a and Wallace-Hadrill 1994 for the numbers. Tacoma 2006 for elites of Roman Egypt. Haley 2003 for Roman Baetica.

[116] As was argued recently in a study on Roman Baetica: Haley 2003. Unfortunately its author fails to appreciate the conceptual significance of the decline from the fourth quarter of the second century AD.

[117] Jongman 2006. In Roman Baetica, this was just the period when social inequality seems to have increased: Haley 2003: 184, 190.

[118] This at least is my reading of Brown 2002 – even if he locates the transition in a slightly later period.

[119] See above.

[120] Jongman 1988a: 193, for elite numbers in Italy. The crucial estimate was that of the number of decurions. I assumed that the 100 largest cities in Italy had 100 decurions each for a total of 10,000, and that the other 331 cities of Italy had 30 each, for a total of 10,000 decurions in smaller cities, and a total of 20,000 in all Italian cities (cf. now Mouritsen 1998). Here, I assume 100,000 decurions, rather than 20,000, since there were something like five times as many cities in the whole of the empire. Aggregate wealth of decurions thus amounted to a minimum of HS 10,000 million, aggregate wealth

(an often quoted conventional figure), their joint income amounted to 800 million sesterces, about a quarter of the entire surplus of National Income above bare subsistence if per capita incomes were 1.5 times subsistence, an eighth if per capita incomes were two times subsistence, and a sixteenth if per capita incomes were three times subsistence.[121] However, many members of the elite far exceeded this minimum. As we have seen, the wealth of a possibly quite middling senator such as Pliny the Younger has plausibly been estimated at about HS 20 million. If he was in fact an average senator, and if all members of the elite, from decurions to senators, had indeed held average fortunes of sixteen times the census minimum, they would collectively have controlled the entire surplus of the imperial economy, even if per capita incomes reached a high three times subsistence. For the early empire, that was probably not true: too many others seem to have enjoyed incomes above subsistence. Most decurions (who together made up most of elite wealth for the simple reason that there were many of them) probably owned fortunes much closer to the census minimum. What this calculation shows, however, is that collective elite wealth was seriously constrained by the size of surplus GDP.[122] When we hear of late antique senatorial fortunes that were typically five times as large as that of the Younger Pliny, then clearly the elite, and the senatorial elite in particular, must have owned much of what there was to own, and come to enjoy almost the entire surplus of the economy.[123] Such senatorial fortunes and incomes not only crowded out the state, as Hopkins argued, but even more so municipal elites – and ordinary citizens.[124]

V CONCLUSION

Roman per capita incomes may well have been fairly high for a pre-industrial economy. Otherwise, it is hard to explain the grand scale of public expenditure or the lifestyle of the elite. Consumption beyond bare subsistence probably reached levels that would not be matched for quite some time. In the early empire, ordinary Roman citizens seem to have benefited from this achievement, in their private consumption of food and material culture, but also as consumers of public goods and services. The rich, needless to say,

of 5,000 knights to a minimum of HS 2,000 million and aggregate senatorial wealth to a minimum of HS 720 million. With these very conservative estimates, therefore, most elite wealth was owned by decurions. Senators, though rich, were too few in number to have much impact. Duncan-Jones 1982: 33 for yields on investment in agricultural property; and Jongman 1988a: 187–99 for elite income and wealth in Italy.

[121] See above for competing estimates of GDP.

[122] This may well be a decisive argument against very low estimates for GDP, the more so when we take later demographic decline into account. Low per capita incomes and demographic decline together squeeze aggregate surplus.

[123] Jongman 2006. [124] Hopkins 2002: 204–8, for competition between rents and taxes.

profited even more. With time, and during the demographic decline of the transition to late antiquity, ordinary Romans failed further to improve their standard of living, although labor had become scarcer. Instead, oppression and inequality increased, to the extent that an increasingly small imperial elite controlled a growing share of the aggregate surplus above bare subsistence. Property, and income from property, became ever more important. This changed the nature of consumption. The very rich had different demands from the less wealthy. They consumed a smaller proportion of their incomes. With the rest, they could only acquire more land.

CHAPTER 23

THE EARLY ROMAN EMPIRE: THE STATE AND THE ECONOMY

ELIO LO CASCIO

I INTRODUCTION

Many scholars envision a modest increase of the GDP of the Roman empire during the first two centuries of the Principate or, for certain regions, even since the second century BC, and some of the contributors to this volume share this view.[1] Some also believe that the increase in GDP in the regions outside Italy, particularly but not only in the western ones,[2] during the first two centuries of the Principate, was primarily the outcome of an increase in population, even if a quantitative estimate of any such increase is obviously beyond our reach for most parts of the empire. For those regions where slim literary and documentary evidence exists, such as Egypt, the size of the population remains a controversial issue.[3] However, the evidence of land surveys in several parts of the empire seems to point to the spread of cultivation and settlement to new areas and the extension of cultivation in previously inhabited areas, while the diffusion of new urban centers and the enlargement of existing ones also suggest demographic growth. The Antonine Plague must have caused a marked decrease in population and consequently a decrease in GDP.[4]

There is less consensus on whether this surmised growth of GDP in the whole of the empire between the Augustan and the Antonine periods was matched by growth in per capita income. Per capita growth can be postulated, by looking at comparative evidence, for the period after the Antonine Plague as an effect of the slackening of population pressure in some areas of the empire and the resulting gain in contractual power by the peasants.[5] We can assume an increase for Egypt: the century-long process of very modest inflation that has been recognized between the Augustan and the Antonine age[6] accelerated abruptly between the 160s and 180s AD, but after that prices probably grew less than the remuneration of

[1] It is perhaps worth noting that some economists and modern economic historians, such as North 1981, are among them; Goldsmith 1984; 1987 does not believe that there was any significant growth and speaks of a "stagnant economy." He does not believe in population growth either.

[2] See, e.g., Mitchell 1993: 241 ff., on Anatolia. [3] See Chapters 3 and 26.

[4] Lo Cascio 1991b; Duncan-Jones 1996; below, Chapter 26.

[5] Lo Cascio 1991b; 1994b. [6] Duncan-Jones 1994.

labor.[7] However, in many regions including Italy, it is not certain that population increase did not outstrip the increase in GDP in the two centuries of the so-called "High" empire.

There is even less consensus on whether the postulated increase in per capita income actually brought better living conditions to the peasant majority of the population, or meant instead a further widening of the distance between rich and poor. It is a widely held view that the majority of the population went on living at subsistence level. Nobody will dispute that distribution of income was disproportionately unequal, even if not all will agree that "elites successfully manipulated their various situations to the detriment of others (especially non elites) in order to monopolise an inordinate share of existing benefits."[8] Goldsmith has attempted some estimates: the 600 senatorial families, representing the top 0.04 percent of the whole population (put at 55 million), would have received approximately 0.6 percent of total personal income. The top 3 percent of the income recipients would have received 20–25 percent of total personal income. The big difference between the yearly salary of the ordinary legionary soldier, 1,200 sesterces (after Domitian), and the yearly salary of the imperial procurator of the lowest degree, 60,000 sesterces, is revealing. But it is interesting to observe that social inequality, measured in terms of per capita income, does not seem to have been much higher than in other pre-industrial scenarios, such as England and Wales in 1688 or at the beginning of the nineteenth century, or Victorian England.[9] And it is hard to find direct evidence of worsening conditions for the general population in the first and second centuries AD.

A closely connected issue is the impact of the state on production: what proportion of the extracted surplus went to the state, to be distributed to non-producers (soldiers, bureaucrats, recipients of the dole at Rome), and what proportion went to the land-owning elite?

Modern controversies on these issues reflect the absence or unreliability of quantitative data. Quite divergent estimates of the population of the empire have been offered, and it is possible to derive from the sparse source material quite different evaluations of the average agricultural yield of different areas. Therefore, very different assessments of the agricultural surplus and of the proportion of the population not engaged in primary production have been advanced. No consensus will be reached on such estimates; hence the possibility of quantifying change, on a macro-economic level, is out of the question. It is a truism, however, that the impossibility of getting passably reliable estimates of a phenomenon such as an increase in per capita income does not mean that the phenomenon itself did not exist, or that it was not

[7] Drexhage 1991; Duncan-Jones 1994; below, Chapter 26. [8] Storey 2000.
[9] Goldsmith 1984; 1987; Bastomsky 1990; and see now Temin 2006.

important in comparison with the performance of other pre-industrial economies.

In order to get simple orders of magnitude, it is therefore necessary to rely on possible proxies for per capita income and the size of the agricultural surplus. By far the most significant proxy for the latter is the extent of urbanization,[10] which remained unparalleled till very recent times in many if not in most of the regions once included in the Roman empire. Another very significant proxy of the level of economic activity has emerged from the study of the Greenland ice cores and lake sediments in Sweden, Switzerland, and Spain, measuring the pollution of the troposphere from smelting operations for silver, lead, and copper extraction: these activities reached a level which was not paralleled again until the Industrial Revolution. In particular, lead pollution indicates a huge volume of silver mining, and therefore of silver coinage, and copper extraction has been taken to imply a scale of production of copper coinage again without parallel until the nineteenth century, indicating a very high monetization of the economy and the widespread use of small change.[11] Imperial coins provide independent evidence of the volume of the money supply in gold, silver, and copper. Duncan-Jones has attempted a very bold estimate of the money stock at the middle of the second century AD at approximately 20 billion sesterces, a volume of coinage without parallel in the periods before and after the first two centuries of the Principate.[12]

In this chapter we will explore whether this higher level of economic activity during the first two centuries of the Principate in comparison with the preceding and following periods, and the possible modest growth then, were, at least in part, the result of the existence of a single political entity embracing the Mediterranean, or were achieved despite it. We will ask whether the ways in which the Roman imperial state was able to secure its survival, drawing as tax a proportion of the surplus and spending it chiefly on providing law and order, and defense against external threats, were conducive to growth or a hindrance to it.

A very successful interpretation of the role of the state in the Roman economy has framed scholarly discussion in the last twenty years.[13] According to the "taxes and trade" model of the Roman imperial economy, devised by Hopkins, the creation of the Roman empire vigorously promoted long distance market exchanges of staples within the Mediterranean region: the areas subject to money taxes were obliged to sell their goods, through a "whole differentiated network of converters," to the tax-consuming

[10] Wrigley 1986.

[11] Hong, Candelone, Patterson and Boutron 1994; Hong, Candelone, Patterson and Boutron 1996; Hong, Candelone, Soutif and Boutron 1996; Rosman, Crisholm, Hong, Candelone and Boutron 1997; Wilson 2002; Hopkins 2000b; Kelly n.d.

[12] Duncan-Jones 1994. [13] Hopkins 1980; 1995/6; 2000a.

regions – the regions where most of the revenues of the state were spent, Rome and the frontier regions – in order to earn back enough coins to pay them as tribute in each fiscal cycle. Also, because a substantial number of large landowners lived in Rome and Italy and spent there the rents drawn from estates that were dispersed throughout the provinces, this extraction of rents must have promoted long distance trade through this same mechanism.

Because it singles out the logical relationship between taxes/rents and trade, the model cannot generally be disproved, provided that there actually were money taxes and money rents, provided that there were tax-consuming and tax-producing regions, and provided that recipients of money rents owned estates in different regions. It is more controversial whether higher demand enabled by the spending power concentrated in the tax-consuming regions would have been satisfied in part by local production and would therefore have enhanced market exchange at the local level. And it is even more controversial whether this mechanism could have promoted economic integration within the Roman empire strong enough to justify the conclusion that "ancient Rome had an economic system that was an enormous conglomeration of interdependent markets."[14]

The cumulative burden of taxes and rents on the producers must have been tolerable, in order for them to create a stimulus to long-distance trade and more generally to market exchanges and production. Moreover the logic of the model implies that rents and taxes "were rivals for a limited surplus."[15] If the cumulative power of the big landowners who formed the ruling elite was strong enough to undermine tax increases, the survival of the imperial state as a political entity would have been endangered.

Therefore, the model is predicated upon the assumption that the amount of taxes necessary for the state to finance its expenditure must have been small to allow the extraction of private rents. Taxes must have been low and that means, in turn, that the ratio of GDP to state budget must have been high.

II THE SHARE OF THE PUBLIC SECTOR

Several estimates of both GDP and the imperial budget have been proposed in recent years, and all of them agree in putting the ratio of the budget to GDP at a few percentage points, no more than 10 percent and perhaps much less. Goldsmith puts the share of the expenditures of central and local government at 5 percent and the share of the imperial government at no more than 3 percent. He also estimates actual GDP, arrived at by calculating both expenditure and income per head at 380 sesterces and

[14] Temin 2001. [15] Hopkins 1995/6.

multiplying this by 55 million inhabitants of the empire (that is, 20,900,000 sesterces). He then calculates the expenditure of the Roman state at 600–825 million sesterces, and, "as the government did not borrow nor generally accumulate surpluses," revenues at much the same level. Hopkins follows a different path by putting the minimum subsistence needs per person/year at 250 kg. wheat equivalent, adding one quarter of gross agricultural product to be saved as seed for the following year, and multiplying the result by 60 million inhabitants. An average farm-gate price for wheat of 450 sesterces per ton[16] yields a *minimum* GDP of 9 billion sesterces, and, assuming a tax rate of 10 percent of minimum gross product, total tax revenues of 900 million sesterces. He does not venture a guess for actual GDP but thinks that it was "perhaps between a third and a half higher" than estimated minimum GDP.[17]

A different and more detailed evaluation of the imperial budget has been offered by Duncan-Jones, who takes into account not only the sparse material provided by the literary sources, as Frank had done,[18] but also further information given by epigraphic evidence. He calculates annual expenditure on different items (army cost, civilian salary-cost, handouts, building, and other costs) as 832–983 million sesterces in c. AD 150 and 1,462–1,613 million sesterces in c. AD 215. He goes on to calculate, on a much less solid basis, aggregate revenues at closely similar levels.[19] Needless to say, these seemingly precise figures cannot conceal the often extremely conjectural nature of the estimates on which they are based. What we know about the *rationarium*, which would have been published regularly by Augustus and his successors, and the *breviarium totius imperii* left by Augustus at his death, shows that state authorities kept track of the various elements of income and expenditure.[20] The existence of a consistent budgetary policy or an actual "economic policy" is more doubtful.[21] In any case, it is interesting to observe that the three estimates of the imperial budget are not so far apart. What we can confidently say is that these estimates provide a plausible *minimum* estimate of the imperial budget and that tax must have been certainly less, and probably much less, than 10 percent. But how much less? May we really conclude that the tax burden was light for the general population of the empire?

[16] 3 sesterces *per* modius: this seems to be the most vulnerable part of the model, since we cannot tell whether this represents a genuinely average price, and are unable to construct an overall mean for all the regions of the empire.

[17] Hopkins 1980 put the cost of the Roman army at 445 (+ or –50) million sesterces. For a critical comparison between the two estimates of GDP given by Goldsmith and Hopkins and of their methods, see now Temin 2006, who advances an estimate which is close to that of Hopkins.

[18] Frank 1959. [19] Duncan-Jones 1994; see also Wolters 1999.

[20] Lo Cascio 2006b.

[21] See most recently Drexhage, Konen, Ruffing 2002a: 27–57, and 2002b: 5–21.

It is certainly possible to argue for higher GDP and budget estimates. Actual GDP must have been substantially larger, not so much because of higher per capita production as because of the possibility of larger population totals. We also need to consider a further argument. As already noted, Duncan-Jones has attempted a very bold estimate of the money stock in the middle of the second century AD at around 20 billion sesterces: this is a very high estimate, according to Hopkins, since "it works out at 330HS per head of the population – equal to three times the level of minimum subsistence."[22] This level of liquidity would be excessive, given the existence of a large weakly monetized rural economy. The way in which Duncan-Jones arrives at his estimate can be questioned.[23] But it is an independent estimate, and if correct might speak in favor of a much higher estimate of GDP. On the other hand, tax income may well have been higher, since state expenditure was probably higher than suggested by existing estimates that focus on military expenditure. Thus, it is an oversimplification to take *stipendia*, *donativa*, and discharge bonuses as the only items of military expenditure, as if expenditure to supply military units had been covered entirely by deductions from pay,[24] and as if there had not been any other items of expenditure such as building material, infrastructure, and so on. Estimate of the annual cost of army salaries and *praemia* consequently need to be increased by an unquantifiable sum. Moreover, Duncan-Jones' calculations of the cost of the civilian employees and of the emperor's household are too conservative,[25] as are his estimates of other outlays.[26] Another item is simply lacking: expenditure for the urban *annona*. Even if we can assume that taxes in kind and rent in kind from the imperial domains account for the grain distributions, and made it unnecessary for the state to purchase grain, the costs of transport (paid to the *navicularii*, the shippers) had to be borne by the state.

A low state share of GDP does not automatically mean that the burden of taxation was light. Large sectors were exempt from taxation. Italy was exempt from both, but many communities in the provinces likewise did not pay poll tax, and a substantial number of them were exempt from land tax as well. Since the population of Italy was large in comparison with the population of most provincial areas[27] and a considerable amount

[22] Hopkins 1995/6 = 2002: 227n.90. [23] Lo Cascio 1997b. [24] See below.

[25] For instance, there is no reason to put the pay of the praetorian governors at 500,000 sesterces: if raised to one million sesterces, the same level as for the consular governors, expenditure increases by 10 million sesterces.

[26] For what it is worth, Frank's (1959) estimate of non-military expenditure in the first century AD was 42 percent of the whole budget, whereas Duncan-Jones 1994 puts it at 23–29 percent in 150 AD, and at 26–29 percent in 215 (cf. Goldsmith 1984; 1987 for 29–46 percent).

[27] Frier 2000 and above, Chapter 3. I would put the share of the population of Italy at an even higher level.

of provincial cities were fully or partially immune, the proportion of the imperial population as a whole which paid taxes was significantly lower than the gross total, and their tax burden must have been correspondingly heavier.

Furthermore, we have to consider the weight of local or municipal taxation, which is not clearly discernible in our sources:[28] local direct taxes are poorly attested for the Principate. But we cannot deny the importance of *vectigalia*, including the revenues from land owned by the municipalities and indirect taxes, especially local *portoria*, which went to the cities and helped fund expenditure at the local level: new data come from recent epigraphical finds in various regions of the empire. The Flavian *lex municipalis* lists various items of income, namely the farming of *vectigalia* and *ultrotributa* (taxes for the payment of services, tolls, and so on), fines and money from unidentified sources, and various items of expenditure, namely the purchase and maintenance of *servi communes*, the *aes apparitorium*, outlays for *sacra*, social occasions, and public works and their maintenance.[29] The inscription *IvEphesos* 13[30] records a series of (presumably municipal) taxes levied in many towns of the province.[31] The *Monumentum Ephesenum* explicitly attests the right granted to a city of Asia, Alexandria Troas, to levy the *portorium* for its own use, while other texts attest the existence of local duties or tolls apart from the *quadragesima Asiae*. While it is impossible to quantify the aggregate income of all the cities of the empire, it would be a mistake to neglect the additional burden of local taxation. Local taxes were competing with state demands for the extraction of surplus.

If the proposition that the tax burden was fairly low can be accepted – and it is interesting to note that a similar state of affairs can be shown to have obtained in other pre-industrial societies[32] – it was not so low to make it hard to understand why increases in expenditure and a probable drop in GDP after the 160s AD resulted in severe financial difficulties. In the first two centuries of the Principate, however, taxation enhanced market exchanges and promoted growth. Other consequences of the political unification of the empire would likewise engender growth: the diffusion of new technological devices in agricultural production, mining, and so on,[33] as well as a substantial decrease in transaction costs.

[28] But see now *Il capitolo delle entrate* 1999. [29] Lamberti 1993.

[30] Originally published by Habicht 1975. [31] Merola 2001.

[32] Goldsmith 1984; see the general remarks of Cipolla 1988, and some of the other contributions in Guarducci 1988, especially Mathias and O'Brien 1988; and some of the chapters in Bonney 1995. Hopkins' objection to estimates of Roman GDP well in excess of 9 billion sesterces – that this would mean that taxes were too low – is duly countered by comparative evidence showing that not all pre-industrial states imposed tax rates that were as high as for instance in Mughal India (for which see Bang 2002).

[33] Gunderson 1976; Greene 2000; Wilson 2002; Lo Cascio 2006d.

III SETTING THE RULES OF THE GAME

The theoretical framework of the New Institutional Economics can serve as a powerful tool for understanding the ways in which the creation of a single political entity in the Mediterranean shaped the economy of the empire and encouraged growth. The New Institutional Economics emphasizes the importance of transaction costs as a key to understanding the performance of economic systems throughout history.[34] In the case of the Roman empire, the creation of more peaceful and safer conditions translated to a marked decrease in transaction costs. The suppression of piracy in the final decades of the Republic, the diffusion of a "technology of measurement" and of common metrological systems, and above all the creation of a unitary monetary zone and of common legal rules, especially in the field of commercial law, were all quite remarkable contributing factors in this reduction of transaction costs, in so far as they reduced uncertainty and improved access to information.[35] The imperial state could define and enforce the fundamental "rules of the game," in particular exclusive property rights, not only in the Italian core but also in the provinces. The spread of the Roman notion (and practice) of private property was fostered by the increase in the number of urban communities of Roman or Latin status. On the other hand, the concepts of the New Institutional Economics can offer a partial explanation of the reasons why this growth could not be sustained and was eventually reversed.[36]

Above all, it can help understand the relationship of collaboration and competition between the emperor and the senatorial elite which can legitimately be considered one of the structural elements of the working of the empire as a polity. The constitutional change which brought about the new monarchic state curbed the elite's ability to continue to exploit the empire on the same scale as before. Conditions for provincials improved despite continuing maladministration. On the other hand, the political convulsions of the third century AD may be considered an important contributing factor in worsening economic performance.

The emperor set the rules of the game at the level of the central and provincial administration, but his actions extended in various ways to the level of the individual urban communities. Provincial governors and city governments were charged with overseeing their enforcement. The scope of imperial interventions in framing economic relationships among private actors was considerable. For instance, the imperial authority intervened to rationalize the territorial distribution of periodic markets and their temporal

[34] North 1990; 1991; 1996.

[35] This is true even if local markets were imperfect and lacked coordination.

[36] The analytical framework devised by North 1979 can be considered an implicit answer to the objections advanced by Saller 2002: 266.

sequence.[37] More generally, particular care seems to have been taken in securing not only the regular supply of foodstuffs to the cities but the regular working of the market, the *forum rerum venalium*, in each city, and local price formation.[38] A series of fragments in the *Digest*, which refer to the role that the decurions (the members of the local senate) were supposed to play in ensuring the local food supply, contain the notion that a fair price is "fair" precisely because it was set by the market, and that only speculative behavior can alter it.[39] Various interpretations of these passages have recently been advanced,[40] but regardless of how they are interpreted, a conclusion seems to emerge: that imperial intervention was aimed at "regulating" the market, in order to avoid speculative behavior, and even an artificial lowering of prices.[41] Again, the "comparative advantage in violence,"[42] which gives the state the authority to set – and the concrete possibility to enforce – the rules of the game in market transactions between private economic actors, could add considerably to the efficiency of contracting.

The creation of a single monetary area may have contributed most to the reduction in transaction costs: a centrally produced coinage circulated almost everywhere, and locally issued coins (chiefly small bronze denominations) were linked to the mainstream coinage by a common system of fixed rates of exchange.[43] Moreover, it was a serious offense, indeed a crime, to refuse to accept current coins which carried the *vultus* of the emperor and were not counterfeit.[44] Again, the enforcement of the legal value of the coins can be viewed as instrumental in reducing transaction costs. High levels of coin output and circulation from Augustus to the third century seem to have been instrumental in facilitating safe and smooth exchanges of goods at local, regional, and interregional level.

IV MONEY AND MONETARY POLICY

No one will deny that the Roman imperial economy, as all other pre-industrial economies, was "dual" in nature: a sphere of monetized market exchange that dominates the record coexisted with a self-sufficient sector whose size and workings are hard to determine: what Braudel defined as the area of "material life," of the use values, as opposed to the "economic life," the market domain, or, to use another concept, the domain of Chayanov's "peasant economy." But the share of the monetized sector was proportionally much larger than in the previous and following periods, since the

[37] De Ligt 1993a; and some contributions in Lo Cascio 2000c.

[38] See for instance the famous piece of legislation concerning the production and export of oil that Hadrian gave to Athens: *IG* II^2 1100, 1916.

[39] *Dig.* 48, 12, 3; 50, 1, 8; 50, 8, 7 [5].

[40] Examined in detail by Höbenreich 1997: 178–88; see also Erdkamp 2005: 288–90.

[41] Lo Cascio 2006c. [42] North 1979: 250.

[43] Crawford 1986; Lo Cascio 1996a; 2003c. [44] [Paul.] *Sent.* 5.25.1: Lo Cascio 1986; 1996a.

use of money was not limited to the urban centers but also encompassed rural *milieux*[45] and was therefore fairly ubiquitous: already at the beginning of the Principate, Strabo considered barter or the use of bits of silver for exchange transactions as characteristics of barbarian and backward areas such as Lusitania and Dalmatia.[46] Literary, epigraphic and papyrological evidence shows to what extent monetary transactions involved all the strata of the society. And the fragments of the Roman jurists strongly suggest that the use of coinage was a fact of daily life. Goldsmith has estimated the monetization ratio at a bit less than one half of GNP at the end of the Augustan period,[47] comparable to the degree of monetization in the least developed African countries today. Moreover, the first two centuries of the empire (and perhaps even more so the third century)[48] witnessed a substantial increase in the degree of monetization.

In terms of its sheer quantity, Roman imperial coinage was quite unprecedented in the Mediterranean world. The output of the central mint was far greater than the production of any previous issuing authority.[49] The beginning of a regular issue of gold coinage under Caesar marked a significant turning point, apart from solving a very serious credit crisis that had been caused at least in part by a shortage of coin:[50] in terms of value, gold was soon to become the most important component of the money stock.[51] The coining of the *regia gaza* of the Ptolemies by Augustus marked another turning point in the monetization of the empire: in the short run, this abrupt injection of liquidity into the economic system would have provoked an abrupt rise of the price level. Several Roman historians acknowledge the relationship between the money supply on the one hand and interest rates and commodity prices on the other.[52]

The denominational system introduced under Augustus included the gold coin, the *aureus* (or *denarius aureus*), of a little over 8 grams and of very high fineness. The *aureus* was worth 25 *denarii* of silver, each of which weighed a bit under 4 grams and was made of almost pure silver, and 100 *sestertii* of *aurichalcum*, an alloy similar to brass. The *sestertius* was normally used as the unit of account. Among the smaller denominations were the *dupondius* of *aurichalcum*, worth half a *sestertius*, and the copper *as*, worth a quarter of a *sestertius*. The value of the smallest monetary unit (the copper *quadrans*) of the monetary system was 1/4 of that of the *as* and thus 1/1600 of that of the top coin (the gold *aureus*). This wide range of denominations

[45] De Ligt 1990–1; Howgego 1992 against Crawford 1970.
[46] Strabo 3.3.7; 7.5.5; see Duncan-Jones 1990: 33 f.; Harris 1993b.
[47] Goldsmith 1984: 273 f. As Goldsmith himself notices, "a much lower figure for the degree of monetization is implied in Hopkins' estimate."
[48] Rathbone 1996b. [49] Duncan-Jones 1994: part 3.
[50] Lo Cascio 1981; Howgego 1992; *contra* Verboven 1997. [51] Duncan-Jones 1994.
[52] Suet. *Aug.* 41.1; Cass. Dio 51.21.5; Oros. 6.19.19.

made every kind of market transaction viable, from the purchase of a loaf of bread to that of an estate.

Roman money was a creation of the state and the "fiscal" character of Roman coinage has been particularly emphasized.[53] That state expenditure was the primary purpose of issuing coin should not be taken to mean that the Roman authorities had no interest at all in its role as a means of exchange, or that their monetary measures must never be thought to have been designed to enhance that function.[54] It has been argued that the great stability of the monetary system up to the third century is indicative of a "monetary policy," albeit rudimentary and empirical, that sought to ensure fixed relationships between gold, silver, and copper denominations, mainly through readjustments of their intrinsic or their face value, and also to supply the economic system with adequate means of exchange.[55] It is even possible to contend that state policy sought to dissociate face value from metal value in order to justify manipulations of the weight standard or of the fineness of the coins by the issuing authority.[56]

In any case, whatever the objectives of the state, the mere existence of a state coinage had an obvious stimulating effect on market transactions. The absence of negotiable instruments should not be interpreted as a significant constraint on the scope and flexibility of the market economy. On the contrary, it may signal that state issues satisfied demand. Moreover, some credit devices did exist: one might mention auction loans[57] or the financial arrangements adopted on third-century Egyptian estates.[58] It is therefore hard to accept the thesis that a "structural" shortage of money must have been a "structural" hindrance to economic development.[59]

Even if we cannot exclude the possibility that private individuals were allowed to have metal coined by the mint, and even if the mode of exploitation of the imperial mines seems to suggest that private contractors could have received their share in newly minted coins,[60] it remains true that most of the new coinage entered circulation via public expenditure. One can even contend that, since old coins paid by the taxpayers were normally reused and coin loss was limited,[61] it was the excess of public expenditure over the income of the state that allowed newly minted coinage to be injected into the economy. To some extent, the dynamics of public expenditure and the fact that it was discretely and differently localized in the various areas of the empire determined the different degree of monetization in different times

[53] Hendy 1991; Duncan-Jones 1994. [54] Lo Cascio 1981; 1996a; Howgego 1990; 1992.
[55] Lo Cascio 1981; Beyer 1995; see also Wolters 1999; von Reden 2002b.
[56] Lo Cascio 1986; 1996a; see now Strobel 2002b and 2004. [57] Andreau 1987.
[58] Rathbone 1991; see in general some of the contributions in Lo Cascio 2003d; and now Temin 2004 and Harris 2006. Credit devices were certainly required in order to avoid the actual transfer of coin over long distances: Harris 1993b; see also Howgego 1992: 27 ff.; and De Ligt 2002.
[59] Pekáry 1980. [60] See below. [61] But cf. Duncan-Jones 1994: chs. 13–14.

and places, as was noticed by the jurist Gaius.[62] Thus, the economy of the areas close to the *limes* was heavily influenced by payments to the army, even if the number of soldiers was not particularly large compared to the population as a whole. The dynamics of the supply of coinage seem directly related to the dynamics of public expenditure: even monetary manipulations that entailed *de facto* depreciation, in so far as they allowed a higher level of public expenditure, resulted in an increase in the supply of coinage which could have had positive effects on production.[63]

V TAX AND PUBLIC EXPENDITURE

In order to account for massive output of the Roman mint, it is not enough to invoke the necessity to compensate for coin loss: rather, we have to assume structural imbalance between tax and public expenditure. This excess of expenditure over tax income was facilitated by the exploitation of a growing number of provincial mines in the first two centuries of the Principate, especially in Spain and, after Trajan, in Dacia. The specific character of this exploitation, drawing on large and small contractors,[64] was closely connected to the overall impact of the new imperial regime at different levels: on the relationship between Italy and the provinces, on the financial apparatus of the state, and on its fiscal organization. One of the most remarkable and original features of the Roman empire as a political and economic organization depended, in a sense, on the way in which the Augustan revolution was achieved, and on the ambivalence of the figure of the *princeps*.

This constitutional change involved a radical change in the relationship between Italy and the provinces. During the late Republic, provincial tribute had been ideologically construed as the direct consequence of conquest: while poll tax was the mark of personal subjection to the conquerors, the imposition of a land tax was conceived as the practical side of the control over provincial land exerted by the Roman people, as certain passages in Cicero reveal.[65] The emergence of a new actor in the political and constitutional scene in 27 BC and the readjustments that followed during the very long reign of Augustus provoked a complete change in the ways in which the empire was managed. A new treasury, the *fiscus Caesaris*, was created alongside the *aerarium populi Romani*: closely controlled by the *princeps*, it was in a sense considered his property. The government and the administration of the provinces were split: some of them were entrusted to senatorial governors (proconsuls) in keeping with republican practices, while those

[62] *Dig.* 13.4.3; Lo Cascio 1991a: 356. [63] Lo Cascio 1981. [64] See below.

[65] Cic. 2 *Verr.* 2.7: the provinces are "*quasi quaedam praedia populi Romani*"; cf. 2 *Verr.* 2.5; 3.57; 102; *Leg. agr.* 3.15.

where the presence of the Roman army was required were directly run by the emperor. These provinces were thought to be *of* the emperor just as the former were thought to be *of* the *populus Romanus*.[66] To some extent, the relationship of the *princeps* with the provinces, which were financially dependent on him and his relationship with the *fiscus*, could be envisioned in analogy to the relationship between a private person and his patrimony.[67] Public expenditure itself, and in particular some of its elements, in so far as they were funded by the imperial *fiscus*, were ideologically construed as the emperor's demonstration of *liberalitas* or *indulgentia*. Nobody, of course, would have doubted that the *fiscus*, with its revenues, was in fact something very different from the patrimony of a private person, and that the revenues of the *fiscus* were used for purposes that we would now call "public." But the notion that these revenues were always *of* the *princeps* (as a private person) was not mere juridical fiction devoid of any practical meaning. While the emperor defined the rules of the game, as we have seen above, he was also, in a sense, a player. It is true that the sheer size of his *patrimonium* and the use of its proceeds for public purposes assimilated these proceeds to a form of tax, but the *patrimonium* itself was in many ways managed as a private asset, even if the imperial *fiscus* enjoyed specific *privilegia* in its relationships with private people.

A complete reorganization of taxation took place at the beginning of the Principate. Uniform, if not universal, criteria for counting subjects and assessing their wealth were extended first of all to the *provinciae Caesaris*, the provinces under the direct control of the emperor, and later to the *provinciae populi* as well. Uniform criteria of measuring and assessing the value of agricultural land were adopted. The replacement of tax-farmers and tax-farming companies by city functionaries and the substitution, in many areas, of tribute in cash for tribute in kind are clearly connected to the introduction of regular provincial censuses.[68] We possess important evidence for the execution of the provincial census in Egypt,[69] even if these documents seem to indicate that the procedures adopted there were in many ways peculiar, depending on the peculiar relationship between the central administration of the province and the urban centers. The general features of the new system of assessing and taxing agricultural land are described in a famous fragment of a jurist of the Severan age, Ulpian, illustrating the so-called *forma censualis*.[70]

This new system must have been beneficial to the provincials for several reasons. Land tax was now related to the monetary value of estates and thus to their revenue, and therefore, though it was not progressive, it was not

[66] The testimony of the contemporary Strabo 17.3.24–5 is particularly revealing; cf. also Suet. *Aug.* 47; Cass. Dio 53.12.2; 4.

[67] Gai. *Inst.* 2.21; cf. 2.7.

[68] Lo Cascio 2000a: 177–219. See in general Neesen 1980.

[69] Bagnall and Frier 1994.

[70] *Dig.* 50.15.4.

arbitrarily fixed: at least in some provinces, it seems to have amounted to no more than 1 percent of the capital value of the land, as declared at the census (that is, certainly no more, and perhaps much less, than 10 percent of annual revenue). Moreover, since the value of the estates was expressed in monetary terms and the land tax had often come to be collected in coin, the land tax itself spurred monetization. Finally, the decline of tax-farmers and tax-farming companies must have lowered the burden of the land tax. However, these changes took a long time to unfold and were not universal. Some regional features survived, and in some parts of the empire, land tax itself continued to be collected in kind.[71] At first, tax-farmers and tax-farming continued to collect indirect taxes, and the new taxes for Roman citizens introduced by Augustus were farmed out as well.[72]

The peculiar position of the emperor also affected the way in which public expenditure was handled by the central administration and perceived by citizens and subjects. The most important recipient of public expenditure, of perhaps up to three quarters of the grand total, was always the army. Civilian salaries and "court" expenditure were another substantial charge. Other expenses were ideologically construed as emanating from the *liberalitas* of the *princeps*. Distributions of coin (*congiaria*) and of corn (*frumentationes*) to the metropolitan *plebs*, handouts to the troops (*donativa*), and more generally personal gifts of the emperor were the clearest expression of this ideology. But the involvement of the imperial financial administration in the provision of infrastructure such as roads, aqueducts, bridges, and harbors fell in the same category of *indulgentia*. In this case, imperial expenditure complemented expenditure by the municipalities and by private benefactors and was chiefly directed at big projects which could not otherwise have been funded: the construction of the two big harbors at the mouth of the Tiber or the draining of the Fucine Lake are among the most prominent examples. Maintenance was provided in part by individual taxpayers (the landowners of the areas in question), but also to a large extent by the imperial treasury.

Expenditure on public buildings in the capital was of paramount importance, and features among the *impensae* (expenses) of the first emperor recorded in the *Res gestae divi Augusti*.[73] Imperial buildings were lavish in scale and luxurious in style, and costs were tremendous.[74] Public works were important because they provided employment for the free population. Suetonius narrates a very instructive anecdote about the emperor

[71] For instance, as late as the beginning of the second century, in recently annexed regions such as Arabia (Lewis 1985–8: 132ff.; 1989: n.16; Cotton 2003).

[72] Lo Cascio 2003a.

[73] These outlays continued to be massive up to the Severan age, and rose again from Aurelian onwards: see Daguet-Gagey 1997.

[74] DeLaine 1997.

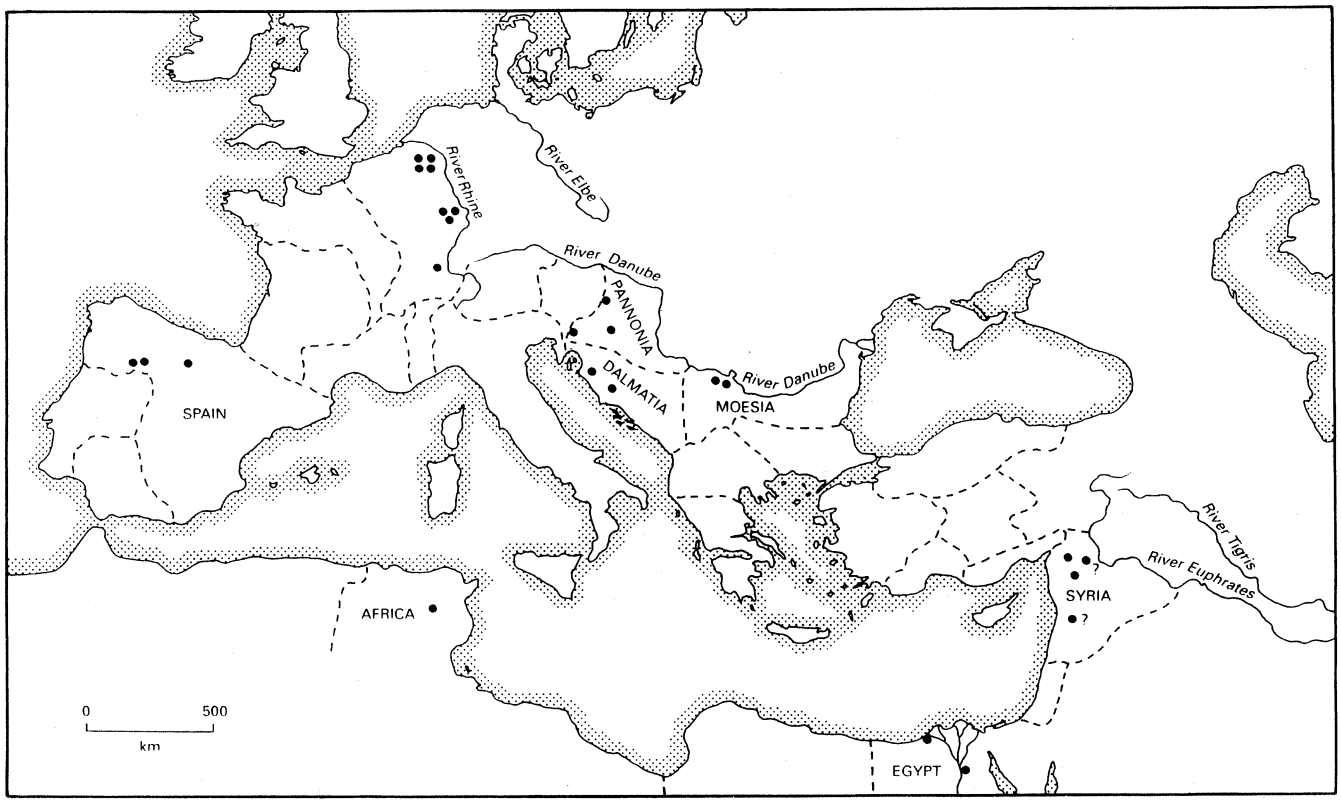
Vespasian, when he was rebuilding the Capitol: when an engineer presented the emperor with a labor-saving device to convey the columns to the hill, Vespasian rewarded the engineer but refused to make use of this invention, stating that he preferred to feed the populace of Rome.[75] The passage has been widely discussed,[76] but its most obvious explanation seems also the most acceptable: Vespasian had a clear awareness of the link between public works and urban employment. Public works thus added to the purchasing power of the *plebs urbana*.

In many towns of Italy, an original scheme of "family allowances" (*alimenta*) introduced by Nerva or Trajan disbursed additional benefits. The emperor gave perpetual loans to the landowners of the territory of a town or of the nearby districts, and the interest was distributed to male and, to a much lesser extent, female children of the same town, "*natos parentibus egestosis*," "born to poor parents," as a late epitomator puts it.[77] The monthly allowances amounted to 16 sesterces for the boys and 12 sesterces for the girls, certainly enough for their upkeep. Apart from quite a few literary and epigraphic sources, this scheme is well known from two long inscriptions from two small Italian towns, listing in detail the declared properties, their value and the portion of the loan, secured by each property.[78] These inscriptions resemble the documents that (in the provinces) would have served as the basis for the assessment of the land tax, according to the procedure described by Ulpian. The perpetual payment of the interest put a light burden on agricultural property in Italy which was immune from land tax. The purpose of the scheme has been much debated. Whereas the *alimenta* used to be understood as a subsidy for landowners, more recent work tends to view children as the intended beneficiaries of this program and the loans merely as a compulsory but efficient means of ensuring the long-term survival of this scheme. The *alimenta* undoubtedly represented a measure to support reproduction, akin to those implemented by some modern dictatorial regimes. Whatever the aims, they raised the purchasing power of the Italian families involved.

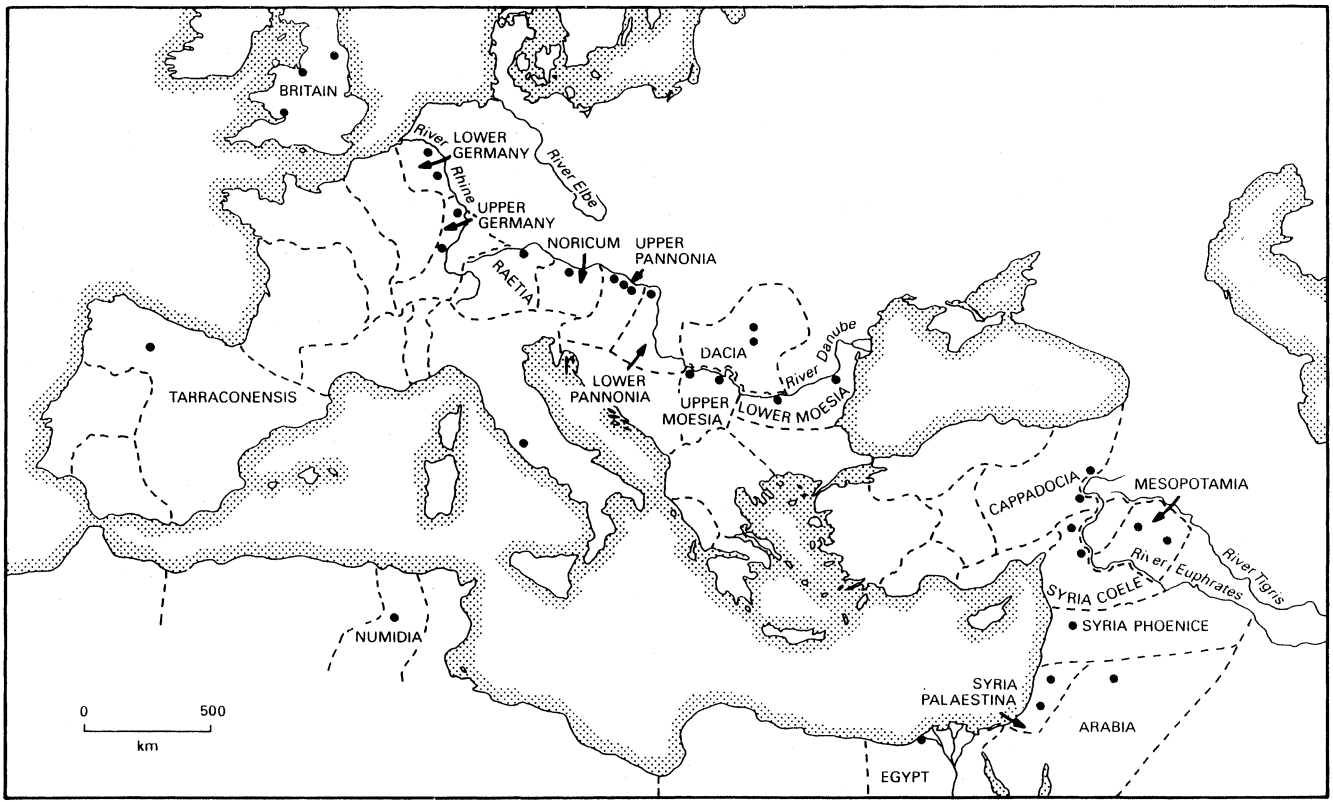
VI MILITARY EXPENDITURE AND ARMY SUPPLY

Relative to the whole population of the empire, the Roman army, at some 300,000–400,000 men, was comparatively small. Thanks to the length of service, only a tiny proportion of all the adult males joined the legions, the auxiliary and naval forces, and the units in Rome. Service in the praetorian cohorts and the legions required citizen status, and soldiers were initially recruited from the population of Italy and of the more Romanized provinces

[75] Suet. *Vesp*. 18. [76] Brunt 1980, with references.
[77] *Epit. de Caes*. 12.4. [78] *CIL* IX 1455; *CIL* XI 1147.



Map 23.1 (a) The disposition of the legions in AD 14 (b) The disposition of the legions in AD 200
Source: B. Campbell, *War and Society in Imperial Rome 31BC–AD284*. London and New York, 2002: 19–20



Map 23.1(b) (*cont.*)

of the west. The auxiliary forces were staffed with provincials from peripheral and recently annexed provinces: they were "native" or "colonial" troops recruited from among the subject peoples. Soldiers enjoyed a relatively high standard of living. As client states were transformed into provinces, the troops moved towards the frontier of the empire. This exacerbated the contrast between the inner and more urbanized areas of the empire and the frontier regions. The troops were no longer an army of occupation, except in a few unstable or exposed areas: once wars of conquest had subsided, it became their duty to defend the border against low-intensity threats. In these conditions, even if the number of soldiers was small and units were often under-strength, the presence of the army precipitated economic transformation and growth.[79]

Soldiers were often accompanied by a number of slaves and servants, while officers kept entire *familiae* of freedmen and slaves. Numerous civilians, chiefly traders and contractors, contributed to the necessities of daily life in the camps and the civilian settlements nearby. Some specific functions are recorded on the wooden tablets found at the fort of Vindolanda on the northern frontier of Roman Britain:[80] the *balniator*, who took care of the baths, the *cervesarius*, the beer-brewer, and the *uector* and the *iumentarius*, carriers using carts or pack animals. Furthermore, many soldiers, at the end of their service, settled in the same areas in which they had served, and they had at their disposal a rather substantial sum of money, the discharge-bonus of 12,000 sesterces, which they could use to set up a farm or to start a trade.

Army demand greatly affected economic life in militarized areas.[81] The soldiers had to be provided with food, fodder (for the enormous number of pack animals and horses), and firewood, and these items represented, as in other pre-modern armies, the bulk (in terms of weight) of supply. Requirements and rations have been ingeniously calculated from modern and comparative data and from ancient evidence. Each soldier received a basic ration of two *sestarii* of grain (850g.) per day; but his diet included also meat, cheese, vegetables, olive oil, sour wine, and salt. Even if some of the grain and other basic foodstuffs arrived in the form of imperial tax or rent revenue,[82] most of these items normally came from areas in the vicinity of the camps and forts. The presence of the army therefore impelled the enlargement of the cultivated area and the introduction of innovations in agricultural and breeding techniques. It has been observed

[79] One normally neglected aspect is illustrated by Haynes 2002.

[80] Bowman and Thomas 1983; 1994; 2003; Bowman 1994; Birley 2002.

[81] See in general Wierschowski 1984; Kissel 1995; Junkelmann 1997; Roth 1998; and also Roth 2000. See below, Chapter 27.

[82] Erdkamp 2002b: 60 n. 32, who quotes Fink n. 91 (a papyrus from Dura with the reference to grain "*ex praediis fiscalibus*").

that in the frontier zone, the army served as a powerful agent of discontinuity in agricultural exploitation: palaeobotanical investigations document the introduction of new plants and the importation of seeds, and the Vindolanda tablets show that poultry and pigs were locally bred and beer was locally produced. It was only where the local agrarian economy was unable to provide sufficient resources (as probably happened in the regions close to the border in Britain), that external sources were required. For climatic reasons, items such as olive oil always had to be imported from the Mediterranean.[83] Thus, army demand increased the volume of exchange between the core regions of the empire and the border areas: the most prominent example is Baetican oil, which found its way to the frontier area of Germany and Britain. The same was true of some manufactured goods: Vindolanda received clothes from Gaul and other goods from Londinium. The accounts and the letters from Vindolanda and the papyrological evidence from Egypt reflect the extremely large and varied range of the goods that were consumed not just by officers and their families but also by ordinary soldiers.[84] The latter might even have access to luxury goods from beyond the empire such as pepper.

Consumption levels must have been related to pay scales. From Augustus onwards, an ordinary legionary was paid 225 denarii (or 900 *sestertii*) per year, while specialists received one and a half times as much (*sesquiplicarii*), or double (*duplicarii*) or triple pay (*triplicarii*). The soldiers of the praetorian cohorts in Rome and legionary cavalrymen also earned higher wages. Pay levels for auxiliary soldiers are uncertain and controversial: they may have received 5/6 of the legionary pay or the same as the legionary soldiers.[85] Domitian raised basic pay to 300 *denarii* (1,200 *sestertii*), and it seems likely that auxiliary stipends were raised accordingly. Military pay subsequently remained stable for more than a century until further increases occurred at the end of the second and the early third centuries. These later raises more than counterbalanced the rise of the level of prices and improved soldiers' living standards. Non-commissioned officers received a higher or much higher pay. Centurions and decurions, the commanders of the *centuriae* of foot soldiers and of the cavalry *decuriae* of the legions and of the auxiliary contingents, received salaries equivalent to several tens of times the basic pay. The salaries of officers drawn from the two top orders of Roman society, the *ordo senatorius* and the *ordo equester*, were higher still: in the second century, a *legatus legionis*, the commander of a legion, received 200,000 sesterces. It has been calculated that officers' pay absorbed perhaps 20 percent of the total cost of a legion.[86] Expenses for food and clothing were deducted from

[83] Even if olives were grown "further north than they normally are in modern times": Harris 2000: 718.

[84] Bowman and Thomas 2003.

[85] Now Speidel 1992, with references; but see Alston 1994.

[86] See in general Le Bohec 1994.

soldiers' pay.[87] Moreover, a substantial proportion of the remaining pay was deposited in individual accounts administered by their units. This system of deductions and savings reduced the physical presence of coin required in and around the camps.

Were military supply demands met by market mechanisms? Two radically opposed views have been advanced. Thus, the army is thought to have been directly supplied through the redistribution of the proceeds of tax in kind and rents collected on public or imperial properties in faraway regions. Grain and other foodstuffs were carried by the *navicularii*, shippers, private businessmen, who transported them on a contractual basis for the imperial administration. Compulsory purchases at fixed prices or requisitions provided the supplementary quota to satisfy the needs.[88] Alternatively, the army supply is thought to have relied on the market and sustained by the purchasing power of the soldiers (irrespective of whether the actual purchases were arranged by the military administration).[89] However, the archaeological evidence, which has been taken to prove that there was a centralized and direct management of the supply to the military detachments can be read in different ways. While it does document specific supply lines, as in the case of Baetican oil, it cannot establish the existence of some kind of "administered trade." It is neither possible nor legitimate to infer from the presence in the camps of Germany and Britain of vessels (the Dressel 20 amphoras) that carried the Baetican oil the existence of direct flows of fiscal oil from specific production areas in Baetica to specific military sites: after all, there is no evidence that tribute in oil was ever collected in Baetica. The distribution of Dressel 20 amphoras may thus be interpreted as evidence of commercial flows towards areas with strong demand for oil.[90] The evidence of the Egyptian papyri, other documents from Tripolitania,[91] and the Vindolanda tablets reveals the operation of market mechanisms for the supply of officers and ordinary soldiers, even if they are not always easy to reconstruct in detail and depended on local circumstances.[92] There is no reason to believe in a centralized administration of military supplies under the supervision of the office of the *praefectus annonae* in Rome.[93] Conversely, the Vindolanda tablets suggest that the procurement of supplies was managed at the level of the single unit, and that soldiers and veterans were sometimes involved as individual economic actors.[94]

[87] Fink 1971: nn. 68 and 69.

[88] Remesal Rodríguez 1986; 2002a; 2002b; Carreras Monfort 2002; Erdkamp 2002b; Whittaker 1994; but, for a more balanced view, cf. Whittaker 2002 (repr. in Whittaker 2004).

[89] Wierschowski 1984; 2001; and 2002; but see also Tchernia 2002.

[90] Tchernia 2002. [91] Marichal 1992.

[92] On the economy of the frontier areas, see in general Whittaker 1994; 2004; and Savino 1999.

[93] Remesal Rodríguez 1986; 2002a; 2002b. [94] *Tab. Vind.* II 343.

VII THE *ANNONA CIVICA*

Since the Republican period, the Roman authorities had intervened in the food supply of the capital, a city whose population had come to surpass that of every other urban center in the Mediterranean.[95] Rome's demographic growth was correlated to the extension of political control over sources of grain that were accessible by river or sea, such as south Etruria, Umbria, and Campania, and later Sicily, Sardinia, and Africa, and finally Egypt. By contrast, the conquest of the Po Valley did not have a remarkable effect on the food supply of Rome: due to high transportation costs, the capital did not normally import foodstuffs from northern Italy. The *aediles* had long been supervising the retail trade in grain to curb speculation. The prevention of famines or shortages was the main goal. More intrusive efforts were made during the Gracchan period. A new law provided for subsidized grain, and large granaries began to be built in Rome and Ostia. These storage facilities helped counterbalance the vagaries of the supply caused by climatic variation. Subsequent *leges frumentariae* intervened to adjust various features of the distribution system by changing the grain price, the number and the identity of the recipients of subsidized grain, or the size of the allocations, until in 58 BC a bill established that grain would be distributed free of charge to all the adult male citizens who were present in Rome. Under Caesar's dictatorship, this privilege was limited to adult male citizens who were regularly domiciled in Rome. Augustus established a *numerus clausus*, a closed number of recipients, and it seems that from then on the privilege was in fact hereditary.[96]

Beyond the grain dole, the state was also concerned about the food supply in general. The *cura annonae* and the exceptional powers given to Pompey in the 50s BC anticipated the more thorough and stable reorganization of the grain supply by Augustus. Some tentative figures give an idea of the scale of the problem: on a conservative estimate,[97] during the early empire, the city of Rome consumed around 30,000,000 modii of grain (200,000 tonnes) per year, a transfer that required the service of some 800 ships with an average capacity of 250 tonnes. In addition, a much larger number of tow barges were needed to move the grain from the ports at the mouth of the Tiber to Rome. The import of other types of food added to the scale of operations.

The concentration of so many consumers in a single place posed a big challenge to a pre-industrial economy and a rudimentary administrative

[95] Rickman 1980; Lo Cascio 2000b for the population of Rome.

[96] And therefore the new immigrants to Rome were barred from it: Lo Cascio 1997a. New beneficiaries were chosen by lot.

[97] Garnsey 1983.

apparatus. The administrative structure set up by Augustus and headed by the *praefectus annonae* in Rome and with offices in the big ports of Ostia and Puteoli supervised the collection of foodstuffs, their transport, storage, and distribution and marketing.[98] Thanks to this arrangement, the city of Rome avoided the specter of other large pre-industrial towns – wild price fluctuations caused by speculation and disruptions in supply. Large provincial cities at least occasionally experienced interventions to stabilize prices and supply.[99]

Since the late Republic, taxes in kind and rents from public and later imperial properties in the provinces accounted for a substantial share of the metropolitan grain supply. This share progressively grew during the early empire, thanks to the annexation of new provinces such as Egypt and the expansion of the imperial estates that was fed by confiscations and legacies: for instance, Pliny the Elder claims that Nero confiscated the properties of six senators who owned half of Africa.[100] It is worth noticing that the *coloni* of the imperial estates in Africa handed over one-third of their crop, and comparable rates were paid by the tenants of the "public land" or "imperial land" in Egypt. Even if only part of this grain was actually shipped to Rome, taxes and rents were sufficient to support the grain dole. Moreover, additional grain was sometimes bought in the same areas where taxes in kind were levied and subsequently sold on the Roman market. State grain could be sold to mitigate price fluctuations in the open market of the other urban centers of the empire.

The *praefectus annonae* set up contracts with the *navicularii*, the shippers (who could also be the shipowners), for the transport of state grain. Shippers and private grain merchants (*negotiatores frumentarii*) were often the same people, and both groups were under the supervision of the *praefectus*,[101] as were dealers in other foodstuffs such as oil.[102] *Navicularii* who used cargo ships of a given minimum capacity to ship grain to Rome were granted specific non-economic incentives and later also coveted exemption from municipal liturgies in their communities of origin. These capacity limits and the shipwrecks of *naves onerariae* give us an idea of the common size of the ships involved in the Roman grain supply: from 10,000 *modii*, or a bit under 70 tons, under Claudius, to 50,000 (or about 340 tons) in a later period.[103] Offering to refund their losses in case of shipwreck, Claudius tried to induce the *navicularii* to sail during the winter period, but this measure proved short-lived. Public supervision also

[98] See in general Pavis d'Escurac 1976; Rickman 1980; see also Herz 1988; Sirks 1991. On the *frumentationes*, see Virlouvet 1995.

[99] See, e.g., the decree of L. Antistius Rusticus, governor of Pisidia (AD 92 or 93): *AE* 1925: 126b, on which see in particular Wiemer 1997.

[100] Plin. *NH* 18.35.

[101] Merchants were the ones who "*annonam urbis adiuvant*": *Dig.* L 6.6.3.

[102] Lo Cascio 2002b.

[103] Pavis d'Escurac 1976; Rickman 1980; Sirks 1991.

extended to other professional groups that were involved in the grain supply, such as the *mensores frumentarii*, the measurers of the grain, the *caudicarii*, the bargees, and probably the *pistores*, the bakers in Rome and Ostia. In the third century AD, the monthly free distributions of grain gave way to the daily free distributions of bread. In addition, the *praefectura annonae* supervised the collection, transport, and distribution of olive oil: the *Mons Testaceus*, an artificial hill made up of the discarded and broken amphoras that had carried it from Baetica to Rome, testifies to the vast scale of these imports. In the Severan age, oil likewise began to be distributed free of charge.

Initially, the *navicularii*, *pistores*, and other professional groups involved in the supply of Rome had a contractual relationship with the *praefectura annonae*, and were paid for their services. Later, as early as the principate of Commodus and the Severi and possibly as a consequence of the financial difficulties following the Antonine Plague, this contractual relationship was changed to a kind of liturgy (*munus*). From now on, the *navicularii* were obliged to use part of their ships' capacity in the service of the *annona*. In due course, service for the *annona* became a hereditary obligation.

The range and nature of state intervention might be taken to suggest the food supply of the capital did not rely on market mechanisms and that we are dealing with an example of "administered trade." It is certainly true that tax and rent grain accounted for a substantial and growing share of the grain that arrived at Rome. However, private merchants and shippers were involved in this operation, and their status as private entrepreneurs remained unaffected. Oil amphoras that were shipped to Rome carried painted inscriptions with the name of the *negotiator*, or *mercator* or *diffusor olearius*, that indicated the identity of the owner of this commodity during the transportation phase. In the Severan period, these names were replaced by those of the emperors and later by that of the provincial department of the imperial *patrimonium*. This suggests that in this period, the imperial administration became directly involved in the collection and transportation of olive oil, a process that is related to the expansion of imperial property in the provinces following the extended confiscations of Septimius Severus. Yet the private names re-appeared in the reign of Severus Alexander: we may conclude that even oil originating from imperial estates in Spain was sold to private merchants both before and after the brief period of direct state involvement in the oil supply.[104] Once again, the inherent ambiguity of the role of the emperor, who acted as a private individual but also set the rules of the game, helps explain why even the expansion of imperial property did not change the market character of the imperial economy.

[104] Lo Cascio 2003b, with references.

VIII THE IMPERIAL STATE AND PRODUCTION

The expansion of imperial property is one of the most important developments of this period but should not be viewed as the result of a direct intervention in the economy or of a *dirigiste* policy. The Flavian poet Statius gives an account of the duties of the *a rationibus*, the central head administrator of the imperial finances, who was originally an imperial freedman and later on an equestrian officer.[105] This passage allows us to deduce the importance of "patrimonial" incomes and expenditures for the imperial budget. Imperial properties consisted above all of agricultural estates, both in Italy (where initially they were few in number) and in the provinces. Their number and size gradually increased during the first two centuries of the empire. Most of the mines and the quarries came to be absorbed into the imperial property. A wealth of inscriptions, papyri, and ostraca documents the pace of this expansion and concomitant changes in exploitation and labor regimes. As already noted, the imperial estates and their rents played a critical role in supplying the urban centers and the army. The imperial mines provided iron for weaponry as well as gold, silver, and copper for coinage. The imperial marble and granite quarries furnished the material for public buildings commissioned by the emperor and analogous activities by municipal administrations and private benefactors outside the capital.[106] In addition, by the Antonine period most of the brick factories around Rome had fallen into the hands of individual members of the *domus Augusta*, until a virtual imperial monopoly on brick production was established in the Severan period.[107]

In the productive sphere, the emperor assumed his usual dual role as private actor and public functionary. This ambiguity had a strong impact on the ways in which the various imperial possessions were exploited. Two features were common to all of them: the involvement of private contractors from small tenants to rich entrepreneurs, and the market-based framework of their operation. Thanks to epigraphic sources, we are reasonably well informed about the management of imperial estates in north Africa.[108] Small-scale farmers (*coloni*) cultivated plots of land as share-croppers. As long as they cultivated the land, they were entitled to perpetual and hereditary leaseholds and also enjoyed the right to occupy unused land as long as they put it under cultivation. *Coloni* paid a rent in kind, normally a third of their crop, and in addition owed a number of days of agricultural labor service to the *conductor*. The *conductor* acted as a middleman who rented an entire estate from the imperial administration for five-year periods, collected the *partes agrariae* from the *coloni*, and cultivated – through the *coloni* but perhaps also with the help of a separate labor force – part of

[105] Stat. *Silv*. 3. 3. 86–105; cf. 3. 3. 43 ff. [106] For Italy and Africa, see Jouffroy 1977; 1986.
[107] Lo Cascio 2005. [108] See in particular Kehoe 1988a.

the estate. The imperial *fiscus* collected rent from the *conductores*, probably again largely in kind. The interests of these three groups overlapped to some degree: while the *coloni* were ready to invest in their parcels and bring unused land under cultivation, the *conductores* sought to maximize their income and thus to persuade the *coloni* to cultivate their plots as intensively as possible, while the *fiscus* aimed to ensure and if possible increase food production for the metropolitan market. The interplay of these interests resulted in the expansion of cultivated land on these imperial estates. The specific measures recorded on epigraphic documents such as *lex Manciana*[109] and above all the *lex Hadriana de rudibus agris et iis qui per decem annos continuos inculti sunt*[110] indicate the impact of deliberate government policy.

In the late Republic, mines, if they were located in areas included in the *ager publicus*, had been left to be occupied by private entrepreneurs. *Societates*, companies, were involved in their exploitation, but it is debated whether they were actual companies of contractors that exploited the pits with their workforce, or companies of *publicani* that exacted the fiscal revenues of the state. Privately owned mines existed on privately held land. At the beginning of the empire, particularly during the reign of Tiberius, many mines were seized by the *fiscus*, at least in some regions such as southern Spain. In recently incorporated areas – above all northern Spain, which was to become the richest source of gold for the imperial mint – the local mines had become imperial property upon conquest and were directly exploited by the imperial administration: colossal investments, possible only for the emperor, were required to extract ore with the help of complex waterpower devices.[111] In general, state control, more sporadically exercised in the Republic when the government sometimes intervened to prohibit or limit the exploitation of mines, was now more readily achieved, at least in the case of the precious metal mines. But the systems of exploitation were diverse: direct exploitation as in northern Spain, or through *conductores*, contractors, as in the iron mines of Noricum; a mixed system, a sort of partnership between the imperial administration and private small entrepreneurs, as in the silver and copper mines of Lusitania.[112] Two important epigraphic texts from a mining district in the last of these regions, dating from the reign of the emperor Hadrian, inform us about the exploitation of the pits and some aspects of daily life in the district itself.[113] One of these texts regulates the concession to private individuals of a series of activities that were to be performed as monopolies. The other one, the *lex metallis dicta*, establishes a set of rules for the *occupatio* and cultivation of the mines in

[109] *CIL* VIII 25902. [110] *CIL* VIII 25943; *CIL* VIII 26416. [111] Wilson 2002.

[112] On the forms of exploitation of the mines, see in particular Andreau 1988; Domergue 1990; on the labor force: Andreau 1989.

[113] *FIRA* I^2: 105 and 104; see Domergue 1983; Lazzarini 2001; Mateo 2001, with references.

the district. While the interpretation of the specific rules is hotly debated, some details seem to be clear: the involvement of small entrepreneurs who occupied and then began to dig the pits, in order to reach the *venae*, the ore deposits. They could claim a *dimidia pars* of each pit they dug, but also had to buy the *dimidia pars* which was property of the imperial *fiscus* for a cash price that was related to the richness of that particular *vena*. According to a widely held view, they also had to surrender half of the ore to the fiscal administration, apart from selling the rest to the *fiscus*. In any case, whatever the system that enabled these contractors to make a profit and pay for the concession, it seems fairly certain that the extracted mineral and/or the resultant metal was to a large extent available to the imperial administration. The Transylvanian mines seem to offer a rather different picture.[114] In this district of the Roman province of Dacia, the site of very rich gold mines, some extant wooden tablets record a labor contract between the miner and the *conductor* of his *operae*, the entrepreneur.[115] In this case, the laborer received a cash salary. However, the diversity in mining regimes might merely be a function of the diversity of the surviving documents: we do not possess a *lex metallis dicta* for Dacia.

The state did not have a monopoly on metal production, and there was a free market for metals. But the imperial administration exercised indirect control, at least as far as gold and silver are concerned, and it was this indirect control that allowed the state to pursue a specific policy in the issuing of coinage. For instance, the opening of new pits in new districts always seems to have been supervised if not decided by the *fiscus*. This link between control of the exploitation of the mines and the currency policy of the emperor is very clearly attested by the passage of Statius referred to above. Moreover, the behavior of the state authorities suggests an interest in the maximization of production rather than in the reduction of the costs of labor that was provided, at least in part, by slaves, convicts, and soldiers. This is particularly evident in the scale of operations of the hydraulic devices in the Spanish mines.[116]

The forms of exploitation of quarries are less well known, even though important evidence survives in the *ostraka*, inscribed sherds, that have been found in one Egyptian district of the Oriental Desert between the Nile and the Red Sea, at Mons Claudianus.[117] In a later phase, production in the imperial quarries appears to have been organized directly by imperial procurators, but it seems that the state had previously relied on the intermediation of private entrepreneurs. As to the labor force, from the evidence from Mons Claudianus we know that it was formed essentially by two types of workers, termed the *paganoi* and the *familia*. Their status

[114] Noeske 1977.
[115] *CIL* III pp. 948 ff., IX–XI; cf. *FIRA* III 150 f.
[116] Wilson 2002.
[117] Bingen et al. 1992; 1997; Cuvigny 2000.

is obscure, although it is likely that the former category consisted of free laborers, inhabitants of Egyptian villages, who had moved to the mining district. The management of marble distribution at Rome as well as in Italy and the provinces is even less clear, notwithstanding the standardized inscriptions found on some of the blocks in the quarries themselves that seem to imply strict supervision of production but whose precise function remains uncertain.[118] It has been argued that all the marble coming from the imperial quarries was claimed by the emperor, who wanted to ensure adequate supply for the furnishing and repair of imperial buildings but could relinquish part of it to private individuals and communities. Yet that does not exclude the possibility of a "secondary diffusion" of reused material. Moreover, it is certain that some manufactured marble goods such as sarcophagi were largely marketed by the imperial workshops or by the imperial administration.

The expansion of imperial property, especially through legacies and confiscations, proceeded spasmodically during the first two centuries but reached a climax with the accession of Septimius Severus, who confiscated the properties of the followers of his opponents in the civil war, Pescennius Niger, and especially Clodius Albinus. The hugely enlarged *patrimonium* was split up and part of it, the so called *res privata*, was put under the control of a new administrative department.[119] The first obvious effect of the enlargement was to eliminate the competition of a certain number of private *rentiers* in the extraction of the productive surplus which was drawn as rent or tax, and this undoubtedly increased the income of the "state," that is, the emperor. But these confiscations also changed the role of the imperial financial administration in the economy as a whole: its interference in economic life certainly increased. Several developments must be tied together. As shown above, the quantity of commodities produced on the imperial estates and directed to supply Rome increased, and the emperor's administration at least temporarily replaced the private *negotiatores olearii*.[120] The emperor also became the unique owner of the *figlinae* around Rome.[121] The contractual relationship which tied the shippers to the administration of the *annona* was changed into a *munus*: the general economic difficulties following the Antonine Plague can explain why the number of *navicularii* who were ready voluntarily to assume the duty of transporting grain to Rome fell, and why it became necessary to resort to coercion to secure the food supply of the capital. With respect to the collection of the *portorium* and perhaps also of other indirect taxes, tax-farming was abandoned and tax-farmers and their clerical staff were replaced, at least temporarily, by the imperial procurators and the imperial *familia*.[122] However, this increased

[118] Fant 1988; 1989a; 1993; Pensabene 1989. [119] Lo Cascio 2000a: 133 ff., with references.
[120] Lo Cascio 2003b. [121] See above, 642. [122] Lo Cascio 2003.

role of the imperial property or of the imperial administration did not radically change the economic structure that had characterized the first two centuries of the Principate: market relations would continue to dominate the economy of the late empire.

IX A DYNAMIC MODEL

According to the "taxes and trade" model, the economic integration of the empire was facilitated by the existence of a unified political and fiscal organization and the concentration of the wealthiest landowners in Rome and Italy. A relatively low cumulative burden of rents and taxes for the peasant majority of the population was a necessary precondition for this outcome.[123] The Antonine Plague drastically reduced the productive basis from which the imperial state drew its financial resources. Under these circumstances, and notwithstanding the panoply of measures taken to deal with this crisis, the tax burden was bound to increase and the economic integration of the empire became increasingly dissociated from the flows of taxes and trade. The expansion of imperial property, in so far as it enabled the state directly to exploit a growing share of the resources of the empire, reduced the scope of commercial transactions.

This development shows that the "taxes and trade" model of the Roman imperial economy needs to be qualified and made more dynamic in order to maintain its undoubtedly powerful heuristic value. The interplay between taxes and trade cannot be thought to be the root cause of the increase in Mediterranean sea-borne commerce since this increase had already occurred before the sharp distinction between "tax-producing" and "tax-consuming regions" was established and taxation in cash money assumed great importance.[124] Mediterranean trade in the last two centuries BC was chiefly based on the export of wine and manufactured goods from Italy to the provinces and beyond the frontiers, especially in the west. Since Italy was exempt from land tax, the export of Italian goods to the provinces cannot be explained with reference to the "tax and trade" model.

The "taxes and trade" model assumes the existence of a structural imbalance between "tax-producing" and "tax-consuming regions." Yet this imbalance could not last indefinitely. It seems legitimate to interpret the long-term dynamics of the economic relationships between these two spheres in terms of relative prices and different "terms of trade" of different areas within the empire, and a gradual deterioration of the provincial terms of trade.[125] The existence of monetary tribute and the concentration of the

[123] See above, 621–2.

[124] Woolf 1992, for the thesis that economic integration in the Mediterranean economy peaked in this period.

[125] von Freyberg 1989.

recipients of rents in Rome caused the influx of capital into the peninsula. This imbalance was offset by an ever increasing flow of imported provincial goods into the same area, whereas Italian exports abated. In the end, this imbalance led to stagnation in Italy and economic growth of the provinces (especially in the west), as long as efficient techniques of production spread from Italy to the less developed areas:[126] if prices were lower in the provinces, it was more profitable to produce there and to sell in cash-rich Italy.[127] In so far as this process served to undermine the erstwhile economic primacy of Italy, it was perfectly consistent with the diversification of the geographical provenance of the Roman ruling class and with the transformation of the empire itself: in economic terms, the core became less of a core while the periphery was rendered less peripheral.

[126] Gunderson 1976. [127] Lo Cascio 1991a.

PART VII

REGIONAL DEVELOPMENT IN THE ROMAN EMPIRE

CHAPTER 24

THE WESTERN PROVINCES

PHILIPPE LEVEAU

The western provinces can be divided into two zones according to their relationship to Rome, the center of power: a Mediterranean zone in which contacts via the sea prevailed, and a continental and oceanic zone separated by the Alps from Italy. They comprise the Libyan, Iberian, Celtic, and Germanic linguistic zones where Latin, the language of administration imposed by the conqueror, also became the idiom of culture. Since they had never been part of the great Hellenistic empires, their population had no experience of state organizations. With a few notable exceptions, administrative practices characteristic of ancient cities were recent and Roman in origin.

These territories were thus new zones open to Roman initiatives. This marks a first difference in character compared with the east where exploitation had started earlier. Moreover, our written sources for understanding the economy are less abundant and particularly so for the continental sector. They favor the urbanized coastal areas of the Mediterranean, the sectors of the economy where the state intervenes – the emperor's laws and administration – and areas of military interest.

Our knowledge of regions that were less urbanized, less subject to administrative control, and not affected by military operations is mainly dependent on archaeological sources which are difficult to organize and use as evidence for economic history. Nevertheless, these sources are primarily responsible for the striking increase in our knowledge of the provinces of continental Europe over the last twenty years. Our understanding of rural settlement patterns has been profoundly altered by the introduction and increasingly general practice of landscape archaeology and rural field surveys. In towns and their immediate surroundings, the *suburbium*, the remarkable development of rescue archaeology has led to a proliferation of excavations. At the same time, the application of modern methods in the earth sciences and environmental studies has allowed us to discover traces of craft activities which had previously been undetected.

I MORE AND LARGER CITIES

Population figures remain modest: around 25 to 30 million altogether according to most recent relevant estimates for the provinces of north Africa, Spain, Gaul, Germany, and Britain.[1] The remarkable urbanization of the west which goes hand in hand with a numerical and qualitative increase of rural sites bears witness to the dynamic growth of the early empire.

Rome's foundation of citizen colonies and later of veteran settlements strongly accelerated the process of urbanization of these provinces. In a few provincial areas, the density of cities comes close to those of the regions of Italy and of the east that had long since been urbanized. This is the case in the eastern part of Africa, in Baetica, and southern Lusitania, in Gallia Narbonensis along the Mediterranean coast and extending north up the valley of the Rhône.

But outside these privileged sectors, the west cannot compare with the east, which was unquestionably more densely populated, more urban, and in general richer and more developed. In this part of the empire, the main concentrations of people are agglomerations of barracks (*canabae*) capable of uniting 40,000–50,000 around the army camps of the *limes*.[2] Carthage was the only city which, with more than 100,000 inhabitants – estimates range from 60,000 to 300,000 inhabitants – might qualify as a "megapolis." For regional centers, including provincial capitals, our estimates barely exceed 10,000–20,000 inhabitants. In Gaul and the north-west, some of these settlements do not meet the criteria of "*urbanitas*" and hence qualify only as *vici*. In the Iberian peninsula under the Julio-Claudians, a quarter of the 399 autonomous cities were exempt from the *stipendium*; beyond the few large agglomerations, cities were but modest centers, the population of most of which would vary between 1,000 to 2,000 inhabitants.[3]

II THE COUNTRYSIDE

The increasing number of rural sites, revealed more distinctly from the beginning of the Christian era by the inventories and archaeological surveys, is too pervasive to be explained as an overrepresentation of those sites which, because of the ceramic evidence, can be "read" more clearly than in previous and later periods.

The quintessential rural Roman settlement and center of agrarian production, the *villa*, witnessed a boom paralleling that of urbanization. In recent years, systematic surveys and excavations everywhere lead to a dramatic increase of finds, so that the figure of about 1,000 villas for the Gauls,

[1] See above, Chapter 3, Table 3.1. [2] Gros 2000b: 77. [3] Le Roux 1995: 80.

Germanies, Spain, and Britain given by Smith in 1997 has turned out to be much too low.

One and a half centuries of archaeological research have revealed the diversity of models to which this structure corresponds. Italian archaeologists have defined a type of villa which corresponds with the texts of the Latin agronomists, the "Settefinestre model," divided into three parts: residential building, *villa rustica*/production facilities, and accommodation for the slave labor force.[4] The model of the slave villa which produces for the market corresponds with a situation found in Italy towards the end of the Republic and in the early empire. But the Roman villa must equally allow for *otium* and thereby be a true country mansion.

This ambivalence explains why archaeologists find it difficult to establish a typology of structures emerging from two architectures: an architecture of amenity, which combines the basic forms of decorative Roman architecture in two broad classes of layouts, the peristyle villa and the porticus villa; and a functional architecture that varies regionally and according to mode of production and period. Like the city (or unlike it as the case may be?), the villa can be seen as a factor of economic development or as a parasitic structure expressing the elites' domination of the countryside. Chronology, purpose, or use are not the only factors dictating the typology of the villa. Location matters too. The agrarian economy of Italy, as opposed to the provinces, is marked by the influx of slaves. The interplay of these factors explains why it is difficult to observe the "Settefinestre" model outside Italy. In the western provinces, the producer-villa did not become established before the middle of the first century AD. But this type arrived earlier on Mediterranean coasts than in central Gaul. In some regions we find what are essentially villas with considerably more modest residential sections. This is the case in Africa, around Caesarea Mauretaniae, beyond the *villae maritimae* of the coast.[5] In Gallia Narbonensis, the number of villas with developed residential quarters is relatively small taking into account (given) the wealth of the provincial aristocracy. In Belgica, Germania, and Britannia, excavations have produced many examples of a succession of estates, one replacing the other: a "small" villa of the first century AD, a "medium-sized" villa of the Antonine epoch, and a large palatial villa at the end of antiquity. This sequence has also been observed in the Iberian Peninsula and in Aquitania. Numerous attempts at evaluating the extent of domains have foundered on a fundamental problem: the relationship between the sizes of the buildings of an estate and that of the land which belonged to it. There is no direct relation between the centuriation, the grid of land assignation, and the *villa*, the building. Excavations record the successive developmental stages of a building whose owners are known only in

[4] Carandini 1985. [5] Leveau 1984.

exceptional cases. The alternative resulting from this artifact of our source evidence lies at the heart of the problem of the economic development of the west. Is the construction of the villas, a century after the conquest, the consequence of general prosperity brought by Rome, or does this new prosperity rather derive from the investment of wealth previously accumulated by indigenous aristocrats or from plundering? The urban elites and the owners of villas belonged to the same class. But the same sites have permitted two types of interpretations: first, an interpretation in terms of discontinuity – a Roman has taken the place of a local aristocrat; families have concentrated the properties, and alternatively in terms of continuity: the increasing wealth of an individual family finds expression in the construction of more and more luxurious buildings. Our interpretations are intimately linked to paradigms which have been shaped by written Italian sources or inspired by better documented modern history. This difficulty makes it necessary to look at studies of individual regions.

III THE *VICUS*

The place of the *vicus* in the rural economy of the west can only be understood in terms of some elaborate historiographical constructs. In a simple model of role division of city and country, the political functions are carried out by the city; the productive functions are divided between villa – for agricultural production – and the *vicus* for most craft production. In the provinces of the west and of Gaul and Germania in particular, the *vici* would have gathered a middle class of farmers, owners, or *coloni* and of artisans who accepted the standardization of the pottery production proposed by the traders. This free population generated regional economic development. There, innovation would have found a more favorable framework than in Italy where the massive influx of slaves and the persistence of slave labor as the mode of production would have prevented it from flourishing.[6] This theory rests on research showing that the Roman occupation of the countryside was not limited to the import of the Roman villa model. Resembling the *oppidum*, as a pre-Roman type of group settlement, the *vicus* has attracted the attention of those archaeologists who are particularly interested in identifying continuity. On the other hand, the identification of production, in particular the activities of artisans, which are not well represented, is a task for a discipline capable of studying the social strata that are less well represented by written sources and neglected by classicists.

Inventories of excavations have allowed us to identify many settlements of all sizes characterized by their functions as trading post *vici*, artisan *vici*,

[6] Whittaker 1990.

peasant *vici*, mining *vici*, etc. But excavations in the vicinity of villas compel us to reject the idea that these sites were isolated. Some *vici* are directly attached to villas, while others are placed several hundred meters from a great villa. In Saarland, the case of Bliesbruck-Reinheim offers an exemplary illustration of the degree of proximity between a great villa and a village.[7] A dynamic approach to the evolution of the rural habitat in the west takes account of such typological diversity. Because of the conquest, the habitat begins to decline. This marks the beginning of new groupings: the rural habitat tends to agglomerate into a *vicus* developed around a center belonging to a private estate, the villa, or in its immediate proximity. The same process of aggregation explains why in Britain and Germany, and along the *limes* in Africa, townships formed themselves around forts and sometimes survived the latters' disappearance. Therefore, the relationship between city, villa, and *vicus* deserves to be described in terms of complementarity and succession rather then opposition and mutual exclusion.

It is not certain whether the three Gallic provinces were the zone in which *vici* first appeared. In the context of still modest urbanization and importance of monumental centers, the relatively expansive extension of the *suburbium* contributes considerably to the impression that northern Gaul was the most developed region in terms of material craftsmanship.

IV MASTERING THE LAND AND THE DEVELOPMENT OF THE *AGER*

In archaeological research, two complementary procedures explain the progress achieved in our knowledge of the extension of land cultivated by Rome in the west: archaeo-morphology and archaeological surveys. The former, aerial archaeology and landscape archaeology, have recorded spectacular successes. Vertical aerial photographs and cartographic analysis have demonstrated the crucial role the Roman period played in the west in dividing the land into plots. Centuriation went hand in hand with the foundation of colonies from the end of the civil war onwards and ensured the takeover of the *ager publicus*. A military framework and forced indigenous labor made it possible to commence the cultivation of large expanses of land, from the north African steppe to the forest of oceanic Europe, and everywhere to make inroads into the marshland. Centuriated, divided, distributed or rented out, these new lands considerably increased the size of the *ager* (the cultivated territory within the empire). Meanwhile, since the 1990s, attempts to describe the appropriation of provincial land by Rome by studying fragmented fossils have become increasingly contested. It seems now excessive to compare the centuriation to a vast net thrown by the

[7] Petit and Mangin 1994.

Roman conquerors over the west and to call it "domestication" of the landscape, analogous to that of the American west in the nineteenth century. In its actual state, the map of centuriations in Europe contrasts in a way which is too schematic to be plausible a Europe of Celtic fields with a centuriated Europe, where France and Spain are particularly prominent as the two countries where the "cadastre paradigm" has been most successful. The elimination of many pseudo-centuriations in Gallia Narbonensis and the extension of archaeo-morphological research in the regions of the north and in Britain leads to the formulation of some plausible propositions.[8] This evolution fits with the assertions of archaeological surveys, which from the 1970s onwards have become a scientific activity. This has multiplied the number of known sites, contributing unarguably to the picture of demographic expansion at the beginning of the Roman period in the west.

More recently, thanks to palaeo-environmentalist studies, already used convincingly in northern Europe,[9] a third means of evaluating the development of the *ager* at the expense of the *saltus* has emerged. Thus, some environmentalists attribute all perceptible changes in the vegetation from the beginning of the Bronze Age to the establishment of the Mediterranean climate, in particular the growing importance of forms of vegetation which have adapted to the dry summers that characterize this climate. A change in annual rainfall is said to have started in the south of Spain and to have moved up to the Gulf of Lions. But, observing that agricultural and pastoral practices have similar effects to a natural drying-up of the climate, others have attributed these changes in vegetation to human activity. In fact, micro-regional studies in Languedoc show a link between the dynamics of vegetation and those of economic development. The early start of the deforestation in western Languedoc (Aude basin) is linked to its vicinity to Narbo (Narbonne), the capital of the province, to the regional urbanization which is much stronger than along the eastern coastal part of the Languedoc, and to agricultural growth identified by anthracological studies. In the same way, in the coastal zone of Catalonia, the difference between the territories of Barcino and Tarragona has less to do with natural conditions than with the development of the Roman occupation in the Ebro delta. The south–north gradient observed in the evolution of vegetation certainly does not reflect an evolution of the climate, but the conquest of the *ager* starting from the southern shores of the Mediterranean.[10]

V AGRICULTURAL PRODUCTION

Cereal production was surely ubiquitous, and ought to be the best known form of agriculture. This is particularly so in the area of trade of which

[8] Chouquer and Favory 2001. [9] Behre 1988. [10] Leveau 2002.

the state kept control for the *annona* of Rome and the frontier army. Even though grain was part of a market which was, in principle, free, this market sector was watched over by local authorities keen to avoid shortages. As a result, there are written sources which – and this is unusual – do not only concern the city of Rome. The areas of production are less well attested. Outside Africa, for which the data of the *annona* can be used, the available evidence does not allow us either to evaluate the quantities produced or characterize the zones of production with any degree of precision. The geography of grain production is too often extrapolated by economic historians from a matching up of the map of the units of production – the villas – the centers of consumption – the cities and the *limes* – and of the land suitable for grain production. Partial exceptions are Gallia Belgica and the north-west of Europe, where regional cereal cultivation is by now well documented thanks to palaeo-carpology and research on technical innovation.[11] The same holds for animal production. It was of fundamental importance for the food supply, but archaeological data are still not explicit enough to identify specific zones of husbandry. Meanwhile, archaeo-zoology contributes qualitative data which fuel debates over the increase in size of domestic animals; as this happened from the beginning of the conquest, it seems it can be attributed to improvement in animal husbandry.

Since the essence of what can be observed about arable techniques and animal husbandry relates to the consumption of their products, archaeology allows us to "read" the data better and to identify zones of olive and wine production and to study their evolution.[12] The techniques of studying amphoras as economic indicators developed in Italy by international teams have enabled us to write a history of the trade of foodstuffs and to identify the routes which brought them to the centers of consumption, in the first place Rome, then the camps of the *limes*, finally to the provincial sites.[13] This history for the provinces of the west shows a reversal of the situation analogous to that of pottery production: first Gaul, but also the Iberian Peninsula, evolved from importers of Italian wine in the Dressel amphoras to exporters to Italy in amphoras of a specific type.

Olive oil is an exclusively Mediterranean product whose importance is linked to a cultural phenomenon: it plays an important role outside its zone of production, namely in the diet of the army on the *limes* and of the Roman and Romanized elites. This brought about a growing demand which is one of the important factors of the agricultural conquest in the Maghreb, well established by archaeological surveys and epigraphic data. The inscriptions of the *saltus* of the Mejerda occupy an essential place in this dossier. In the field, recognizing production zones is helped by the stone components of oil presses. At the end of the seventies, Carandini, basing his claims on

[11] Raepsaet 2002. [12] Leveau et al. 1993. [13] Panella and Tchernia 1994.

studies of pottery, proposed to explain the urban density in the north of modern Tunisia as a function of the export of African red slip ware and of agricultural products: grain – though the income from production on imperial domains did not benefit the cities – and above all oil, which was going to compete mainly with that of Baetica.[14] Some twenty years later, drawing together archaeological facts available for three regions, the south of Spain, the Tripolitana, and Tunisia, Mattingly showed that there was a considerable increase in the amount of land devoted to olive growing.[15] In the centuriated regions of *Africa vetus*, surveys conducted on foot and from the air have provided evidence for a rapid expansion in the numbers of olive presses on geometric plots of land or for traces of plantation holes. These observations have also been used by Hitchner as evidence for the capacity of the Roman economy to generate growth.[16]

Since then, the microregional study conducted by a Tunisian Danish team of a space of 40,000 hectares around Segermes, one of the many little towns of Africa Proconsularis, has led Ørsted to insist on the diversity of soils and production methods. He also reminds us that it is necessary not only to see the agrarian economy of north Africa with regards to the Roman market, but also to take into account the regional dimension.[17] The material found by surveys clusters chronologically in a period of at least fifty years during which the finds are rarely strictly contemporaneous; therefore one has to refrain from drawing too much of a parallel between antiquity and the Tunisian olive production in the nineteenth century. It is here that observations on the presence of *Olea* in pollen diagrams based on the series of marine sediments from the Gulf of Gabès become relevant:[18] there, the Roman period shows a share of about 10 percent, i.e., the same level as observed in the sediments from the harbor of Carthage during the same period.[19] These percentages, double what palynologists would accept as evidence for olive cultivation, confirm the importance of olive trees within this landscape. But they do not allow us to assume a monoculture comparable to that of the ninteenth century. In the same sediment sample, the percentage increases to nearly 20 percent in the Middle Ages and up to 40 percent during the French mandate (late nineteenth to mid-twentieth century). Such percentages were reached in antiquity too, but only elsewhere, namely in Baetica, another major region of olive production. In the pollen profile of Laguna Medina, near Cadiz, a peak of *Olea* reaches nearly 40 percent for a period datable to the second/third century AD. These measurements contrast with previous and later periods during which the curve settles between 5 and 10 percent.[20] The combination of these facts thus justifies the hypothesis of commercial agricultural production, but also documents relative differences in importance for different regions.

[14] Carandini 1969/70. [15] Mattingly 1988a. [16] Hitchner 1993.
[17] Ørsted 2000: 178. [18] Brun 1983. [19] Bottema and Zeist 1985. [20] Stevenson 2002.

From the 1990s onwards, studies of viticulture, whose importance for the economy of Roman Italy had already been known from the precise information offered by ancient treatises on agronomy, have once again become a major preoccupation of archaeological research. Outside Italy, its importance is tied to the inclusion of wine in the ration of legionaries in the camps of the *limes* and to consumption by Italian settlers and the provincial elites as a departure from a pattern of consumption which had reserved wine for special occasions only. In the same way as for olive oil, the identification of the provenance of the amphoras in which wine was distributed has advanced our knowledge of the zones of production.[21] In Provence and Languedoc, where both plants are cultivated, the excavation of wine storage facilities led to a reevaluation of the importance of viticulture relative to olive cultivation. It is difficult to distinguish the two just through careful study of the possible or likely stone bases and supports of oil and wine presses which are rarely distinguished by casual field survey. Brun and Laubenheimer have admirably synthesized some twenty years of research on viticulture in Gaul.[22] They have shown its essential place in the agricultural economy of southern Gaul. But there is a crucial difference between the two plants: the farmers of the ancient world were able to move production nearer to the places of consumption by making the Mediterranean plant adapt to more northern climatic conditions. Its importance in Aquitania has been confirmed. Hence "with the exception of isolated regions and it seems the Alsace, the Mosel and Rhine areas," the vine had conquered "from the first century AD all the territories it was to occupy in the Middle Ages."[23] Archaeological data prove that it reached Britain as well. Viticulture on the Mosel and Rhine offers remarkable examples of integration into the local economy. The archaeological evidence for its rise clearly postdates the construction of the legionary camps, which means that in this sphere their presence can be linked to political developments. The oldest evidence dates from the third century. The civic and military elite, and later the imperial court which was established in fourth-century AD Trier, stimulated "the demand for good wine and provide[d] the financial means to establish both wine production plants and the vineyards themselves."[24] But one should not imagine the Roman west as one huge vineyard as in the past, based on Arab writers, one had pictured Africa as one huge olive grove.

VI MINES AND QUARRIES

Urban and rural building works, road construction, and hydraulic works necessitated the opening of quarries and the construction of ovens to burn bricks and lime. The market was local or at most regional. Where the environment lent itself to it, quarries were opened near the building site and

[21] Tchernia 1986. [22] Brun and Laubenheimer 2001. [23] *Ibid.* 212. [24] *Ibid.* 178.

maintained for as long as building went on: the quarry of L'Estel near the Pont du Gard provides an example of this practice. In other cases, building programs generated local supply: the lime of the ovens of Iversheim sur L'Erft supplied the sites along the Rhine; the stone from the Midi moved up the Rhône towards Lyon; brick cargos circulated on the Guadalquivir. The precious marbles from Africa, Italy, and the east are found on sites along the Rhine.

The pattern is different for the products of mines: lead; which is generally used in particular for urban water supply; silver, which is gained from galena, its ore; and gold, whose exploitation was controlled by the state. Mining activities were stimulated by urban development, the luxury of the aristocracy, and the Roman state's demand for metal for coinage. While the mines of the eastern provinces had already been exploited in earlier periods, the mining areas of the west were put to use successively and in a coordinated manner to respond to the imperial needs and to ensure the monetarization of its economy. The activity of mines in Spain, brought to light again by the research of Domergue, is at present the best known.[25] The "industrial" scale of the exploitation is demonstrated by the importance of the workforce, reaching (according to Polybius) 40,000 workers in the mines of Carthago Nova (Cartageña) (Strabo 3.2.10). In principle, one cannot count as enrichment of the region the considerable means invested by the Roman state in the exploitation of the resources of their provincial subjects. However, the Iberian example shows that during the empire the system was able to evolve. In the south-east of the peninsula, the mining sectors of the eastern Sierra Morena and the Sierra of Cartageña and of Mazaron were progressively integrated into the regional economy. The activity of the mines of Carthago Nova largely came to an end towards the Augustan period. But the families of Italian origin which had been involved in their exploitation for several generations ensured the durability of the economic development of Carthago Nova, which became a colony under Caesar or Augustus. This situation distinguished this zone from other mountain districts which remained marginal.[26]

VII MANUFACTURE

(a) *Metallurgy*

The working of precious metals with their specific uses has to be contrasted with the working of iron. The use of this metal is crucial for the efficiency of tools used in both agriculture and manufacturing. In principle, its primary production did not differ from that of other metals: after a period

[25] Domergue 1990. [26] Orejas 2001–3.

when mining concessions were given to rich Italian entrepreneurs, production came to be controlled by *procuratores ferrariarum* attested in Gallia Narbonensis and Lugdunensis. But on the level of consumption there are fundamental differences. The example of the Swiss plateau is typical. In an area systematically studied by surveys, the Roman period is characterized by a real abundance of iron in everyday life.[27] The mediocre conservation of this metal and the recycling of objects had led to an underestimation of its use. Systematic studies of countless known piles of slag allowed only identification of slags from the forge rather than from smelting, which would be proof of primary production. The metal was imported in the form of ingots: from zones nearby, located in France? Noricum? Burgundy? The question remains open. But the last one of these regions is among those where primary iron production of major importance has been recognized. Systematic survey has in fact allowed us to identify mining works and piles of slag in central Gaul, among the Senones, the Haedui and the Bituriges and in Gallia Narbonensis, in the Montagne Noire, where production greatly increased from the middle of the first century BC onwards.

Containing hundreds if not thousands of workshops, these zones can be distinguished from districts of middling importance, where there are some hundreds of sites. Systematic use of Carbon 14 together with traditional archaeological techniques has enabled us to distinguish them from regions which had been thought to be important in antiquity but only had become so during the Middle Ages. The region between the Sambre and Moselle rivers is a case in point. On the other hand, in Morvan and Berry, the clever use of field survey enabled researchers to propose the existence of areas that had been specifically used for the reduction of iron ore.[28] This example illustrates the unevenness of regional development. Agetencum, the main settlement of the Senones, where we know mainly about primary production, is described as a *vicus*. By contrast, Autun and Avaricum, the main settlements of the Haedui and the Bituriges Cubi, were endowed with all the public monuments commonly associated with Roman urbanism. A class of metal-working craftsmen is attested there. This continued into the late empire with the installation of *fabricae* for arms in these two cities, in Autun itself and in Argentomagus. Since the 1980s, when Cleere reviewed the organization of this production in the western provinces of the empire, research spurred on by Mangin has allowed us to draw a map of several zones of production in Gaul.[29] Recent fieldwork and the systematic use of geo-chemistry to differentiate slags from the smelting of the mineral from forge slags of smithies have provided more information than textual sources would have offered.[30] The same is true of the metallurgy of lead. Isotopic geo-chemistry shows the diversity of its provenience in western Switzerland:

[27] Mangin et al. 1995. [28] Leroy 2001: 90. [29] Mangin et al. 1995. [30] Serneels 1998.

local (from the Valais), regional (from the Vosges) and material from further away (Britain, Spanish peninsula).[31]

(b) *Pottery*

Craftsmen worked in all kinds of settlements. There is not a single case of an urban agglomeration without workshops, located in the *suburbium* rather than the civic center. Detailed excavations have shown that they were to be found just as much in villas as in village-type agglomerations. By "detailed excavations" we mean those excavations which not only investigate buildings and systematically collect all visible remains including slags, crucibles, and fragments of moulds, but also thoroughly sieve excavated soil (or subject it to flotation, thereby recovering all plant remains, bone, and debris from craft production). This procedure has brought to light, for example, tiny droplets of bronze which allowed us to determine the location of manufacture of objects and metal vessels typically found elsewhere, exported from the Rhineland to the Orient. They have corrected the focus of discussion of the artisans, which once put more emphasis on their social status and the distribution of their products than on production itself.[32]

It is from this angle that one would expect insights on pottery, which survives in large quantities. We have underlined the importance of widespread use of terracotta for the production of building materials and containers for agricultural products. The real importance of this product within the wider economy is of course much more limited. The value of amphoras is mainly that of their content. To a lesser degree the same is true of pottery dishes, the main chronological indicator in stratigraphy of Roman sites. This limitation does not prevent us from paying proper attention to the massive production of Gallic *terra sigillata*. Its presence in Pompeii in AD 79 signals the reversal of the relationship between the Gauls and Italy and the rise of the provinces. A map of *sigillata* workshops lets us follow an evolution which began with the settlement of Italian potters in the *suburbium* of Lyon. It continues with their migration towards the north-western margins of Gallia Narbonensis, at Montans and La Graufesenque, a *suburbium* of Condatomagus, the capital of the Ruteni, then from there successively towards Lezoux and finally towards the north-west, Argonne and Lorraine (Gallia Belgica) and along the Rhine.[33] In fact, production of fine pottery becomes more and more regional. In the Iberian Peninsula, from Claudius onwards, regional products replaced pottery from Gaul and were distributed throughout Mauretania Tingitana from two main centers in the Ebro valley around Tritium Magallum and Andujar in Baetica. They

[31] Guenette-Beck and Villa 2002. [32] Polfer 2001: 10. [33] Woolf 1998: 193–202.

differ in importance: Tritium Magallum is as important as La Graufesenque, while Andujar wares were disseminated less widely. But in both cases we are dealing with highly urbanized areas. The third provincial area which reveals comparable productivity, Africa, exported its *sigillata*. The works of Peacock have shown that one of these, African Red Slip C, was produced in central Tunisia.[34] But the origin of African Red Slip A, widely distributed around the western Mediterranean, is still unknown. It would therefore be premature to pronounce on its role in a regional economy. These workshops are also a sign of progress: current research on the workshops of central Gaul – the most important are around the site of Lezoux in the Allier valley – between the first and the fourth centuries AD challenges overly linear views of the evolution of centers and patterns of production. An archaeology of furnaces shows how the potters responded to the need "to adapt their working tools to the constraints of highly competitive markets."[35]

VIII THE GEOGRAPHY OF TRADE AND REGIONAL DEVELOPMENT

In the west, where a common currency had developed over the course of the first century AD through the disappearance of municipal coinages and increased monetarization of the economy, trade depended primarily upon the development of infrastructure, most importantly the systematically organized road network radiating from Rome outwards. Of course, the Roman state limited its efforts to the *viae militares* which were essential for the *cursus publicus*. But trade followed swiftly in the wake of conquest and administration; traders were to contribute for their maintenance with their taxes. We must not exaggerate the scope of the road system. Modern maps of the Roman road network do not take time into account: they represent the sum total of all road works in antiquity. "Some routes are bound to have shrunk and disappeared while others, appearing later, replaced them."[36] Roads were not a completely new development either: before Rome, during the Barcid period, an organized network already existed in the Spanish peninsula; in southern Gaul, the movements of the Cimbri and the Teutones and those of Roman armies show the importance of movement on land routes between northern Europe and the Mediterranean. Strabo drew attention to "the harmonious agreement (*homologia*) which characterizes" the Gauls "in relation to the water routes and the two seas which form its borders" (4.1.14). The Roman investment in infrastructure to make these river systems more navigable, which was considerable, also contributed to

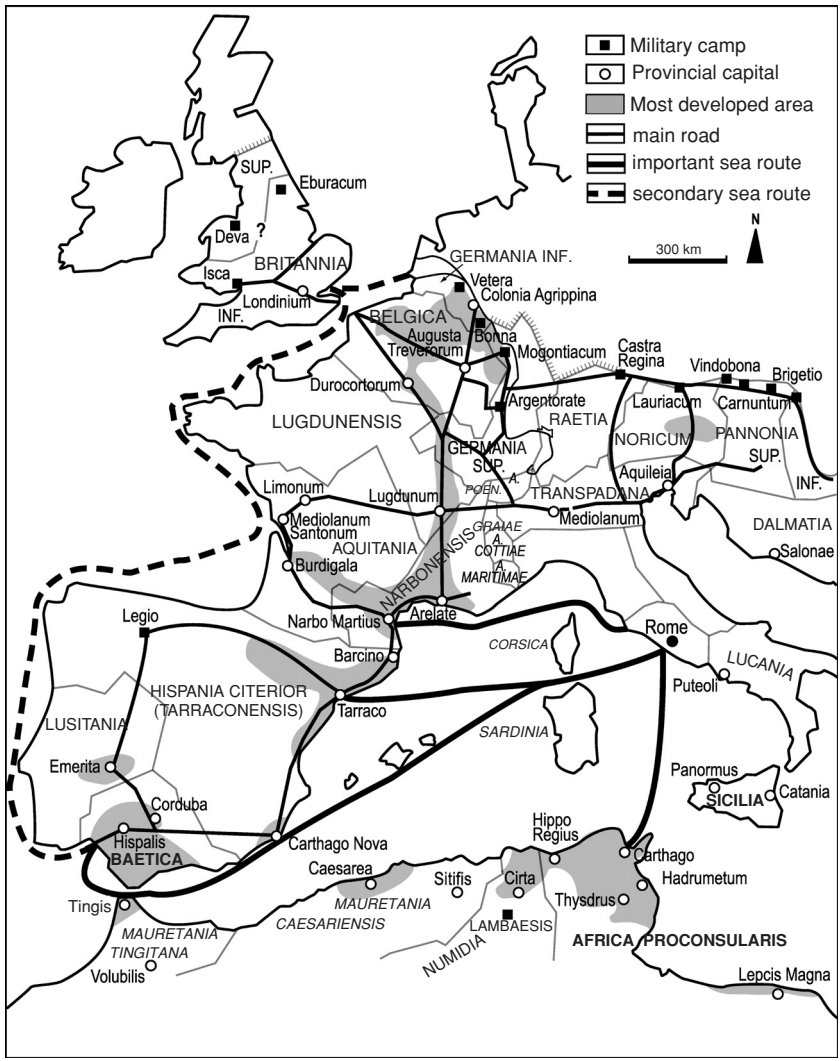
[34] Peacock et al. (1990). [35] Delage 2001: 134. [36] Sillières 1990.

the development of this network. It was chiefly through the Rhône valley since the Hallstatt period that objects produced in Etruria, Greece, and the east penetrated the country. It remained the main commercial route from the Mediterranean to the Rhineland.

Punctuated by a string of cities, whose construction marks a break with the geography of the tribal territories of the pre-Roman period, there existed a land route that ran parallel with the river. Its development had begun with the access canal to the Rhône which Marius had dug in 102 BC. It combined more or less developed river sections. Beyond Lyon, the canal from the Saône to the Mosel planned by the legate for Germania Superior (Tac. *Ann.* 13.53.2) was never realized. This axis was competing with the routes along the Atlantic and the Danube. From the second century AD onward it was possible to travel from the east directly to the regions of the north-west by following first the Danube and then the Rhine. As elsewhere, trade benefited from the same network of roads or waterways designed to enable the movement of troops along the *limes*. The Danube route did not completely replace the central axis. The same is true of the route along the Atlantic, which linked Mauretania Tingitana and the Iberian provinces, in particular Baetica, to Britannia. In theory, this doubled the old route linking the Mediterranean to the Atlantic via the Aude and the Garonne. In reality, however, there were obstacles to its use in the Gulf of Gascogne which even advances in maritime navigation did not fully overcome.

Until Rome's assumption of control of the Rhine–Danube regions, most trade followed the routes along the Rhône or over the Brenner and widely skirted a mountain range destined by its altitude to remain of marginal importance for trade. Once Rome had extended its empire northwards, geography demanded that the state exercised total control of the Alpine passes. This explains why during the early empire the administrative geography of these provinces was defined by the routes and itineraries which ensured travel from Italy: the alpine provinces commanded the passes.[37] Here too the merchant followed the army, which led to the type of settlement which was to become the alpine city. On the Italian side these grew into "real" cities. On the provincial side, we find *vici* located along the routes leading down from the passes. These were closely linked to transalpine traffic but also increased the value of local resources. In Gallia Narbonensis, the *civitas* of the Allobroges is attested in a pre-alpine form as in Vienne and in two alpine *civitates*, Cularo/Grenoble and Geneva. On the other hand, there does not seem to be any decisive change in the exploitation of the other two resources specific to the mountains, namely vegetation (forage from the pastures and rangelands and wood from the forests) and the mines. The very different evolution of the economy of the

[37] Van Berchem 1982: 200.



Map 24.1 Communications and development in the western provinces
Graphics: M. Sintès-Aioutz

mountain areas demonstrates the impact of the new centrality of Rome in defining an administratively fragmented area. When describing the borders of the Gallic provinces Strabo (4.1.1) stresses the opportunistic character of the division of the provinces which takes no account of the old borders. This was particularly true in the Alps, where the new organization was necessitated by a completely new circulation network.

IX THE WEIGHT OF THE REGIONS

The example of the Alps leads to the central question which now can be addressed: what was the impact of "Romanization" on the regions? This concept is open to criticism on account of its vagueness, but its very flexibility allows it to be used as a footbridge providing a tenuous passage between different domains of provincial life (religion, language, art, economy . . .) where one can recognize the influence of Rome. I have used it above in connection with an activity specific to mountains, mining, which in the south-west of the Iberian peninsula allowed the integration of certain mountain regions – the Sierras of eastern Morena, Cartageña and Mazaron – while others retained their marginality. The Roman empire made use of the technical means at its disposal to master an environment in very specific contexts which have yet to be categorized. This leads us to the question of the conquest of the cultivated land which also had been touched upon earlier on with reference to southern Gaul. In the first century AD, the Elder Pliny compared Gallia Narbonensis to Italy (*HN* 3.31). But this complimentary generalization conceals extremely diverse conditions. The Narbonensis featured vineyards, olive groves, fields of grain on the silt of the Rhône, transhumant flocks in the Crau, towns aligned along the coast and along the Rhône and Aude-Garonne valleys. But it also included remote alpine valleys.

Similarly, the contradictions in Pliny's observations on the Iberian provinces might be explained both chronologically, in terms of different stages, and geographically, in terms of regional differences. Their urbanization came to a halt under the Julio-Claudians when a quarter of the autonomous cities escaped the *stipendium*. "Beyond some sizable agglomerations, the large majority of cities were centers of modest size which could vary from 1,000 to 2,000 inhabitants."[38] Meanwhile, *pace* Pliny, who calls the award of Latin rights by Vespasian "rash in a period of turmoil for the state" (*HN* 3.4.30), the municipalization of the peninsula cannot be understood without the context of a strong economic development. Baetica, where Pliny counted 175 cities, and neighboring Lusitania saw a level of development which recalls that of Gallia Narbonensis. In Baetica since the Flavian epoch, Gades, Hispalis, Corduba, and Italica produced a remarkable series of aristocratic dwellings. Birthplace of two emperors, Italica spread a model pattern of the aristocratic house in the peninsula.[39] Emerita, capital of Lusitania, received successive waves of settlers. Its centuriations and the construction of dams associated with large villas and with irrigation zones, fit with the picture of a true "pioneer frontier." In the north, the vast area of Tarraconensis was divided into three *conventus* whose

[38] Le Roux 1995: 80. [39] Gros 2001.

centers formed nuclei of development: Tarraco and the coastal cities of its *conventus*, Caesaraugusta in the Ebro valley, and in the south Carthago Nova with its mining zone. In North Africa, where the way for Romanization had been paved by the encounter with Punic civilization and, from Masinissa onwards, the wish of Numidian princes and Moorish kings to embrace classical civilization, is not fundamentally different. Africa Proconsularis and Numidia stand out by virtue of the sheer number of towns, the quality of their urban culture and the position of their elite within the empire: under Marcus Aurelius, 15 percent of the senators whose local origins are known were Africans. This development affected above all northern Tunisia and its extension into the north-east of Algeria. But the idea of a radical separation of these zones from that of a mountainous Mauritanian west left to primitive Berber tribes is not acceptable. This contestable conception[40] revives the old contrast between a "Roman Africa" and a "forgotten Africa"; the three capitals of the Mauretaniae – Sitifis on its plateau, Caesarea and Tingi on the coast – constitute just as much poles of urbanization and development. In this the western Maghreb, the sea routes play a principal part while a geo-ecological factor, the rise of the desert to the Algero-Moroccan border, accentuates the peripheral character of the region.

In the early empire, the preponderance of the Mediterranean regions is indisputable. Did this change later when the emperors established themselves in Trier? Did they simply respond to a military necessity or was this the consequence of a reorganized imperial economic system? If so, after Rome lost its central position, peripheral regions would have acceded to the status of "new core regions." Haselgrove maintains that the historic rise of the regions of northern Europe clearly predates the break-up of the unity of the Mediterranean brought about by Islam.[41] He argues that between Augustus and the crisis of the third century AD, the countries between the Mosel and the Rhine had seen remarkable development in which their support for Rome in the crisis of AD 69 constituted an important stage. The *civitates* of the Treviri and the Mediomatrices involved in providing supplies for the frontiers would thus have become poles open to innovation.[42] The military camps and the cities of the *limes* would also have attracted long-distance trade. These incontestable facts, which justify attributing to the frontier regions this role in economic development, should be contrasted with others, which put this overestimation into perspective and attribute the shift of the center of power to a (geographical) periphery to geopolitical and military considerations rather than to the economic weight the periphery had acquired. Under the Severans only a small number of senators came from the three Gallic provinces. The contrast between a less urbanized western Gaul and an east traversed by the commercial axis from the Rhine to

[40] Lepelley 1998: 71. [41] Haselgrove 1987: 121. [42] Raepsaet 2002: 329.

the Saône remains noticeable. The cities of the north-west were both fewer in number and less prosperous. In Britain, where economic development has been re-evaluated, urban activity remained modest compared to that of the Mediterranean regions, despite the blossoming of building activities after Hadrian's visit.

X A TYPOCHRONOLOGY OF REGIONAL DEVELOPMENT IN THE ROMAN WEST

An analysis of the Roman west in terms of regional development shows a diversity which one could categorize according to the fourfold modern classification of J. Friedmann.[43] Without a doubt, only the region of Carthage could perhaps be classed as a "core region." In light of what has been said about the development of the provinces of the north-west, they cannot be counted among this category, but among the "upward-transition regions," a status they reached by the end of the early empire. As discussed above, the regions of the Iberian peninsula had been in this category for a long time already. Its south-west constituted a unique key economic unit which asserted itself despite the provincial divisions. But none of its large cities, Emerita, Corduba, and Hispalis, dominated the region clearly enough to allow classing the region as a "core region." The same is true of the valleys of the Rhône and Saône: stretching from Arles to Autun between Alps and the Massif Central, they acquired this status as a result of an evolution which recent research has retraced.[44] They formed a corridor of strongly urbanized development, but there was no single pole (neither Lyon nor Vienne).

All these regions previously went through the stage of "resources frontier regions," the third of the categories defined by Friedmann. Among these one would count also the large cities of western Gaul, in particular Pictons and Bituriges. The fourth and final category, "downward-transition region," might comprise regions which were already urbanized or on the way to urbanization at the time of conquest, and saw a decline during the early empire. I have dismissed this hypothesis for the Mediterranean regions as a whole. But this proposition does not assume that all would need to belong to the same category and some might be considered to be "downward-transition regions."

Regions which experienced their first phase of development at the end of the Republic and in the early empire are also those where the first withdrawals, which took place from the middle of the second century AD onward, signalled the crisis of the third. Gallia Narbonensis is a good example. While the alpine zone became more urbanized, in the south-west

[43] Friedmann 1973. [44] Favory et al. 2003.

of the province the disappearance of Ruscino shows a contrary trend. In the countryside, surveys show a decreasing number of sites from the reign of Marcus Aurelius onwards. Was there a crisis in the province comparable to that attributed to Italy, with which Pliny had compared it? This is the subject of a debate connected with the interpretation of the archaeological data. The "abandonment" of the countryside can lead to a pessimistic interpretation of the change in settlement pattern towards larger agglomerations. Hence the impression of a crisis could simply be an effect of the scale of observation.

In his classification, Friedmann thinks of societies of the industrial age. For completeness, a fifth category is needed which covers regions where forms of economic life dominant in prehistoric times had persisted. These regions owed their marginality to geo-ecological factors: the Mediterranean hill regions, the steppes of the Iberian peninsula and Africa, the high Alps and Pyrenees, the great forests of the Gauls and of the north-west and the marshes, both inland and coastal as well as in deltas.

XI CONCLUSION

The data presented here can be read in different ways. It is possible that the urbanization of these provinces and the related efforts to provide roads or sea or river routes served simply to transfer the wealth of the provinces for the benefit of Rome and its elites. Taking into account the rigidity of the system in the absence of major technological innovations, the facts cited to argue for economic development would in reality be behind a major crisis of which there were signs already from the Antonine epoch onwards. In the fourth and fifth centuries AD, in the context of practically no (economic) growth, the concentration of wealth in the hands of a shrinking minority and the military collapse of Rome would have liberated its peripheries, whereupon Africa and the north-west of Europe became new "core regions." Such a paradigm fits quite well with models which underline the subordination of the provinces in the service of Rome and the provinces and in particular with the model of the "consumer city." The latter insists on the dissemination of a common political and cultural model, the urban model, derived from the system of the city state, the spread of Latin and of *negotiatores* who did business with the whole population, not merely with a small minority of aristocrats. Rome becomes the common fatherland of a united Occident. This reading favors an approach which sees all development as a spread of the economic model of Rome. Yet as critics of the concept of Romanization emphasize, the history of the Roman west cannot be reduced to the spread of a cultural model. Regional specificities play an essential role as well. In an evolutionist perspective, the twin concepts of

"center and periphery", developed in the 1960s by Marxist theorists[45] are particularly relevant in accounting for the disruption in economic circulation caused by the integration of the defeated into the imperial system. On the scale of the empire and on a geopolitical level, the subordination of the conquered territories to the service of Rome and the army of the *limes* characterizes all the provinces of the west as dependent periphery. A regional analysis, however, documents differences between them which cannot be explained by either their original ethnic diversity or by the deceptive heterogeneous nature of the data at our disposal. Since prehistoric times, a small number of regions, in contact with the trading economies of the Mediterranean, distinguished themselves from the rest of Africa and Europe. Often the trader preceded the soldier. In the west, the restructuring of regions which promoted the integration into the Roman system was gradual and uneven. Between Rome and the *limes*, regional diversification was the result of the interplay of internal factors leading to the emergence of the regional poles presented above. This does not contrast cities with main local capitals which related to their countryside in a manner analogous to the relationship between Rome and its empire, but generates differentiated regional units. From an evolutionist perspective, regional differentiation caused by this process led to a positive dynamic of economic development. New regional differences did not result in a simple recreation of the previous situation.

Thus, in an evolutionist perspective, regional diversity would be the motor of innovation. Economic development would be real. Demographic development would correspond to the increase in the number of cities built and of rural sites and, contrary to Malthusian theory and in accordance with what Boserup proposed, would justify belief in the possibility of sustainable development in the west. Demographic issues therefore seem to be essential, and we may wonder whether the suggested population total of 25 or 30 million for the western provinces is compatible with the current portrayal of the development conveyed by archaeological research.

[45] Amin 1973.

CHAPTER 25

THE EASTERN MEDITERRANEAN

SUSAN E. ALCOCK

I INTRODUCTION

From the welter of disagreements and uncertainties surrounding the ancient economy at large, one presupposition often tacitly governs approaches to the Roman east. It is assumed that the eastern empire was less radically transformed, that it witnessed less "growth," than its western counterpart or than the imperial heartland of Italy itself. Pre-existing high levels of urbanization, relatively greater distance from Rome, and a less pronounced military presence, are among the explanations offered to explain this phenomenon.[1]

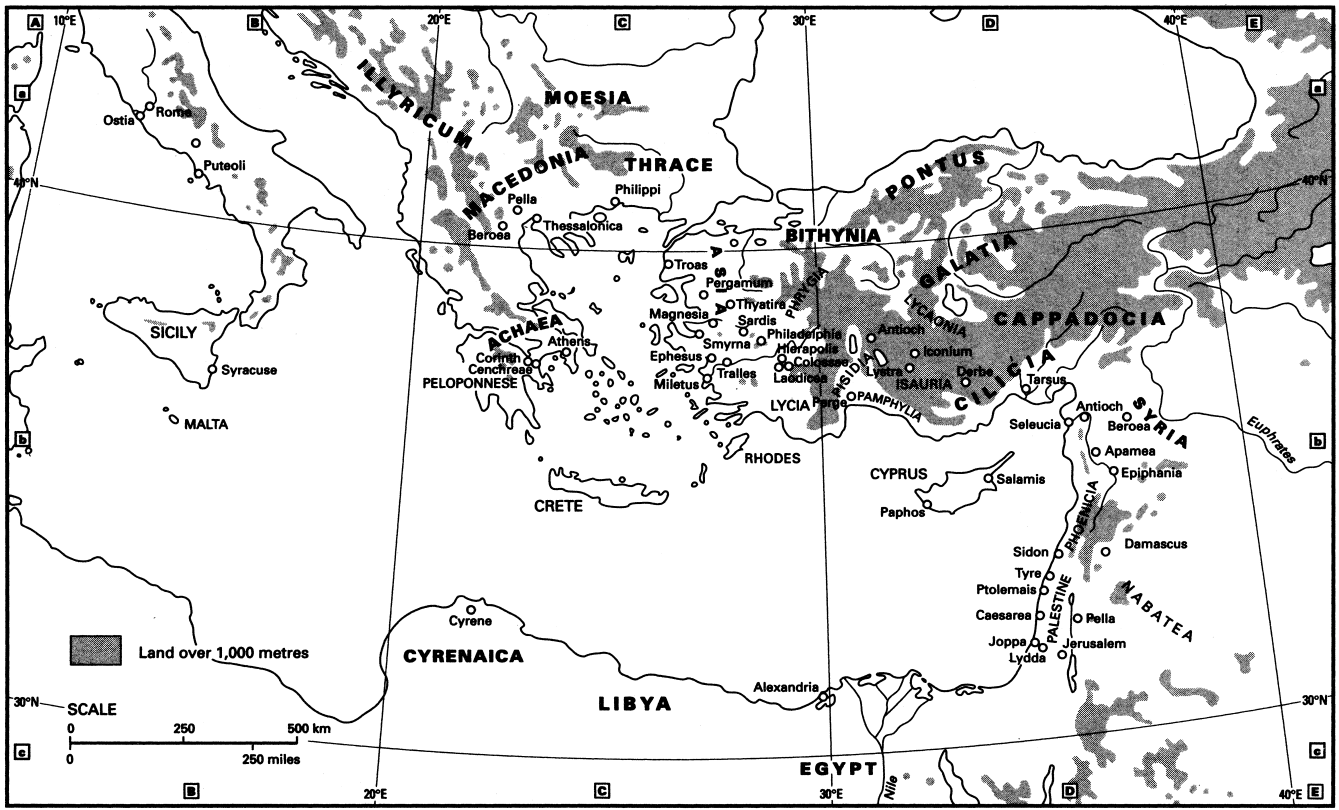
This assumption may very well be true, but it has contributed to a dominantly western orientation in many, if by no means all, general studies of the Roman economy.[2] This chapter will take issue with this state of affairs in two respects. First, it is necessary to assess how far the state of our evidence dictates the perception and its consequences. And second, it is necessary to challenge the notion that "more change" is automatically better and more interesting, and that the economic history of the eastern provinces can thus be judged negatively and somewhat disregarded.

The Roman east is home to not a few famous facts and familiar insights into the workings of the ancient economy: tombstones record an impressive number of occupations at Corycus in Cilicia; Hadrian can be observed intervening in oil and fish prices in Athens; Dio Chrysostom speaks to the behavior of urban elites; the Talmud and the New Testament offer anecdotal testimony for everyday economic life. Culled principally from Greek authors of the early empire, or from "loquacious" cities and their rich epigraphic records, these pieces of evidence recur from one secondary account to the next.[3] The problems posed by such fragmentary texts – which catch partial and serendipitous snapshots of a moving and complex

[1] See, for example, Garnsey and Saller 1987: 58; on agricultural developments, Garnsey 2000: 692–3.

[2] E.g., Duncan-Jones 1990; Greene 1986; but see Rostovtzeff 1957.

[3] Many of these appear in the helpful source book, Meijer and van Nijf 1992. For two views of the economic testimony of the Mishnah and Talmud, see Neusner (1990) and Safrai (1994). On the loquacity of cities: Rostovtzeff 1957: 138.



Map 25.1 The eastern half of the Roman empire
Adapted from Bowman et al. 1996: map 21; graphics: A. T. Wilburn

target – have, of course, been recognized before, endemic as they are to the economic study of the empire as a whole.

Where the eastern Mediterranean clearly still lags behind other parts of the empire is in the availability of archaeological evidence, both in "raw" form and, more tellingly, in broader synthetic studies. This remains the case despite much improvement in the last few decades, for example with the expansion of regional survey projects and with progress in the vital area of ceramic studies. In part the problem lies in the overall amount of work done; in part on the type of work done (with a heavy emphasis on the excavation of urban, public spaces); in part on the frequent lack of reliable data publication. For example, in just one oft-cited index of economic activity – shipwreck frequency – the west does much "better" than the east, yet the recorded sample on which that assessment relies is clearly problematic.[4] It is not special pleading to highlight these material problems from the start, given that archaeological data provide our only substantive new means of accessing the ancient economy, and thus a principal means of escaping established assumptions and tired arguments.[5] As far as is possible, material evidence – urban excavations, regional surveys, mortuary studies, ceramic analyses – has been drawn into what follows and some appraisal given of where our analyses may go astray for lack of such information.

This chapter, covering the period from roughly 200 BC to AD 300, cannot be a comprehensive analysis of economic behavior in the eastern Mediterranean.[6] What it can do instead is sketch out some of the structural determinants of the region's economic performance, and then trace that performance through the processes highlighted elsewhere in this volume: production, distribution, and consumption. Isolating these very closely interwoven elements is helpful for the purposes of this particular type of overview; ultimately, however, the interaction of the three requires reconciliation and synthesis in other, more targeted studies.

At the end of the chapter, we will return to the assumption with which we began, and revisit the issue of relative growth across the empire. This opens the door to a possible shift in perspective, one which moves away from viewing the region in this period as the historical tail end of the "ancient economy." Economic analysis in other pre-modern empires contends that

[4] On this western advantage: Harris 2000: 712; on the different traditions of archaeological study in east and west, Millet 1997. With Greene (2000: 56), I can point to recent publications in the *Journal of Roman Archaeology* as one index of improvement. Ceramic progress: Degeest 2000: 43–59, 65. Shipwreck data: Parker 1992: 6, 9; see Hopkins 1980: 106.

[5] Hopkins 1983b: ix. Such sentiments echo the arguments of Greene 1986: 170–1; Greene 2000: 29–30, 56; see also the papers in Parkins and Smith 1998.

[6] For an irreplaceable collection of facts and factoids on the economic life of Roman Syria, Greece and Asia, see the essays by Heichelheim, Larsen and Broughton in Frank's *Economic Survey of the Ancient World* (1938).

imperial zones will be transformed differentially, depending on their ethnic makeup, their local history and internal organization, their geographical and cultural distance from the metropolitan center, their natural characteristics and resources, and so on. What tends to emerge is a highly variable imperial landscape, yet one in which all parts unquestionably carry the impression – however expressed – of domination and demand. Looking at the eastern Roman empire less as the end of a long-lived system, and more as something new under the sun, may give us a new way to corral our disparate data.[7]

(a) *The definition of the region and its place in empire*

The area to be discussed in this chapter begins with the Balkan peninsula and arcs eastwards and southwards to the borders of the next chapter, Roman Egypt (Map 25.1). The number and configuration of provincial units in this zone varied over time, but around AD 106 would have included Achaea and Macedonia in modern Greece and the former Yugoslavia, Republic of Macedonia, various divisions within the nation-state of Turkey (Asia, Bithynia and Pontus, Galatia, Cappadocia, Lycia and Pamphylia, Cilicia), as well as Syria, Judaea (later Palaestina) and Arabia in the Levant. The frontier, and more specifically military, aspects of border provinces are not here discussed.[8] Greek was the common tongue of the region's elite, but numerous local languages (such as Aramaic or Phrygian) survived under the empire. Although the area in general is sometimes referred to as the "Greek provinces," that label must be used with care.

The ecology of the region ranges from the Mediterranean climate of the zone immediately encircling that sea, to increasingly more arid territories as one moves away to east and south. Within this broad expanse, geological features such as mountains or plateaus created a variety of micro-climates, with direct implications for agricultural success and the concomitant need for exchange. No one would claim that the east in general boasted the most effortlessly fertile lands of the empire, but certain exceedingly rich districts did exist, such as the territory of western Asia or the Hauran in Syria. Mines, quarries, and other natural resources were irregularly distributed across the region, which is also differentiated by variable access to water transport. Coastal or near-coastal communities were obviously well served by the Mediterranean itself (as illustrated by the travels of such figures as Apollonius of Tyana or St. Paul); harbor complexes were both monumentally

[7] Finley 1985; for some caustic comment on "Finley's undifferentiated classical world": Greene 2000: 45; also Paterson 1998: 150. For imperial parallels: Blanton 1996; D'Altroy 1992; Stein 1998. This is already apparent in some treatments of the Roman world: e.g., Mattingly 1997.

[8] See below, Chapter 27; Kennedy and Riley 1990.

developed (as at Caesarea) and painstakingly maintained (as at Ephesus or Seleucia in Pieria).[9] Rivers, with the exception of the Tigris and Euphrates, did not shape developments to the degree seen in the west, but some (for example, the Orontes or the Sangarius in Asia Minor) and water bodies such as Lake Tiberias were navigable routes of communication. Yet other areas, such as the high tablelands of Anatolia, remained relatively landlocked. Perhaps not surprisingly, modern agroclimatic classifications divide up the territory of the eastern Roman empire into numerous sub-zones – an observation that no doubt would be felt even more strongly by an ancient farmer or trader, from an on-the-ground perspective. Economic opportunities and options would vary substantially, depending on where in the region one operated.

The circumstances behind the annexation of these eastern provinces varied dramatically, as did their subsequent political and military trajectories. This is not the place to rehearse these data, essential background though they are to any economic inquiry.[10] What can be noted, however, is that while events of the first century BC (the Civil and Mithridatic Wars, the conquest of Crete) quite viciously affected parts of the eastern Mediterranean, the Augustan takeover does appear to have inaugurated – albeit with periodic and localized exceptions – an extended epoch of peace. Only in the third century, for example with the raids of the Heruli or Persian invasions, was the *pax Romana* significantly disrupted.[11] Looking at a map of the eastern provinces also makes clear that many were "internal" to the empire, buffered externally by a frontier zone. As a result, some provinces, such as Achaea, were technically unarmed (*inermis*); others harbored only a limited military presence. That is not a universal rule: Cappadocia, Syria, Arabia and Judaea – provinces along the *limes* or with a special history of imperial antagonism – all housed legionary and auxiliary forces, while other "troublesome" areas (for example the mountains of Pisidia) received veteran colonies as another means to ensure order. On the whole, however, a stable peace is one central element in the economic preconditions of the early empire.[12]

Much of the area considered here (Achaea; the Asian provinces; Syria) would fall within the "tax-exporting" category of Hopkins' provincial

[9] Caesarea: Holum et al. 1988; Ephesus: Zabehlicky 1995; Seleucia in Pieria: Sartre 2000: 658.

[10] For historical reviews see Alcock 1993: 8–24 (Achaea); Bowersock 1983 (Arabia); Bowersock 1989; Jones 1937; 1940; Levick 2000; Macro 1980 (Asia Minor); Millar 1993b; Sartre 2000; 2001 (Near East); and Sartre 1991; Thomasson 2001 (for general reviews).

[11] Internal revolts are reported from places such as Achaea, as well as the very much more famous outbreaks of Judaea, when thousands are said to have been sold into slavery. On banditry: Isaac 1998b; Shaw 1990.

[12] Distribution of legions: Cornell and Matthews 1982: 79; Pisidian colonies, Levick 1967. On the economic benefits of peace: Rostovtzeff 1957: 133, discussing Aristides' *To Rome*; Paterson 1998.

classification. Garnsey and Saller, who posit instead a "three-fold division of provinces by function," would largely concur, while allowing for the possibility of overlapping roles. Certainly some eastern provinces directly supplied the troops within their borders, and received outside help to do the same. Specifics on taxation are, of course, notoriously elusive. For the east, both tax in kind and in cash are attested (sometimes assessed on the same land, as seen in a document from the second-century Babatha archive, found in a cave near the Dead Sea), but money payments appear widespread in this sector of the empire. Taxation, although experienced in several parts of the east before (most notably those areas encompassed within Hellenistic kingdoms), now became a regular and more or less universal element in the economic configuration of the region.[13]

(b) *Demography and urbanization*

Two essential parameters – the number of people in a region and their distribution in space – both govern and are governed by the workings of the economy. Recent evaluations posit, first, an overall "modest measure of sustained growth" in the early empire, and second, a greater population density in the east than in the west at the time of Augustus. That relative balance, it has been argued, was then affected by east-to-west migration over the early centuries of empire, a migration fed by the commercial and intellectual classes, as well as by the movement of slaves. That there was migration in the opposite direction (colonial populations, *negotiatores*) is undeniable, but is considered negligible in comparison: Juvenal's famous line about the "Orontes flowing into the Tiber" (3.62) would seem apposite here. In Frier's demographic simulation of events, by AD 164 the population of the western empire would have grown significantly faster, eventually assuming a density more comparable to that of the east which, by contrast, remains "virtually stagnant."[14]

Frier admits that this simulation is "very tentative," noting that archaeological evidence might argue for more growth in the east than this model would allow; Scheidel's reconstruction of the situation seems somewhat more optimistic, although there can be no question but that populations grew more quickly in other parts of the empire. Much would also depend on how to interpret the movement of intellectuals and other "talent." There has been a tendency to assume that Greeks, "most of them clever and educated men, emigrated in masses to countries which offered better opportunities,"

[13] Hopkins 1980: 101–3; Garnsey and Saller 1987: 95–7; Duncan-Jones 1990: 187–98. On the Babatha document: Isaac 1998a.

[14] Frier 2000 (quote at 814).

with "the same wind that brought prunes and figs and damsons to Rome they came." How far the epigraphic evidence for easterners in the west indeed reveals a significant, and lasting, shift in human capital is debatable; such movements at very least, however, do raise questions of evolving economic links and loyalties.[15]

What can be discussed with more confidence is the distribution of people in space. It is not news to observe that the east was far more urbanized than the west, a structure resting not only on centuries of *polis* formation and expansion, but on ongoing civic foundations by Roman generals and emperors alike. Yet, while true as a generalization, this observation needs to be kept in perspective. First, villages (*komai* or *katoikiai*) – either in the territory of cities, on sacred estates or as independent entities – were a vital component in the social organization of many areas, especially Anatolia and Syria. Secondly, the level of urbanism was by no means uniform: as one moved inland from the Mediterranean, or into drier environmental zones, civic numbers dropped off. On the whole, Syria and Arabia are less overwhelmingly urban in orientation than Achaea and Asia.[16]

Another critical phenomenon is the size of some of these entities. If Rome was *the* mega-city of the empire, with Alexandria (and eventually Carthage) next in line, the provinces of the east were home to several cities which could potentially have approached 100,000 inhabitants: Antioch, Pergamum, and Ephesus (possible candidates); Corinth, Athens, Smyrna, and Apamea (less likely). Most civic units, however, clearly comprised much smaller populations, perhaps in the range of 10,000–15,000, and with a proportion of people dwelling outside the urban center. The "super-cities" of the east were not only disproportionately well endowed in demographic terms but attracted all manner of other things: visitors, markets, goods, and gods.[17] This gravitational pull, to be discussed again below, would have included an influx of immigrants, necessary to replenish civic populations in the large, dirty and diseased centers of antiquity.[18]

[15] Quotes are from Rostovtzeff 1957: 254; Charlesworth 1970: 96. Frier (2000: 808) does not overestimate the numbers involved here, but still feels such movement – in the long run – would seriously impact population levels: see above, Chapter 3.

[16] City distribution: Rostovtzeff 1957: 258; Sartre 2000: 649–50, 662–3. On villages: Broughton 1938: 627–48; Mitchell 1993: 176–97 (Asia Minor); Dentzer 1985; Ghadban 1987; Harper 1928; Sartre 2000: 648–9 (Syria); Safrai 1994: 64–82 (Judaea/Palestine); see Poulter 1987: esp. 404.

[17] On "super-cities": Harris 1993b: 11–12; above, Chapter 3; Woolf 1997: 6. Mitchell (1993: 243–4) has proposed that relatively few cities in the various Anatolian provinces would have passed 25,000 urban inhabitants (exceptions might be Nicomedia, Cyzicus, Ancyra, Thyateira, and Sardis); the majority of the remaining 130 cities would have been in the 10,000–15,000 range.

[18] Frier 2000: 813; Scobie 1986; Woolf 1997: 9.

II PRODUCTION

(a) *Agriculture and the land*

The centrality of agriculture in the Roman economy, as in most pre-modern economies, has been firmly established already in this volume, as has the uncertainty of agricultural production in the eastern Mediterranean – with all the implications for contact and exchange that brings in its train. Finally, as elsewhere in antiquity, land-ownership in the Roman east offered avenues to security and status, as well as the preeminent means to garner wealth in the ancient world.

Given these fundamental continuities, what can be said more specifically about the Roman east? First, its mosaic of land-ownership was exceedingly complicated. Land was divided among an ever-changing assemblage of individuals and institutions, including the emperor and his family (with estates attested in Judaea, Syria, Asia Minor, and Greece, as well as other resources, such as certain trees in the forests of Lebanon and balsam plantations at Judaean En-gedi) and the Roman state (the Bithynian royal lands, for example, becoming *ager publicus*). Other participants included cities, immigrant *negotiatores*, private citizens of all types and ranks, and gods and their sanctuaries (Athena at Ilium, Zeus at Aezani, to name but two).[19] The trend, visible elsewhere in the empire, towards increasing stratification in the control of agricultural wealth is manifest, not least in the material munificence of large estate owners in civic and (to a lesser extent) rural display. Large-scale proprietors could well possess property in numerous places, even in different provinces; the scattered holdings of Herodes Atticus (in at least eight separate parts of Greece and in at least three provinces) provide just one spectacular example of a no doubt frequent phenomenon. The ongoing existence of minor landowners, whose "small-scale production continued to be important in the Roman empire," is more difficult to observe, but must be accepted for the east.[20] Labor on the land likewise varied in composition. The "relative absence" of servile labor in rural activities has been noted in Asia, being perhaps somewhat more widespread in Greece. Tenancy (embracing a spectrum of dependent statuses), together with the periodic hiring of free labor, was surely a very common means of organizing production.[21]

[19] Imperial estates: Broughton 1938: 648–63; Crawford 1976: esp. 63–6; Thompson 1987. On Lebanon, Sartre 1991: 324–5; Sartre 2000: 644; on En-gedi: Isaac 1998a: 169–70; Safrai 1994: 150–5. Temple estates: Broughton 1938: 676–84 (Asia Minor); Sartre 2000: 644; Tate 1997: 67–9 (Syria).

[20] On peasant survival: Garnsey 2000: 701. For details of large estates in specific regions: e.g., Alcock 1993: 63–88 (Achaea); Broughton 1934 (Asia Minor); Mitchell 1980: 1070–80; 1993: 149–64 (Galatia). On Herodes: Finley 1985: 100–1; Tobin 1997.

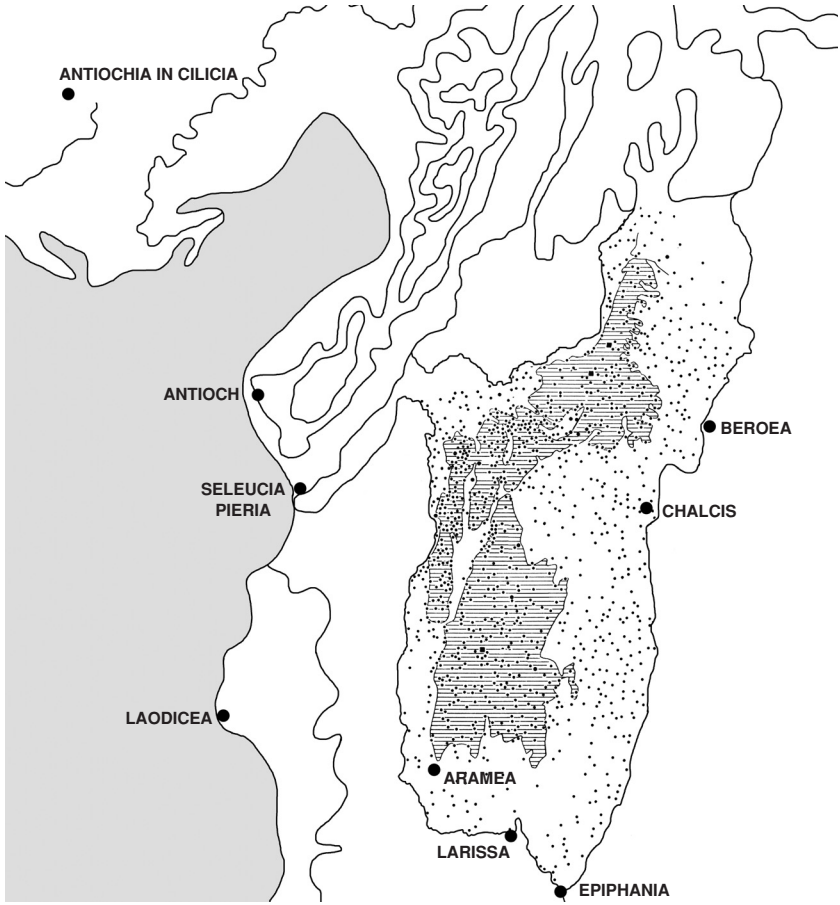
[21] Garnsey 1980b: 35; Whittaker 1980: 73, 77; see also Broughton 1938: 839. For an overview of rural labor: Garnsey 2000: 702–6; in Asia, Whittaker 1980. Tenancy: Garnsey 1980b; for Greece, Foxhall 1990. On the likelihood of slave labor on imperial estates: Crawford 1976: 51–2.

It has been persuasively argued that, thanks to its more developed urban armature and perhaps in part to cultural restraint, the east suffered less disruption in patterns of land-ownership (for example, through invasive investment by the senatorial class) than did north Africa or the western provinces. Even so, senators did acquire extensive properties, for example in western Greece, Macedonia, and Asia. More pervasive (if at a less elevated level) was the appearance of significant communities of *negotiatores* in numerous parts of the region where – sooner rather than later – they rooted themselves in their adopted lands. Finally, although there are relatively fewer imperial colonies and foundations in the east, where these appear (e.g., Nicopolis and Corinth in Greece; Pisidian Antioch and Cremna in Galatia; Aelia Capitolina in Judaea), previous systems of land-ownership were recast.[22] In all cases, the result of these external interventions worked in favor of expansive, often imperially privileged, landowners.

Given this background, what changes are observable in the agricultural landscape of the eastern provinces? The archaeological evidence is patchy, especially in terms of the kind of intensive regional work necessary to track rural development in detail. Yet where such field survey work has been undertaken, the overall trend is clearly towards an early imperial (first to third centuries AD) expansion of site numbers, with settlements often moving into previously unoccupied or little utilized areas – arguably a proxy indicator of expansion in cultivated area and of heightened intensity in production, as well as of demographic growth. This pattern has been observed in the Aegean islands (including Crete and Cyprus) and Asia Minor (e.g., Rough Cilicia, Lycia, Black Sea coast). Syria too saw a florescence of rural activity, most famously in the "Dead Cities" of the northern limestone massif with its continuous growth in occupation and exploitation from the first century onwards (though peaking beyond the period under study; Map 25.2). The Hauran also witnessed a notable rise in habitation and apparent prosperity. Numbers of rural sites discovered in Jordanian surveys similarly pick up in either Nabataean or early Roman times. Finally, surveys in Judaea/Palaestina likewise attest to an upsurge in rural settlement, although once again the peak here is reached only later, in the Byzantine period. The story of expansion and growth is by no means universal. Many parts of Achaea, for example, demonstrate a converse retraction of settlement and abandonment of territory, although even that is not uniform across the province.[23] To the picture presented by regional survey can be

[22] Hatzfeld 1919 catalogued *negotiatores* all over the east, but the phenomenon is far more pronounced in Asia (especially), Achaea and the Aegean islands than in Syria or Judaea; see also Broughton 1938: 543–54. Colonies: Alcock 1993: 132–45; Isaac 1998c; Millar 1990; Romano 2000.

[23] For references: Alcock et al. 2004; Alcock 1994. Syria: Ball 2000: 207–45; Dentzer 1985–6; Tchalenko 1953–8; Sartre 1987; 2000: 645–7; Tate 1992; 1997. Judaea/Palestine: Safrai 1994: 437–48. For Achaea: Alcock 1993: 33–92; Davis et al. 1997; Petropoulos and Rizakis 1994; Rizakis 1997.



Map 25.2 Distribution of ancient sites in and around the limestone massif of Northern Syria. Shading indicates the area of the massif
After Tchalenko 1953: vol. II, pl. XXXV; graphics: A. T. Wilburn

added another index of interest in agricultural productivity – the evidence for Roman-period irrigation projects (cisterns, reservoirs, tanks). This is especially notable in Syria and Judaea, but concern for waterworks is ubiquitous in the east (witnessed, for example, in the numerous aqueducts of the east, including small agriculturally oriented examples, or in the draining of Lake Kopais in Boeotia).[24]

[24] Coulton 1987; Greene 2000: 39; Heichelheim 1938: 140–4; Horden and Purcell 2000: 244–50. On the Kopais: Fossey 1979; Oliver 1971. Water mills have been noted in Palestine, near Caesarea: Greene 2000: 41 and n. 83; water-mill operators at Phrygian Hierapolis: van Nijf 1997: 56.

Sometimes this upward climb in site numbers can be seen to begin in Hellenistic times, and, as noted, sometimes – especially farther to the east – it carries on long past the scope of this study. But what strikingly emerges, for the early imperial period, is a general picture of increased agricultural activity and, by extension, intensity of production, at a level greater than has previously been appreciated. How to explain this? It would be unwise to assume identical processes at work, and, obviously, the devil of understanding this pattern lies in the detail. Yet for some areas it was undoubtedly linked to the market offered by a nearby conurbation, especially the supercities of the east; for others it might be owing to the stimulus of local natural resources (such as timber, ore, or marble), their exploitation, and the need to feed specialist workers.[25] Such aggressive behavior makes good sense for the small farmer out to produce a surplus to cover tax burdens, on top of other economic and social obligations. The decisions taken by large-scale proprietors, with their wider range of options, are always less predictable, but this evidence strongly suggests a frequent willingness to push agricultural opportunities.

As for what was being grown across this increasingly active rural landscape, the vast majority of crops were what we might well expect: the staples of cereals, olives, vines, legumes. Animals, either in the large flocks of the prosperous (mentioned periodically in the ancient sources) or the agropastoral symbiosis practiced by smallholders, must also be kept in the picture.[26] The textile industry of certain eastern cities (to be further discussed below) dictated localized concentrations of herding, often of animals hailed as possessing very particular characteristics. Geographical pockets focusing on a significant cash crop, such as the olive-oil production of the Syrian limestone massif, can also be occasionally identified. Largely neglected, but actually quite remarkable, are the various lists of unusual fruits, plants, or other rare and wondrous things grown in the east: Asiatic peaches, liquorice (the best from Cilicia), remedies and poisons from Pontus, perfumes from Boeotian Chaeronea, and so on. Such items – noted principally by Pliny, Galen, Strabo, and Pausanias – have traditionally been dismissed as one-off luxuries impossible to quantify and, in the grand scheme of things, unimportant.[27] Yet this kind of specialized attention to unusual crops, however limited in scope or restricted in volume, should instead intrigue us, for it

[25] Regional surveys are rarely placed precisely to test these possibilities, though see Rauh and Slane 2000 for the cedar exploitation of western Rough Cilicia. On the need to produce food for marble workers and copper miners: Fant 1989b; Given and Knapp 2003: 301–11.

[26] Whittaker 1988; ancient sources on specifically eastern animal husbandry: Broughton 1938: 617–20; Heichelheim 1938: 152–6; Larsen 1938: 485.

[27] Jones 1940: 261 on "the Salonite cheese of Bithynium or Syrian nuts and fruit . . ."; Larsen 1938: 485 sighs over this practice of "recording the unusual rather than describing the normal." For lists of such goods, see e.g., Broughton 1938: 611–15; Charlesworth 1970; Heichelheim 1938: 131–40; Safrai 1994: 146–50; for Crete, Rouanet-Liesenfelt 1992.

raises the question of just who was devoting energy to their production, to what end, and with what repercussions for local conditions and labor. The power of exotic goods – in aid of social display and political authority – has been much studied in other cultures, and for Roman trade beyond the bounds of empire; the rare products of the eastern provinces similarly deserve greater attention.[28]

Such local wrinkles aside, on the whole a balanced combination of agricultural endeavors should be envisioned across these regional landscapes. Inscriptions retailing the makeup of individual holdings testify to their mixed nature, as does at least one slightly more unusual data source: an array of Phrygian tombstones attesting to the side-by-side regional practice of viticulture, agriculture, horse-rearing, and marble exploitation.[29] Across the east, whatever the precise mix of crop and husbandry regimes, we can infer one thing simply from the continued existence of its many cities: there must have been, usually, successful surplus production of basic necessities to feed, clothe, and otherwise supply and support those units. This task, of course, required other, non-agrarian forms of production.

(b) *Non-agrarian production*

Fine iron work from Cibyra, hairnets from Patras, glass from Sidon, ships from Cyprus: the list of artisanal activities connected to the east, rather like its rare plants and potions, is long. In this case, too, a concern for the size and economic "significance" of productive units has often deflected attention from just how they may have operated. The quality and quantity of evidence is variable, and it is probably most sensible simply to review a few of the better documented enterprises in turn.

(b.1) Ceramics

The major sigillata types of the eastern Mediterranean (including Eastern Sigillata A, B, C, and D, with their various aliases) have been identified, but the history of fine ware production remains in many ways opaque. The industry appears to have experienced a "big boom" in Augustan times, with the appearance of new wares (e.g., Pontic sigillata) and a much expanded use of existing types; after an early stage of imitating western forms, much of this production went its own way, appearing to come to an end at some point in the third century AD. While much attention has been devoted to the creation of ceramic typologies, issues of production (and the implications of their distribution) have been less examined. To date, only two fineware

[28] For a study of the impact of an imperial "luxury" trade (pepper) on primary producers: Morrison 2001; on exotica: Helms 1988; Thomas 1991.

[29] Waelkens 1977; Broughton 1938: 685–90.

kiln sites have been explored in detail: the Ketios valley near Pergamum, and Sagalassos, home to the only very recently defined Sagalassos Red Slip Ware. Features of both sites, in the minds of investigators, decidedly point to elite ownership of raw materials and the means of production (including the land on which the potting took place), with potters holding "their traditional low place in society." A fragmentary docket from Pergamum, recording the types of vessels made, is similar to examples found at La Graufesenque in Gaul, but how far the organization of ceramic production parallels other parts of the empire remains an open question.[30]

(b.2) Textiles

Any discussion of textile production in the Roman empire is sure to allude to the high-quality cloth of Phrygian Laodicea (with merchants as far afield as Lyon), as well as to the weaving or dyeing specialties of other eastern centers. It is clear, however, that textiles were a matter for ubiquitous manufacture, although different places were famed for specific products: Cos for diaphanous silks, Tarsus for linen, Ephesus for towel weaving, Tiberias for coarse cloths and mats, and so on. Others have argued for the organized and professional nature of much Roman textile production, as well as for the numbers of individuals potentially involved in such activity. At Tarsus, the poor and disenfranchised linen workers were numerous enough to be a "useless rabble and responsible for tumult and disorder" (Dio Chrys. *Or.* 34.21); Pausanias' note about how the "charming" women of Patras (who outnumbered the men of their city) earned a living weaving *byssos* may speak to a specifically female labor force (7.21.14).[31] The exact articulation between the supply of raw materials (wool, flax) and the actual manufacturing process is nowhere clear, but a close link between local supplies and local industry can be assumed: "The country round Laodicea produces sheep that are excellent not only for the softness of their wool . . . but also for its raven-black color, so that the Laodiceans derive splendid revenue from it . . ." (Strabo 12.8). Other materials and fabrics (cashmere, cotton, silk) were imported from outside the empire, in some cases to be worked or reworked in centers such as Palmyra before being shipped further on.[32]

[30] Coarse ware analysis presents even more problems, though it is increasingly clear such cooking wares could travel long distances in the Roman world: Fulford 1987: 61; Riley 1981. For overviews of pottery research in the eastern Mediterranean: Degeest 2000: 43–66; on finewares, Hayes 1997: 52–9; Poblome 1999: 25–7; Slane 2001. On the organization of production: Poblome et al. 2000; 2001: esp. 164–5.

[31] Jones 1960; Horden and Purcell 2000: 352–4. For ancient references: Broughton 1938: 817–25; Heichelheim 1938: 191–2.

[32] On Palmyrene textiles: Schmidt-Colinet et al. 2000. That volume raises the possibility of one form of technology transfer under the empire, the desire to imitate (in wool) the look of Han damasks. Glass blowing is another possible case of such transfer.

The harvesting of the murex shell, and the dyeing of purple cloth, also surfaces as a widespread industry around the eastern Mediterranean. Some centers, such as Tyre with its Tyrian purple ("the most beautiful of all") were particularly famous; despite the unpleasant conditions (presumably the smell) of the Tyrian dyeworking, "yet it makes the city rich through the superior skill of its inhabitants . . ."(Strabo 16.2.23). Smaller sites are also recorded, however; various sources identify five places in Achaea alone, and Pausanias (10.37.3) reports half the population at Phocian Bulis as given over to such activities. Archaeological evidence backs up this impression of distributed purple production in Greece, with murex dumps and dye works found, for example, in the southern Argolid, in the Athenian Kerameikos, at Eretria and Chalcis in Euboea, and an especially impressive village of dyers at Koufonisi (Leuka) on Crete. Similar material traces are dotted along the Mediterranean coast elsewhere in the east; *collegia* of purple-dyers are also known from Asia Minor, for example at Hierapolis.[33]

(b.3) Mining and quarrying

If never as stupendously rich, massively developed, or as notoriously foul as the mining operations of Spain and the west, several locales in the east were home to enterprises in pursuit of gold, silver, copper, lead, iron and other minerals (such as cinnabar or alum) or precious stones (such as amethyst). Ore-producing mines, as is documented elsewhere, fell under state control, being leased out to individuals or to *societates*; slave labor appears to have been commonly used.[34] Compared to Syria, and especially to Asia (noted for silver and iron), Achaea was little involved in this industry, although the famed silver mines of Laurion are known to have been revisited for their ore dumps. One contemporary glimpse of an eastern mine in action is given by Galen, who was interested in the possible medical uses of copper by-products. His visit to the copper mines of Soli on Cyprus illustrates their imperial administration, the use of slaves and the horror of mine conditions. Being sent to the Cypriot mines would, in the late third century, become a punishment for Christians from Palestine and Syria.[35]

As for metal-working itself, the cry ("Great is Artemis of the Ephesians!") of the silversmith Demetrius and his fellow craftsmen calls to mind just one documented industry in the east. Finished artifacts, especially in the form of divine and imperial images, were everywhere in public and in private,

[33] For references, Alcock 1993: 111; Schmid 1999. On Cretan purple, Rackham and Moody 1996: 206–8; Horden and Purcell 2000: 616.

[34] On mining generally: Greene 1986: 144–9; Woods 1987. Salt pans, dotted about in both inland and coastal locations, also belonged to the state, unless otherwise granted (for example to sanctuaries, as with Athena Polias at Priene).

[35] Alcock 1993: 110–11; Larsen 1938: 486 (Achaea); Broughton 1938: 620–4, 693–4 (Asia); Heichelheim 1938: 156–7 (Syria). On the mines of Soli: Broughton 1938: 694; Mitford 1980: 1297–8. Dacian mining opportunities attracted emigrants from Asia Minor: Noeske 1977: 315–19.

being carried, for example, in the procession detailed in the early second century AD Salutaris foundation.[36] The manufacture of both precious and utilitarian artifacts is recorded, in passing, for many cities, though few production sites have been explored. As just one example of the kind of work possible (and necessary), a recent technical study of extant statues has been able to reconstruct the existence of an eastern bronze workshop of Severan date, with its output (including imperial imagery) distributed to a catchment of sites in Cyprus and Turkey.[37]

As with mines, most (if not definitively all) stone quarries were the property of the imperial fisc. Unlike mines, the most desirable stone sources lay in the east; of some 318 objects found at the Trajanic marble yards at Portus (admittedly not a completely representative sample), the material for some 90 percent came from the eastern provinces, especially from Achaea and Asia. Although various types of precious stone were consumed, marbles take pride of place, and are one indubitable "growth industry" under the empire. Administration and exploitation of these quarries was a dynamic affair, with each marble type following its own trajectory, if sharing in an apparent third-century decline in activity. Intensive field work at quarrying sites (notably Docimium in Phrygia), together with textual evidence and scientific characterization studies, combine to create a still-evolving picture of the marble trade, from initial extraction to final consumption.[38]

One of the "famous facts" mentioned at the start of this chapter was the long list of occupations (100-odd in all) recorded in the tombstones of the port town of Cilician Corycus. That range of occupations can be glimpsed in other contexts from Achaea and Asia as well as, for example from a synagogue at Aphrodisias.[39] *Collegia* of craftsmen also testify to a dense network of manufacturing activities at work in the east; if best seen in the Asian provinces, there is evidence for fullers at Antioch (for whom a special channel, 2.5 km. in length, was constructed with conscript labor) and for goldsmiths and leather-bottle makers at the Arabian capital of Bostra (identified through their assigned seats in the theater). These were not individuals of the highest status (although nor should they be assumed to be poor). The likelihood of relationships between such endeavors and large-scale landed proprietors – at very least through the supply of raw materials (wool, wood, clay, flowers) from the latter's estates – seems too cogent to deny.[40]

[36] Acts 19.24–7; Rogers 1991: 91–5, 107–10; van Nijf 1997: 238–9.

[37] Jones 1994. For textual sources on metalwork: Broughton 1938: 826–39; Heichelheim 1938: 195.

[38] Fant 1989a; 1993; 2001; Dodge 1991; Herz and Waelkens 1988, and references in Paton and Schneider 1999.

[39] Corycus: Patlagean 1977: 156–81; Hopkins 1978b: 72; see also Broughton 1938: 869–70 (Alabanda, Philadelphia); Cartledge and Spawforth 1989: 172 (Sparta); Reynolds 1987 (Aphrodisias).

[40] See above, Chapter 20; Pleket 1983: 141–2; 1984. On *collegia*: van Nijf 1997: 18–23 (social status of craftsmen and traders), 89–91, 228.

Further explorations of the physical location and scale of specific artisanal or "industrial" zones would, of course, be helpful at this juncture. The relative absence of rural villas, especially working villas, in the east, if no doubt in part owing to an investigative bias, is provocative, and one clear point of departure from other sectors of the empire.[41] Few villages have been explored in sufficient detail to offer much help here, and even very recent studies of eastern cities continue to focus on their monumental structures and public spaces. This strategy has militated against the discovery of possible urban-based (or peri-urban) manufacturing sites, of the type discovered at sites with long-running, or broadly conceived, investigations, as at Pisidian Sagalassos (where a "Potters Quarter" has been excavated) or at Corinth. Finds kept from early excavations at Antioch also quietly point to a range of practical behaviors at the household level, including carpentry and fishing. It is unlikely in the extreme that any of these cases was unusual. Such observations add their testimony to arguments for an overall increase in productive activity in the early imperial east, as well as continuing the reassessment and deconstruction of the "consumer city" model for classical antiquity.[42]

III DISTRIBUTION

Discussion of the movement of goods in the ancient economy has usually revolved around the question of its nature, such as the ratio of institutionalized reciprocity and redistribution to market exchange, or the balance between "staples" and "luxuries." This discussion will instead first consider the distribution of goods in space – at the local, regional, and long-distance scale – before turning to the issue of the agents involved in these various transactions.[43]

Precisely delimiting these spatial domains is, of course, a nightmare: what is local? what is a region? But if accepted in impressionistic fashion, overlapping systems of exchange emerge in the eastern empire. By "local," for example, we could envision the territorial ambit of a particular city or large village, or a close nexus of these entities – absolute distances are here less important than topography: say, for the sake of argument, a day, or a very few days travel time. A considerable density of exchange in antiquity would operate first and foremost at this scale, although the situation could

[41] On the under-explored, and variably defined, phenomenon of the eastern villa: Rossiter 1989; Alcock 1993: 64–71 (Achaea); Applebaum 1989; Safrai 1994: 82–99 (Judaea/Palaestina).

[42] Recent eastern urban studies: Parrish 2001; Segal 1997. On Sagalassos: e.g., Poblome 1999: 24; on Corinth: Engels 1990; on Antioch: Russell 2000: 86–7. Recent comments on the "consumer city": Horden and Purcell 2000: 105–8; Mattingly and Salmon 2001b; Morley 1996; Parkins 1997; Whittaker 1995. Cf. above, Chapter 3.

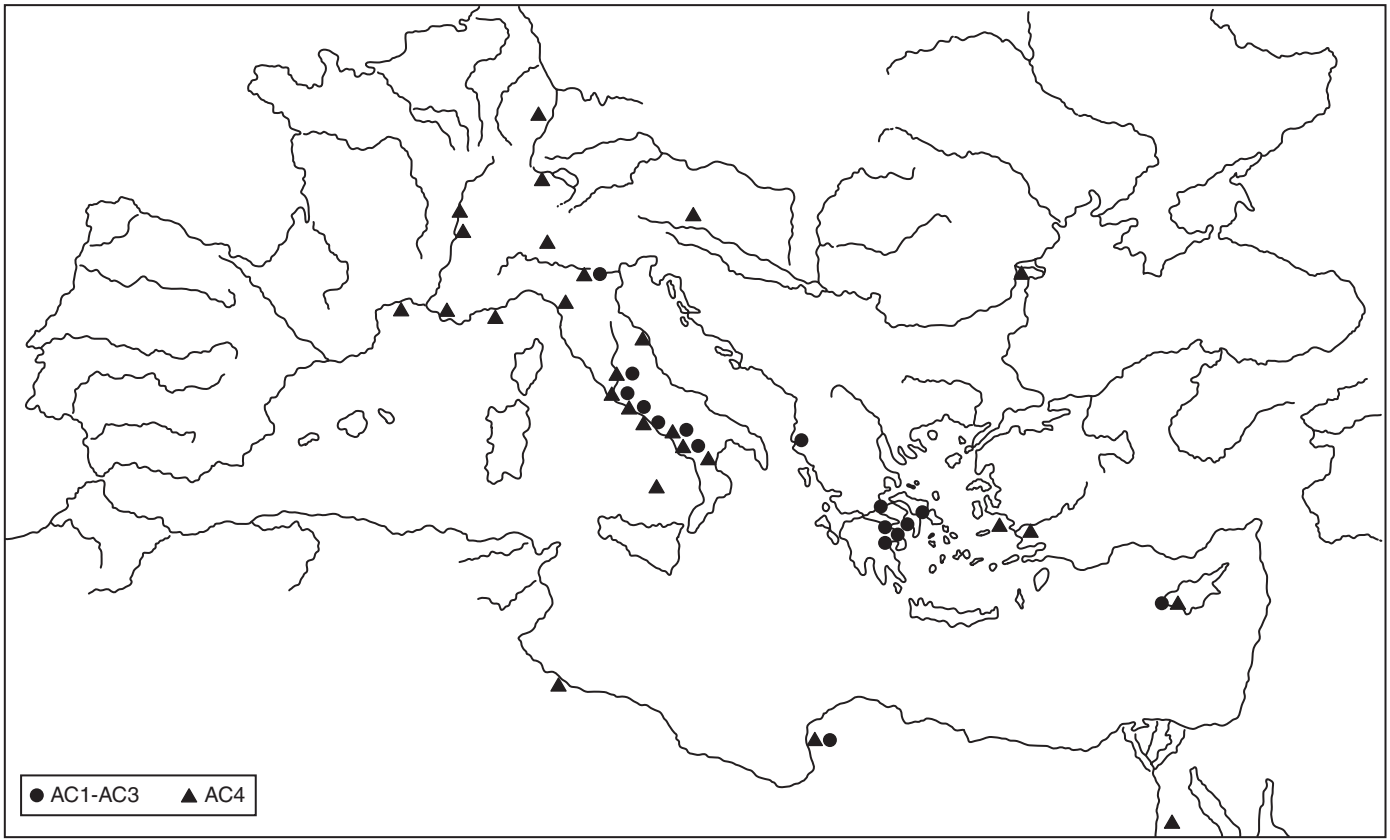
[43] Davies (1998a); also the papers in Mattingly and Salmon 2001a; Saller 2001b: 582. See Harris 1980a: 131 on problems with the concepts of "import" and "export" in this context.

vary profoundly over time – especially depending upon the vagaries of agricultural production or upon other periodic events (e.g., major festivals, an imperial visit) when wider relationships would be called into play. For obvious reasons, this sphere of exchange is normally the least archaeologically visible of all, with perishable goods or everyday, utilitarian objects (those least studied, such as tile or coarse pottery) on the move; we do have, however, occasional textual evidence, such as the very active, if small-scale, exchanges limned in Apuleius' *Metamorphoses*. Cities or villages (many of which saw the early imperial construction or redevelopment of marketplaces, or agoras) served as points of exchange, as did the phenomenon of local fairs; two examples, among several offered by de Ligt, include a twice-yearly *panegyris* at Tithorea in Achaea and at the remote locale of Imma in Syria.[44]

Regional distribution can here be arbitrarily (and loosely) defined as the movement of goods across distances exceeding travel times between neighboring cities, yet remaining within the ambit of the eastern provinces. This level of exchange remains under-explored, but was very active in the eastern Mediterranean – a fact we can both infer and observe. The east's degree of urbanization, and the sheer size of cities at the top of the hierarchy, would have necessitated the development, either permanently or periodically, of broad catchment areas to provide for civic consumption requirements. For centers such as Pergamum, Ephesus, Corinth, not to mention nearby Alexandria (a clear importer of eastern produce), regional transport of grain, oil, and wine would be essential. More extensive distribution patterns are also indicated by zones of agricultural intensification: for example, the olive oil of the Syrian limestone massif, produced in substantial quantity (but not particularly famous), must presumably have supplied the down-scale markets of numerous cities. Ceramic evidence also materially points in this direction. Fulford's quantified analysis of a handful of coastal Mediterranean sites (among which, admittedly, only Knossos represents the east) demonstrated that something like one-fifth of fine and coarse wares were imported, suggesting "a considerable volume of maritime traffic." This tallies with the growing evidence for the variable distribution of eastern ceramic forms, for example with Lund's observation that nearly half of all Cypriot sigillata was sold outside Cyprus (notably to Cilicia, Egypt, Crete, Judaea, and Petra), with forms manufactured especially to cater to overseas clients.[45] The consumption of non-locally produced goods, or of goods with typological links extending to many areas of the east (to be discussed

[44] On episodes of glut and need: Garnsey 1988. Apuleius: Millar 1981: esp. 72–3. Fairs: de Ligt 1993a: 67, 79; more generally, 64–75, 78–82; in Judaea/Palaestina, Safrai 1994: 243–62.

[45] Fulford 1987: quote at 66; Lund 1997; see also Blondé et al. 2002; Hayes 2001; Lund 2003; 2005. On Syrian oil: Sartre 2000: 646.



Map 25.3 The variable distribution of Cretan amphora types (AC1–AC4) outside the island of production
After Marangou 1999: Figure 4; graphics: A. T. Wilburn

further in the next section), also argues for an increasingly vibrant network of regional interaction.

The civic rivalries of the Roman east come into play here, for it is clear that such competition fought, in part, over benefits which in turn attracted a heightened density of buyers and sellers. Assize centers (such as Apamea/Celaenae in Phrygia) are one example, as is made clear in a much-cited passage from Dio Chrysostom. At such places are brought together a throng of people:

> . . . litigants, jurymen, orators, princes, attendants, slaves, pimps, muleteers, hucksters, harlots and artisans. Consequently not only can those who have goods to sell obtain the highest prices, but also nothing in the city is out of work . . . And this contributes not a little to prosperity; for wherever the greatest throng of people comes together, there necessarily we find money in greatest abundance, and it stands to reason that the place should thrive. (*Or.* 35.15–16)

Provincial capitals, university towns, oracular shrines, neocorate centers are relevant here, as are regional fairs – gatherings (compared to their local counterparts) of longer duration and more extensive territorial "pull."[46] Regional systems of exchange thus had numerous, distributed hot spots across the eastern provinces.

That leaves long-distance trade, which will here be taken to mean the distribution of raw materials or finished products either to Italy and the west, or their conveyance to (or through) the east from beyond the bounds of empire. Goods involved ranged from high-value, low-bulk goods (the rarities of fruits and nuts discussed above, as well as the silks of China), right through to monolithic columns of Greek marble. Wine identified by its point of origin, for example from Aegean islands (notably Rhodes and Crete), is one well-recognized export to Rome and points west, although investigations into eastern amphora types in general remain at a relatively preliminary stage (Map 25.3).[47]

The queen of all long-distance trade links, of course, was the transport of luxury goods (spices, perfumes, slaves, silk, cotton) from beyond the eastern frontier, notably via India and Yemen, into the Roman imperial sphere. Such commerce is currently best illustrated in Egypt, especially thanks to new archaeological evidence from Red Sea ports such as Berenice and along the Eastern Desert routes. Yet physical traces of a cross-Arabian trade in aromatics (with Roman activity building on a Nabataean foundation) are visible in cities such as Petra and outpost garrisons such as Hegra, although

[46] On civic differentiation: Jones 1940: 263; Millar 1977: 394–434; Woolf 1997: 8–9. Regional fairs: de Ligt 1993a: 84–8, e.g., at Cyzicus in Asia Minor.

[47] Peacock and Williams 1986: 25–8; Empereur and Picon 1989; Tomber 1993. Cretan amphora studies are a notable exception: Empereur et al. 1991; Markoulaki et al. 1989; Marangou-Lerat 1995; Marangou 1999; more generally, see Lawall in press.

this route seems to have declined in vitality during the early empire. To the north, the frontier oasis of Palmyra sat at the terminus of several overland and river communication routes, stretching back to the head of the Persian Gulf and linking to points east as far as China. Although the romance of the "caravan city" label applied by Rostovtzeff has been greatly deflated, the mediatory commercial role played by Palmyra unquestionably, and profoundly, affected the community's social organization and political circumstances.[48]

Local, regional, and long-distance are but crude distinctions, and one obvious goal is to elucidate them further, especially by tracing and accounting for developed special links between different, not necessarily predictable, sectors of the empire.[49] These spatial divisions were also obviously nested one within the other and were entirely permeable: the same goods could remain locally or move globally. Exchange of amphora-borne commodities (wine, oil, figs) is one example; another such multi-level activity was the slave trade. Thrace, western Asia Minor, Syria and – at times – Judaea were known surplus producers of slaves. Various eastern cities, most famously Ephesus, served as large-scale collection and distribution centers. The chief flow of bodies, no doubt, was towards Italy, but a degree of local and regional consumption must also be assumed.[50]

Governing and constraining all of this activity, of course, were the physical conditions of transport by land and sea. Mere distance was not the make-or-break factor. For landlocked communities, ". . . our surpluses are unprofitable and our scarcities irremediable" (as Gregory Nazianzus of Cappadocia sorrowed, *Or.* 43.34–5), while coastal communities could safely develop a higher degree of economic interdependence. Overall, however, the literary evidence for human traffic – pilgrims, sophists, doctors, bailiffs, missionaries – and their seeming relative ease of movement around the eastern provinces and beyond, argues for a growing velocity of circulation at this time, fostered by the trite but true blessings of peace. More rigorous measurement, admittedly, is difficult, not least since the volume of sea traffic, as previously observed, is not yet well measured by shipwreck data. On the other hand, the establishment or improvement of road networks across the east has been well documented. That many of these routes were designed originally for military purposes does not negate their wider utility, although burdens on neighboring populations also accompanied imperial and army

[48] Rostovtzeff 1932b; Bounni 1989; Starcky and Gawlikowski 1985; Sartre 2000: 658–62. For one recent review of Rome's eastern trade, with extensive bibliography: Young 2001.

[49] Ceramic distributions speak, for example, to especial ties between Crete and Campania, Chaniotis 1988 or inland Sagalassos and Egypt: Poblome 1999: 25; Hayes 1997: 16. Dacia and the eastern Mediterranean demonstrate, by contrast, a lack of connectivity: Fulford 1992: 299; Glodariu 1976.

[50] Frier 2000: 809–10; Harris 1999: esp. 74–5. On the status of slave traders: Pleket 1983: 139. On customs dues: Engelmann and Knibbe 1989; de Laet 1949.

traffic. The picture was, as always, dynamic: the creation of a road, or the boosting of one web of communication at the expense of another, could make or break patterns of exchange and of prosperity.[51]

As for the agents involved in these interactions, the usual suspects can be seen at work: the Roman state, shippers (*naukleroi*), merchants (*emporoi*), together with *negotiatores* of western origin. These can be briefly reviewed, before engaging, from an eastern point of view, with the heated issue of elite involvement in trade and exchange.

Imperial interventions (apart from the base-line impetus of centrally administered taxation) included control of the output of marble quarries and ore sources, as well as the movement of supplies for the army on the eastern frontier. Appeals for state assistance in the food supply of eastern cities are periodically recorded, for example a second century AD case in which Egyptian grain was allowed to be shipped to Ephesus. Paradoxically, the physical presence of the emperor, and all that he brought with him, could apparently trigger subsistence problems, as when Sparta, around the time of a Hadrianic visit, was also given permission to buy Egyptian wheat. Gifts of money (in times of trouble, such as earthquakes) and of goods such as marble columns (by petition) are other imperial additives to the eastern economic mix.[52]

Naukleroi and *emporoi* are documented in action at all levels of exchange and from numerous civic bases in the east. On the whole, and predictably, these do not emerge as individuals of high status, although some distinctions are discernible: merchants could advance somewhat more easily than shippers, purple-dealers (a specialist trade) could do better than other merchants. None of these wheelers and dealers, however, appears to have matched the affluence and scope of some of the very well-to-do merchant families seen in the west.[53] Finally, Italian *negotiatores* (often with links to coastal cities) are visible in business capacities (e.g., banking, lending), yet with a growing interdependence of their "landed" and "commercial" interests that can also be argued for members of the Greek elite.[54]

Few smoking guns point to direct elite involvement in eastern business affairs, yet Pleket has convincingly argued for such engagement, as a sideline "with structural significance." Indeed, it has been hazarded that such families were perhaps "a little less squeamish" than their Italian counterparts

[51] Communication routes and roads, see for example: Charlesworth 1970: 76–87; French 1980 (Asia Minor); Alcock 1993: 120–4; Charlesworth 1970: 114–20 (Greece/Macedonia); Thomsen 1917; Safrai 1994: 274–91 (Syria, Arabia, Judaea/Palaestina). Ease of human traffic: Woolf 1997: 9–11.

[52] On the loss of Egyptian grain to the east: Garnsey and Saller 1987: 98–9; for Ephesus: Wörrle 1971; for Sparta: Cartledge and Spawforth 1989: 152–3. Marble: Fant 1993: 155–7.

[53] Pleket 1983: 139–43, who uses the Aufidii, with extensive possessions and curial positions in both Africa and Ostia, as one western comparison. See also Rauh 2003.

[54] For specific studies of such families, and their trajectories over time: Jones 1970; Levick and Jameson 1964; Mitchell 1974.

about overt desire for economic gain. Cases of elite hoarding of grain are known; Dio Chrysostom speaks of sharp money-lending, as well as the ownership of tenements, ships and slaves "in great numbers" (*Or.* 7.104).[55] Some enterprising eastern characters, such as T. Flavius Damianus, were also highlighted in the work of John D'Arms. Damianus owned urban property and acquired productive land which he planted with fruit-bearing trees; he "improved" a seaside property to allow docking facilities for cargo ships. Such behavior – where "landed and commercial wealth could be simultaneous and complementary assets; public generosity and a concern for status could be compatible with efficient management of assets and a keen interest in profits" – cannot have been unusual among eastern elite families, especially given their habits of consumption. Damianus himself, according to Philostratus (*VS* 605–6), was famed for building a *hestiatorion* near the Ephesian Artemision, "adorned in Phrygian marble such as had never before been quarried."[56]

What emerges in the eastern Mediterranean, then, is a complicated web of exchange, of things produced and things imported, with various agents working at various scales, and in varying rhythms. While that may seem a painfully vague statement with which to conclude, some generalizations about distribution in the early imperial east are still possible: that the distances involved in some forms of exchange lengthened, that the number of "end points" for trade contact multiplied, and that the velocity of communication and interaction increased.

IV CONSUMPTION

What ultimately drives the dynamics of both production and distribution, however, is the third and remaining axis: consumption. Unfortunately, this is the most difficult of the triad to summarize in brief. Beyond a basic division between public and private, huge gulfs of difference yawn between super-cities and villages, between the urban aristocracy and the rural poor. Yet this entire, highly differentiated pattern of demand is relevant to any attempted outline of the early imperial economy.

The fundamental issue of food supply to cities has already been raised. Although failures and hunger are known, local and regional efforts largely provided what civic populations needed to live, even if this sometimes led to shortage at the other end of the chain, with rural deprivation and hunger: as Galen (for one) has been taken to suggest in *On the Wholesome and*

[55] Pleket 1983: quote at 136; Harris 2000: quote at 733. On the oversight of civic grain supplies: Pavis d'Escurac 1987.

[56] D'Arms 1981: 164–5; Fant 1993: 156, n. 73.

Unwholesome Properties of Foodstuffs. Another major insight into what many cities "ate" is revealed in any photograph or plan depicting their numerous buildings and amenities. Paid for either by the community itself or by wealthy donors (occasionally by the emperor), the baths, colonnaded streets, gates, libraries, theaters, temples, nymphaea, aqueducts – all highlights of what has been termed the international or marble style – demonstrate materially where much surplus revenue was going. Although major building in some centers can be seen as early as the Augustan period, the *floruit* of this visual transformation took place in the second century AD. This appears to be the case in Asia, Syria, and Arabia, and – to a lesser extent – Achaea. Other forms of civic beneficence, from the creation of *agones* to the legacy of foundations, are less monumentally permanent signs of the same elite dedication to civic standing via public consumption.[57] This development, of course, has in the past been derided as a classic form of non-productive investment, leading to no further technological or economic good or gain.

There is a danger in taking the "standard features" of eastern cities and assuming uniformity in their behavior or desires. Although detailed analyses are in their early days, there are signs of great variety in civic access to, and use of, goods, as well as in the factors underlying such variation. In part, this could well be a matter of location and geography. It is perhaps not surprising that an inland city such as Sagalassos appears to enjoy fewer imported wares than coastal cities such as Anemurion or Perge; what is interesting is that the city is otherwise very well set up in terms of architectural display and the usual signs of conspicuous consumption. Close study of ceramic assemblages, comparing for example Athens and Corinth, reveals very different patterns in imports and choices of styles adopted, decisions which can be related to the self-perceived nature of the community and its prevailing social concerns. Westward links and imitations, for example, are more visible in some civic assemblages than in others, although Italian imports (of fine and coarse pottery) are seen throughout the east.[58]

As for the consumption choices of individuals, literary sources can offer some powerful and touching tales of personal habits and dreams. One can contrast the young man in Lucian's *The Ship* who wants a "dream of wealth" – a house near the Stoa Poikile, slaves, clothes, carriages, and horses

[57] For urban reviews, see n. 42; Ball 2000: 149–206, 246–356; Macready and Thompson 1987; Millar 1993a; Sartre 2000: 653–5; Yegül 2000. For documented examples of elite munificence in Asia Minor: Broughton 1938: 663–76, 715–33; 746–97; Macro 1980: 684–5; Rogers 1991; Wörrle 1988. On Galen, see Garnsey and Saller 1987: 97; Mitchell 1993: 169.

[58] On Sagalassos: Degeest 2000: 260; Waelkens 2002. Corinth and Athens: Rotroff 1997; Eiring 2000; Slane 1989. Italian imports: Hayes 1997: 52–9; Riley 1981; Will 1997.

(as well as the eponymous ship to make all possible: *The Ship or the Wishes* 11, 13) – with Paul's letter to Timothy: "We brought nothing into the world; for that matter we cannot take anything with us when we leave, but if we have food and covering we may rest content . . . the love of money is the root of all evil things . . ." (1 Timothy 6.7–8).[59] Archaeological measures of individual consumption include the examination of private homes and of mortuary contexts. On one level, a predictable schism immediately arises between the world of the wealthy and that of the majority of the population. Yet signs of broader networks of exchange, and new options in consumption, seem apparent at all levels of the hierarchy.

The contents and decoration of private homes and tombs, of course, speak to a broad array of questions – of social status, of cultural identification, of cultured living. Here, we can simply note the richness of elite homes in the east. Antioch, where excavations in the 1930s preserved at least some of the range of domestic finds, yielded up (in addition to the well-known, superb mosaics) a plethora of furniture ornaments, locks and keys, jewelry, toilet articles, sculptures, lamps, coins, pottery, nails, chains – in materials ranging from lead to bone to gold. At the other end of the spectrum, small rural sites in Greece, of no perceptible distinction, yet had imported eastern sigillata and African Red Slip forms, as well as local imitations of these and other, Italian wares.[60] The tombs of the rich and famous are almost invariably robbed out, but leave their monumental sarcophagi or elaborate burial structures as visible testimony to their expensive care. By contrast, the graves of the poor are rarely published, but an example could be offered in the contents of one not very remarkable tomb chamber, in Ephesian territory (modern Uzgur). For the nine ceramic, seventeen glass and three bronze items found, although their precise production centers remain unknown, parallels can be found as far afield as Cosa, Corinth, Ostia, Tarsus, Berenice, Athens, Stobi, Knossos and more.[61]

These two brief comparisons seek only to argue that, up and down the social scale, the acquisition and utilization of goods extended beyond the immediately local sphere and (presumably) carried with it some social force and charge. In and of itself, this phenomenon is no new thing, yet the argument can be made that, with a wider availability and range of goods, circulating at greater speed, selective consumption and consumer choice

[59] As noted by Pleket 1983: 136.

[60] Kondoleon 2000 (Antioch); Wulf-Rheidt 1998 (Pergamum); Rauh 1993: 193–249 (Delos). Diet and health are another obvious, but still future, measure for the Roman east, though see King 1999. On rural sites in Greece, see Alcock et al. 2005.

[61] On elite burials: Ball 2000: 361–75; Cormack 1997; Cremer 1991; 1992; Hallett and Coulton 1993; Schmidt-Colinet 1989. On the tomb at Uzgur: Gürler 2000.

became a more pervasive and powerful phenomenon in the Roman world. Ironically, one of our best list of "goodies" comes in a denunciation revelling in the destruction of a great city and its material abundance:

> . . . cargoes of gold and silver, jewels and pearls, cloths of purple and scarlet, silks and fine linens; all kinds of scented woods, ivories, and every sort of thing made of costly woods, bronze, iron, or marble; cinnamon and spice, incense, perfumes and frankincense; wine, oil, flour and wheat, sheep and cattle, horses, chariots, slaves, and the lives of men . . . (Revelation 18.12–14)

Customs of consumption, actual or imagined, could become a platform for cultural and religious reaction and resistance, with implications in turn for economic strategies.

V CONCLUSION

As threatened early in the chapter, this discussion was never intended to provide a comprehensive survey of economic behavior in the eastern Mediterranean from c. 200 BC to AD 300. It remains a brief, and inevitably schematic, review. What the evaluation does offer is an introduction to some of the structural determinants (geography, demography, urbanization) of the region's performance, as well as an emphasis on three processes (production, distribution, consumption) that motivated and dictated economic development. A few more general points, arising from this analysis, can be raised in conclusion.

First, looking at the Roman east leaves one in close sympathy with recent arguments for the plurality of the ancient economy. As one reviews the various elements of production, distribution, and consumption, and the manner in which these played out among so many different agents at divergent spatial scales (from hand-carried loans to next-door neighbors to the transport of sarcophagi to the far reaches of the west) – any inclination to box the east into a single *monocolore* framework (to use Davies' adjective) appears an increasingly bad idea. Thinking instead in terms of "a loosely articulated mélange of separate systems each with its own rules, purposes and ideology," however, leaves us with decisions about how to define and analyze these systems, without creating new, equally unhelpful boxes ("the marble trade," "purple in the east").[62] Electing a spatial perspective on the organization of economic process – be it for local patterns, regional cadences, or inter-regional flows – offers one way to follow out alternative sets of behavior, while still allowing for their mutual influence, if not outright integration.

[62] Davies 1998a: 241; see also Paterson 1998: 164.

Second, the issue of growth. Aggregate growth in production – to some as yet unquantifiable, but arguably considerable degree – must be accepted for the early imperial east, although such a global statement should not mask the fact that there would always be winners and losers across this considerable expanse. Many indicators point in this direction: the development of urban hierarchy, the increase (however modest) in overall population, the expansion of rural settlement, the density of merchant networks, the material evidence for more exchange and more consumption of more types of goods. Following the same parameters, a growth in per capita production can also be assumed, but to validate this statement (for example by examining improvements in living standards across a sufficient sample of population) would require different, and better, evidence than we currently possess. As for temporal change (otherwise admittedly little discussed here), the third century witnessed a slowing, or hiccup, in the positive trajectory of the east at large. Later Roman and Byzantine evidence suggests, however, a general recovery and even continued subsequent growth, notably in the area of agricultural production. Where this does not hold true is for certain industries hit particularly hard by either pan-Mediterranean developments (the rise of new ceramic production centers) or the difficulties of central authorities (the decline of marble quarrying).

With these arguments in mind, we can return to the presupposition with which this chapter began: that the economy of the east was less dramatically transformed, that it experienced less "growth," than that of its counterpart in the west or in Italy. In the end, the verdict must be that it really doesn't matter (unless, of course, such a conclusion is taken to justify the region's continued neglect). Entry into an imperial system, it is clear, led to substantial change in all important aspects of eastern economic behavior – in external demands and expectations, in productive goals and capacities, in modes and distances of distribution, in civic and individual habits of consumption. What does matter at this point is how to refine our understanding of that scenario, given that totalizing overviews (such as this chapter provides) can only get us so far. Both more adventurous and closer grained studies are required, especially those calling upon the growing corpus of archaeological data.

Finally, the ambit of what falls under the rubric of "economic history" in the east requires reconsideration, as suggested by the institutional framework emphasized elsewhere in this volume. Far more thought needs to be given to the manner in which cultural, ethnic, or religious difference skewed economic choice and behavior in different parts of the eastern empire. Did the dictates of Jewish religion affect rural settlement in Judaea? To what extent is Achaea's less prosperous trajectory attributable to its identity as "Old Greece"? Did devotion (internal and imperial) to the Hellenic past make dramatic transformation, cultural and economic, a less viable

proposition in certain zones of the east than in the west?[63] All of these have been posited, and many more such hypotheses could be entertained. Little goes untouched within an empire, but a spectrum of forces affect just how that touch was felt, and how it was expressed – and that is as true for the economies of the Roman world as for any domain of life.

[63] Hirschfeld 1997; Alcock 1997a; 2002: 36–51; Woolf 1994: 128.

CHAPTER 26

ROMAN EGYPT

DOMINIC W. RATHBONE

I INTRODUCTION*

This chapter aims to assess the extent, nature, and causes of economic change in Egypt in the first three centuries of Roman rule (30 BC – AD 284). I will argue for significant aggregate and per capita growth in the first two centuries, attributable to the institutional, commercial, and behavioral impact of integration into the Roman world; then, following the Antonine plague, some aggregate decline in production but renewed, if more differentiated, per capita growth attributable to internal socioeconomic changes. The issues of continuity and peculiarity are fundamental. First, in any period we face the myth of the unchanging nature of Egyptian agriculture and agrarian culture, which hinders recognition of times of significant change.[1] Second, Egypt has long been seen as an untypical province of the Roman empire: politically separate, geophysically distinct, culturally unique. So too, supposedly, it was kept outside the general economic structure of the empire, and is untypical for Roman economic history. Few historians now overtly subscribe to this view, but a sub-theme of this chapter is that Egypt is instead our best documented case of the normal regional variation within the empire-wide framework.

These problems envelop the papyrological evidence.[2] The 20,000 or so Roman-period texts on papyrus published to date offer a quantity and range of documentary evidence unique in the Roman empire, and permit some quantification of social and economic phenomena. However, the relative wealth is poor and unevenly distributed. Over three centuries we have an average of twenty-one census returns per 14-yearly census, and one price of wine, the best attested commodity, for every two years.[3] Half of the papyri

*In Roman Egypt land was measured by the "aroura" (ar.), equivalent to 2,756 m^2. The standard dry measure was the "artaba" (art.), equivalent to 4.5 Italic modii, that is 38.78 l.; officially, one artaba of Egyptian wheat weighed 30.3 kg. The standard monetary unit of account was the Alexandrian "drachma" (dr.), notionally equivalent to the Roman sesterce (HS); see further below.

[1] Debated in Bowman and Rogan 1999. The myth is in part orientalizing, but also reflects the politico-religious ideology of the Pharaonic state.

[2] Montevecchi 1988 is the best guide to the documentary papyri, Bagnall 1995 to historical use of them. Habermann 1998 analyzes their chronological distribution.

[3] Bagnall and Frier 1994, adding seventy-eight returns published since they wrote; Rathbone 1997a.

are of the second century, and the bulk of them come from two nearby areas of Middle Egypt, the town of Oxyrhynchus and some villages on the edge of the Arsinoite nome. From Upper Egypt and the deserts we have some texts, mostly receipts, on ostraka (potsherds), from Lower Egypt (the Delta) some carbonized administrative documents, and from Alexandria almost nothing. We know that the nomes (regional administrative units) of Egypt retained some cultural and administrative differences through the Roman period, and the Arsinoite nome, as a semi-oasis (the Fayyum) developed by the Ptolemies, more than most. The restricted and, within that, haphazard documentation of topics by time and place makes it difficult to assess continuity and typicality. Archaeological evidence in the form of settlement and burial sites, and the material items which survive in them, is far more evenly spread throughout Egypt, but has only been studied patchily.[4]

II DEMOGRAPHY

The demography of Roman Egypt is a topic of much recent debate. Josephus (*BJ* 2.385), writing around AD 75, claims a total population of 7.5 million, excluding the residents of Alexandria. Some scholars, myself included, think this a traditional and gross exaggeration, while others insist that Josephus should be believed.[5] Comparison with nineteenth-century census figures and estimates of the ancient carrying capacity of the land are not certain or precise enough to settle the point. Data from a few Arsinoite villages in the mid-second century AD suggest the average rural population density, which excludes the nome capitals and Alexandria, did not exceed 120 persons/km^2; although the validity of this crude estimate has been questioned, very much better data from the mid-third century BC, after implementation of the Ptolemaic scheme to develop and settle the Fayyum, point to an average density, including the nome capital, of only 60 persons/km^2, which makes the Roman-period estimate look high rather than an underestimate.[6] For want of more persuasive alternatives, I stick to my previous estimates of a total rural population of 3 million, and up to 1.5 million inhabitants of Alexandria and the nome capitals, which, rounded up, gives a total population of around 5 million in the mid-second century. Settlement evidence (see below) suggests this was the peak of Egypt's populousness in antiquity, apparently the result of a slow but steady rise

[4] Bagnall 1988 and 2001; cf. van Minnen 1994.

[5] Rathbone 1990; *contra* Lo Cascio 1999a; cf. Scheidel 2001a: 181–250, and above, Chapter 3.

[6] Sharp 1999 on Theadelphia, and van Minnen 1994: 234–6 on Karanis, argue for much higher Roman densities, but from doubtful premises. Ptolemaic density: Clarysse and Thompson 2006: vol. II 92–102. Even if we imagined a very high average rural density of 150 persons/km^2, that would give a total rural population of 3.75 million.

from 30 BC. No one disputes that the Antonine Plague, which was carried into Egypt in AD 166/7, caused over the next decade a dramatic aggregate population loss, probably of around 20–30 percent to judge from some attested cases, including over twenty Delta villages.[7] Signs of partial abandonment of Arsinoite villages, and the growth of large estates (see below), hint that population regrowth may have been skewed in favour of urban centers. Study of the extant census returns, the richest standardized source of demographic data from Roman Egypt, points to a high mortality and high fertility regime, susceptible to crash in a crisis like the Antonine plague, but also capable of generating significant long-term growth.[8] Whether it was a high or low pressure regime will be considered after discussion of the evidence for production.

III LAND AND AGRICULTURE

Egypt was famed throughout antiquity for its amazing agricultural output, the result of the annual Nile inundation with its rich silt deposit, which, unlike the Euphrates and Tigris spates, conveniently coincided with the sowing season for arable crops. The standard estimate of the total area potentially under cultivation is 9 million arouras (25,000 km^2), based on a Ptolemaic temple text and one set of nineteenth-century figures, which looks optimistic against other late nineteenth-century totals of around 20,000 km^2 actually under cultivation. However, two regional totals for land liable to tax in kind, one for a division of the Arsinoite nome in AD 184/5 and the other a fourth-century summary for the whole Oxyrhynchite nome, backed by much wider archaeological and documentary evidence for rural settlement in middle Egypt and the Delta, indicate that the extent of cultivation, which peaked in the second century, was greater than in the nineteenth century, and not matched until more recent times.[9] There were no grand state-sponsored development schemes on the Ptolemaic or Achaemenid model; expansion must be attributed to private initiative, encouraged by fiscal policy. Plots of uncultivated public and private land which were confiscated, abandoned or otherwise ownerless, a chronically recurring phenomenon, were sold off or leased out by the nome authorities on very favorable terms through a well-documented, albeit unstudied,

[7] Cf. above, Chapters 2–3. [8] Bagnall and Frier 1994.

[9] Critique of traditional view by Scheidel 2001a: 220–3. *P.Oxy.* LXVI 4527: the Heracleides *meris* is assessed for 814,863 art. wheat (also 54,841 art. barley, and some other grains); at an average tax rate of 3 art./ar. (see below), an area of 270,000 ar. of arable land is implied, equivalent to 750 km^2, half the size of the Fayyum. *SB* XIV 12208, with *BL* VIII 379: 163,687 ar. of private land and 38,857 ar. of public land in the Oxyrhynchite liable to tax in grain, equivalent to a total of 560 km^2 of arable land. Arsinoite settlement: Rathbone 2001; Oxyrhynchite: Krüger 1990: 41–9; general: Alston 2002: 384–9, including the rather different phenomenon of the sixth-century rural repopulation in the form of estate villages.

process of local registration and public offer to any reasonable bid.[10] The state also provided authority and backup for regional maintenance of the public canals and dykes by means of a communal corvée system.[11] Inadequate or excessive inundations were a regular threat to agricultural production, roughly once in every seven years, but, perhaps because of a favourable climatic macro-cycle, only once, in the late 240s to early 250s AD, is there evidence for a run of problems over several consecutive years, and even that, prices suggest, was weathered without serious upset.[12] The one major development in irrigation was the spread of the cattle-powered pot-garland water wheel (Arabic *saqiya*) to provide perennial water from wells or canals for walled enclosures (*ktemata*) used for intensive viticulture and the cultivation of fruits and legumes. Although it was a Hellenistic invention, documentary and archaeological evidence both indicate that its diffusion occurred through investment by large private estates in the third century.[13]

The Roman government soon subordinated the varied traditional land categories of Egypt to its simple schema of private and public land, and eventually removed the residual restrictions to a free market in private farmland.[14] Even lessees of public land seem in practice to have enjoyed considerable security of tenure, apparently collectively in the Arsinoite nome but as individuals elsewhere.[15] Two Arsinoite village tax registers of the mid-second century show that 53–59 percent of their territory was public land, which may reflect their origin in an area reclaimed by the Ptolemaic state. Notionally public land in the fourth-century Oxyrhynchite nome comprised 19 percent of the total, and 24 percent of the farmland of a Mendesian toparchy, in the Delta, around AD 300. At Naboo, in Upper Egypt, in 118/9 royal and sacred land made up 26 percent of the "mainland" total, although the category of royal land classed as private shows that a total of 39 percent had once been public.[16] These figures imply a steady drift of public land into private ownership through the cycle of abandonment and sale, and we would expect this trend to have accelerated after the Antonine

[10] E.g., *W.Chr.* 374 (late 1); *P.Col.* X 257 (142); *P.Petaus* 13–23 (184/5); *P.Pheretnuis* (195/6); cf. Rowlandson 1996: 48–53.

[11] Bonneau 1993; Sijpesteijn 1964.

[12] Inundations: Said 1993: 152–5; Bonneau 1971. c. 250: Rathbone 1997a: 193–4.

[13] For the irrigation system see above, Chapter 16. *Saqiya*: Venit 1989; Oleson 1984: 350–85; Habermann 2000: pls. 21–6. Named *ktemata* first appear in second-century papyri but are predominantly attested in the third century and later (*DDBDP* search 31/7/02). *Saqiya* pots are frequent among the late Roman surface detritus of abandoned Arsinoite villages (autopsy).

[14] Rathbone 1993, though I now believe that sales and other transfers of catoecic land may have been restricted to within the "gymnasial" group, at least into the second century.

[15] Rowlandson 1996: 80–8. Note that traditional Egyptian tenancy from the state was far more secure than has often been supposed: above, Chapter 16.

[16] *P. Berl. Leihg.* 1 5, Theadelphia, AD 158/9, 59 percent; *P.Bour.* 42, *horiodiktia* of Karanis, AD 167, 53 percent (ignoring *ousiai* in both cases). *SB* XIV 12208, with *BL* VIII 379, Oxyrhynchite. *P.Oxy.* XLIV 3205, Mendesian. *P.Giss.* 60, Naboo. Cf. Johnson 1936: 25–74.

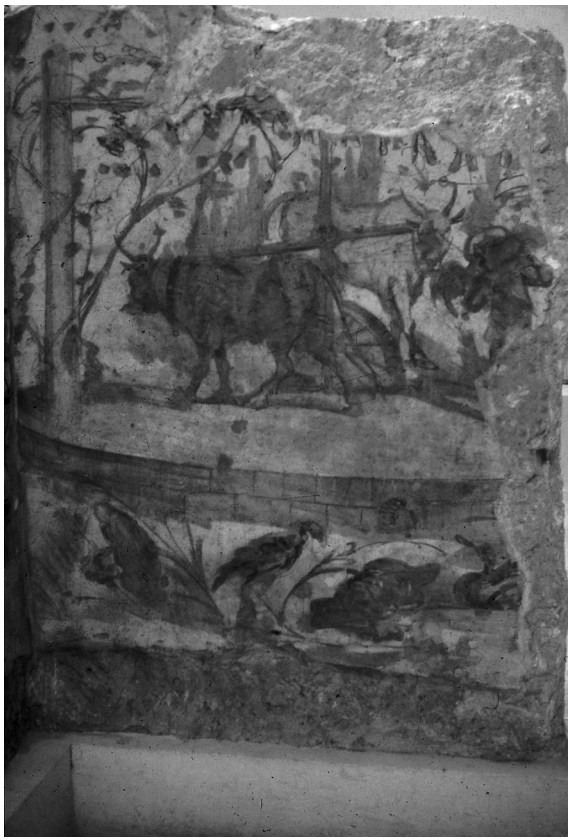


Figure 26.1 Wallpainting of a water-wheel from the Wardian Tomb (Alexandria) (Reproduced with kind permission from Dr. Mervat Seif el-Din, Director, the Graeco-Roman Museum, Museum Street, Alexandria, Egypt. Inventory number 27030)

Plague. It has been suggested that the Arsinoite fiscal report of AD 184/5 (see above), where only 27 percent of the wheat taxes due had been paid by the end of the civil year (late August), indicates a drastic reduction in the area actually cultivated, but this is far from certain.[17] By the fourth century, remaining public land had been handed over to private ownership, and was still registered as "public" only because it bore a higher tax rate in lieu of the previous rents (see below). This presumed reform of Diocletian was not radical, but consolidated and confirmed long-standing Roman policy.[18]

[17] *P. Oxy.* LXVI 4527, with van Minnen 2001a. It was quite normal for taxpaying to be delayed well into the next year, and note that 45 percent of the barley due had been paid.

[18] The change, which may have accompanied the introduction of the new system of tax assessment in 297 (*P. Cair. Isid.* 1), has never been studied; meanwhile, see Rowlandson 1996: 63–9.

A fiscal register of private landholdings at the Arsinoite village of Philadelphia in AD 216/7, in which 15 out of 197 landowners are categorized as elite outsiders, appears to show a relatively equal distribution of arable land with a Gini index of 0.532. Tax reports of AD 308/9 from nearby Karanis, after some padding out of gaps, produce a Gini index for private landholding of 0.478. But managers (*phrontistai*) of large estates are attested at Philadelphia then and soon after, whose holdings must lurk disguised in the village section.[19] Large private estates, with properties dispersed through a nome, begin to appear in the late first to early second century, such as the Oxyrhynchite estate of the Tiberii Julii Theones, but the emergence of really large estates, with substantial holdings in many villages of a nome, and comparable landowning probably in other nomes too, such as the Arsinoite estate of Aurelius Appianus (perhaps over 4,000 ha.) or the Oxyrhynchite estate of the Calpurnii Horiones, is a phenomenon of the earlier third century.[20] To some extent these large estates were the result of a slow process of accumulation going back to the first century. However, archaeological evidence for the wine-pressing installations which they used (*lenoi*, see below) suggests a particularly rapid phase of expansion achieved by acquisition and reclamation of private and public land abandoned as a result of the Antonine Plague. Two survey documents from Theadelphia reflect the change: in AD 158/9, of its 6,300 ar. or more of farmland, 8 percent was taken up by vineyards and orchard/garden land; by AD 216 the total farmland had, it seems, shrunk by 19 percent to 5,100 ar., of which 29 percent was now under vines and the like. The growth of viticulture is attested in the Delta too, in the Mendesian nome, where 24 percent of the farmland in one toparchy by around AD 300 was vineyards and garden/orchard land.[21]

Agricultural experimentation was not as eye-catching as in the Ptolemaic period, because the main obvious changes from closer integration with the Mediterranean world had already been accomplished, notably the switch from emmer to naked wheats as the principal grain crop.[22] The standard, conservative, estimate is that the average wheat yield was tenfold, that is a gross crop of 10 artabas per aroura (roughly 1 tonne/ha.), as in the Ptolemaic period, although some scholars think this is much too low. There is plenty of direct evidence for a standard sowing rate of 1 art./ar., but remarkably little for yields. The best set comes from the third-century Arsinoite estate of Aurelius Appianus, where attested wheat yields on directly worked and leased lands ranged from 7.0 to 16.6 art./ar., with an overall mean average

[19] *P. Yale* III 137 pp. 21–30, with explanation of the Gini index of distribution (from 0.0, perfect equality, to 10.0, utter inequality) in Bagnall 1992. See Rowlandson 1996: 99–100 for straw men in land registers.

[20] Swiderek 1960; *P. Theon.*; Kehoe 1992; Rowlandson 1996: 103–18; Rathbone 1991.

[21] *Lenoi*: Rathbone 2001: 1116. Theadelphia: Sharp 1999. Mendesian: *P. Oxy.* XLIV 3205; cf. *P. Ryl.* II 216 and 427 descr.

[22] See above, Chapter 16.

of 13.0 art./ar.[23] This supports the obvious expectation that yields will have varied widely depending on a variety of natural and human factors. A normal tenfold yield fits well with the indirect evidence of rents on state land, which averaged around 3 to 3.5 art./ar. and rarely exceeded 5 art./ar. (see below). Private leases of the Roman period, from both the Arsinoite and Oxyrhynchite nomes, tend to specify a biennial rotation of wheat and hay, or legumes, with a high wheat rent, averaging 7.7 art./ar. in the Oxyrhynchite leases but in one Arsinoite group reaching 15 art./ar. in one year and a small cash rent, or no rent, in the other year. The rationale and reality of these rent arrangements remains a puzzle (possibilities include delayed payment in wheat, or part-commutation to cash, and so on), but, because they represent two years' output, they do not necessarily imply much higher than tenfold annual yields. Biennial crop rotation seems to have been the norm on private land in Roman Egypt, as specified in leases and attested in private accounts for land worked directly. The low taxes assessed in wheat could easily be met from the portion of land under wheat, or by other means. Crop rotation was probably less common on state land, whose annual rents, mostly set in wheat, were much higher and were normally, it seems, paid in wheat.[24] Broadly, we may hypothesize that the average wheat yield on private land was higher than that on public land, say twelvefold rather than tenfold. A crude estimate of the average gross annual agricultural production of Roman Egypt in wheat equivalent (assuming 80 percent of 9 million ar. under cultivation, of which 25 percent was public land, and no fallowing) would be 83 million artabas (2.5 million tonnes).

The evidence for agricultural practices, as for other topics, is patchy and localized, which makes it difficult to discern trends. Some practices may escape documentation. For instance, there is extremely little evidence for double- or catch-cropping in comparison with mediaeval Egypt, but maybe only because it is not mentioned in the lease contracts which are our prime source of information on cropping; in fact hay, which is often specified in leases, was often cropped two or three times a year.[25] The level of wheat rents in private leases rises to a peak in the second century and drops back in the third, but this probably reflects the changing availability of tenants (that is, labor; see below) rather than productivity. Some interrelated developments do seem attributable to the growth of large estates in the third century: greater use of animals in irrigation, cultivation, and transport (see below);

[23] Schnebel 1925: 125–7; *contra* Lo Cascio 1999a: 440–2, over reliant on Foraboschi 1981; Rathbone 1991: 242–4, with *P. Bingen* 111.3–6 (Appianus estate: a total of 2,826 art. from 217 ar.). This is a classic illustration of our dependence on particular concentrations of evidence.

[24] Leases: Rowlandson 1996: 236–52 and 1999; Johnson 1936: 74–145. Crop rotation: Schnebel 1925: 218–39.

[25] Rowlandson 1999: 144; cf. Rathbone 1991: 233–5; Schnebel 1925: 145–60.

probably therefore more manuring, especially of the artificially irrigated *ktemata* (walled enclosures); diffusion of the use of scythes (*chortokopa*, "hay-cutters") not just for hay, but for grain crops in place of traditional sickles (cutting near the ear and ploughing in the stalk) or uprooting, perhaps deliberately to harvest more straw for the animals; proportionately greater production of fodder crops, which may also have contributed to the fall in wheat rents and more complex specification of rotation in third-century leases.[26] While we might expect a certain drop in aggregate production due to abandonment of some land after the Antonine Plague, if the earlier third century also saw considerable conversion of public land to private ownership, we could posit a significant increase in productivity due to more diversified and intensive cultivation, perhaps accompanied by a slight rise in the average wheat yield. As already noted, the main development was the enormous expansion of viticulture, which, as the Heroninos archive illustrates, involved investment and the widespread application of technical improvements. Vines were carefully selected, tended, and harvested to produce specific types of wine, they were cultivated intensively in walled enclosures irrigated by cattle-powered water wheels drawing water from stone wells, the grapes were pressed in screw-presses in new pressing rooms (*lenoi*), built in Roman style of fired brick, mortared and lined with hydraulic cement, and the wine was bottled in clay winejars, which, at least around Alexandria, imitated the Italian form Dressel 2–4. Remains of the virtually indestructible *lenoi* are found throughout Egypt, confirming the typicality of the evidence of the Heroninos archive, and they were probably common in other wine-producing areas of the later Roman world, for the fourth-century agronomist Palladius explains how to construct one.[27]

IV URBANIZATION AND CRAFT PRODUCTION

If we had no papyri, we would still, from the archaeological evidence, unhesitatingly identify urbanization as one of the main socioeconomic developments in Roman Egypt, as it was in most provinces of the Roman empire. The main visible traces on surviving sites of the almost forty *metropoleis* (nome capitals) are of Roman-period buildings, sometimes as reused in the Byzantine period. Adding the evidence of the papyri confirms that the second century saw a boom in the erection of public buildings, notably theaters, bath-houses and temples, mostly paid for out of civic resources. This continued into the third century, when big programs of repair and embellishment are also attested, notably at Hermopolis Magna.

[26] This is inevitably impressionistic, drawing principally on Oleson 1984: 350–85; Rowlandson 1996: 236–52; Rathbone 1991.

[27] Rathbone 1991: 248–56. *Lenoi*: e.g., *P. Mich.* v p. 244 (not a bath-house!); el-Fakharani 1983: 182–3, pls. 36–7; Palladius 1.18.

Many of these buildings, like the theater at Oxyrhynchus, magnificent in its size and decor (probably the largest in Roman north Africa), and the urban water-supply system of Ptolemais Euergetis (capital of the Arsinoite nome), represent the large-scale application of sophisticated engineering techniques.[28] We have little evidence for developments in this period at the two main "Hellenic" foundations in Egypt of Alexandria and Ptolemais in Upper Egypt. In the Roman period Coptos seems to have become the chief city of Upper Egypt. Alexandria was no longer a royal capital and focus for lavish royal spending, but instead it became the main transport and trade center of the eastern Roman empire, and the fragmentary architectural remains imply considerable public and private building activity.[29] The rise of the *metropoleis*, which are normally imagined to have been over-sized villages in the Ptolemaic period, was initiated by the Roman sociopolitical policy of creating an urban "Hellenic" elite to provide the regional and civic liturgic functionaries required by a more Roman administrative system.[30] However, there was from the start an economic element and impact. The definition of this elite was tied to the privatization of catoecic land (see above), and the urban residents rapidly developed patterns of consumption, with the associated production and trade, typical of Roman provincial urbanism (see below). Good data for the size of urban populations are completely lacking, but in a few cases we can make guess-estimates from recorded numbers of houses.[31] Some *metropoleis* were relatively small, like Apollonopolis Heptakomias in Upper Egypt with around 7,000 inhabitants, while in Middle Egypt Ptolemais Euergetis and Oxyrhynchus were probably more typical with about 20,000 each, and Hermopolis Magna unusually large with maybe up to 40,000 residents. Roman Alexandria, the second largest city of the Roman empire, probably had a population of up to 0.75 million (larger than in Ptolemaic times), while villages in Egypt had populations ranging from a few hundred to around 4,000. Omitting these larger villages, although they were as big as "cities" in other provinces, we can estimate that from 20 percent to 30 percent of the population of second-/third-century Egypt lived in cities, which makes Egypt one of the most urbanized provinces of the Roman empire. The material vitality of the cities in the third century, allied to the evidence for limited rural repopulation, suggests that the percentage probably increased after the Antonine Plague to the 30 percent end of the range.

[28] Alston 2002 is a wide-ranging and detailed study. Papyri: Lukascewicz 1986. Hermopolis: Bailey 1991. Oxyrhynchus theater: Bailey 2007. Ptolemais water supply: Habermann 2000. Cranes: Bailey 1996.

[29] Coptos: Herbert and Berlin 2003. Alexandria: McKenzie 2003; cf. Venit 2002.

[30] Bowman and Rathbone 1992.

[31] Rathbone 1990: 118–22; differently, Alston 2002: 331–3.

The economic life of the cities of Roman Egypt is difficult to reconstruct because the documentation is too particular and fragmentary to permit much generalization. Particularly frustrating is the poor evidence for Alexandria. Textile production is the only craft to have been studied seriously so far, albeit only from the documentary evidence, and there has been very little research into the distribution and marketing of goods. As the normal residence of most large and medium landowners, we would expect cities to have been the major centers of consumption in Egypt. The papyri attest a wide variety of craftsmen and tradesmen, but so sporadically that attempts at quantitative analysis are futile. The basic trades, such as carpenters and wine sellers, are found in villages, but many more, and more specialized, trades were based in the cities. As elsewhere in the Roman world, many "service" occupations are attested, such as the scribes, doctors, musicians, wet nurses, doormen and so on, employed privately and by temples and civic institutions. As elsewhere, textile workers dominate the record. One indication of scale is given by a second-century register of customs duties which shows that over five days in one November 1,956 items of clothing, mostly Greek-style tunics (chitons), were shipped out of Oxyrhynchus, presumably towards Alexandria and the Mediterranean. Egyptian weavers, like their counterparts in other provinces, mostly produced finished items of clothing rather than, as in mediaeval practice, rolls of untailored material. A speciality of Egypt, and probably a major export to the Mediterranean (and India), was linen, and, for what it is worth, there seems to be more evidence for flax cultivation in the third century. In terms of urban employment, unskilled and semi-skilled occupations, such as construction labor, were probably equally or more important, but they are seriously under-represented because they did not generate written contracts or receipts. The Roman period saw a great boom in the quarrying of marble and granite, and some growth in the mining of emeralds and gold, which was all run on private lines, apart from military protection, by the *patrimonium* (private estate) of the emperor.[32]

Retail traders in designated markets were subject to small fees for the right to sell, some flat rate, some pro rata, due to the local civic or religious authorities; for selling in the nomes, a territorial "concession" had to be purchased. Sometimes the authorities also tried to impose conditions about supplies or prices. Artisans, and some other professionals such as prostitutes, were liable to annual fixed capitation taxes for their crafts, called "handicraft-taxes" (*cheironaxia*), due to the Roman administration. Like the poll tax, with which they were collected, the rates varied from

[32] General: Johnson 1936: 335–88; Alston 1998; van Minnen 1987. Alexandria: Empereur 1999; Neesen 1990. Textiles: Wipszycka 1965. Tunics: van Minnen 1986; these were not army supplies, for 1,079 of them were children's chitons. Flax: Schnebel 1925: 203–5; Rowlandson 1996: 236–40. Mining: Maxfield 2001; Klemm and Klemm 1994: 211–17.

nome to nome; Arsinoite weavers, for instance, paid 38 or 76 dr. a year.[33] Craftsmen often operated from a one-room workshop-cum-shop opening onto the street, the common ancient, mediaeval, and modern habit, which implies small units of production. The new large estates of the third century employed some inhouse craftsmen, especially carpenters, but still relied mostly on ad hoc contracting of independent artisans. If we knew more about Alexandria, where, in broad terms, we know there were important industries producing glassware and perfumes, we might find larger scale enterprises with structured workforces like the workshop with "many" linen workers attested in one isolated text. They must have existed throughout Egypt for construction (no evidence), shipbuilding (one attestation), and so on, and for mining and quarrying, as is now well attested in the eastern desert, especially at Mons Claudianus. Contracts of apprenticeship appear in the papyri for both freeborn youths and slaves, but slave labor seems usually to have been supplementary to free labor, even in the quarries.[34]

Some cities had quarters which were named after types of craftsmen or traders, but although a few cases of loose grouping are known, like the weavers around the Serapeum at Oxyrhynchus (and kilns were always on the edges of villages), normally there was no particular zoning of trades. Even small villages had designated and organized areas for selling food, foodstuffs and other items, principally, by long tradition, in and around temple precincts and along their processional avenues (*dromoi*), such as the big Serapeum market in Oxyrhynchus. Many cities and larger villages also had a Greek-style colonnaded "market" (*agora*), or several. Annual religious festivals could be accompanied by a special general fair (*paneguris*), and some villages had periodic specialized markets, for instance for trading camels.[35] Most craftsmen and some retailers seem to have belonged to trade "associations" (*koina*, or *sunodoi*, better not translated as "guilds"), which had club rules, annual subscriptions and elected officers. Their best attested functions were social and religious: to hold dinners, to confer a sense of importance, to help with deceased members' funerals, and so on. However, they also arranged and managed agreements to fix prices or divide market territories, and they often dealt on behalf of their members with the local and provincial authorities, for instance collectively paying their members' *cheironaxia*, or providing supplies for the Roman army. In this period, before the fourth century, it seems to have been advantageous, but not a state requirement, to belong to an association, and associations had

[33] Wallace 1938: 191–223; Hobson 1993; Rea 1982.

[34] Workshops: e.g., at Marea, el-Fakharani 1983: 178–81; at Tebtunis, Begg 2000: 245–53. Estates: Rathbone 1991: 166–74. Linen *ergasterion*: *P. Oxy.* XXII 2340 (AD 192). Shipyard: Casson 1990. Mines: *O. Claud.* II–IV. Apprenticeship: Johnson 1936: 388–92. Slaves: Biezunska-Malowist 1977: 73–108.

[35] Zoning: Alston 2002: 153–7. Markets: Alston 1998; Jördens 1995: 49–52.

not yet been made regularly subject to collective obligations imposed by the state.[36]

Attempts to quantify the percentage of textile workers, for example, or textile output, are illusory at present. Clearly many urban workers, and some in bigger villages, were in apparently "non-productive" occupations which converted the agrarian profits of landowners into items of consumption and display. But this also created wealth, by stimulating competition and demand, and because the processes of transformation (from wheat, say, to painted wallplaster) were complex and monetized. Equally clearly, there was a substantial urban production which created wealth more directly, partly by exports to Alexandria and beyond, and partly by sale to the villagers who produced food. Although loomweights are as commonly found in Egyptian villages as on rural sites in the rest of the Greco-Roman world, the papyri show that peasants purchased clothes (and funerary textiles), and burials and rubbish layers are full of mass-produced jewelry, amulets, figurines, and other small items, which were probably mostly of urban manufacture (see below). Technological developments are hard to trace. Most weavers stuck to the traditional Egyptian horizontal loom, and use of the "Alexandrian" upright loom was a speciality. The quality of terracotta and faience figurines dropped visibly after Roman annexation because of a change to mass production techniques. The skilled techniques used in the glass industry were of Hellenistic origin. Crudely, the scale of urbanization in Roman Egypt, and contemporaneous prosperity of the rural population, implies that cities were producers of wealth as well as consumers of agrarian surplus.[37]

V TRADE AND TRANSPORT

If surplus production, agrarian and urban, was to create wealth, it needed a distribution system. The number of specialist food sellers attested in cities and larger villages show that local retail networks existed, and accounts of personal and institutional expenditure, like those of Kronion the supervisor of the record office of Tebtunis in the 40s, or those of the estate owner Sarapion in the earlier second century, show a daily routine of small-scale purchases for cash.[38] Literary, documentary, and archaeological evidence illustrate regional and interregional distribution through, for example, finds of red slip pottery from Aswan (which imitated North African finewares), the records of internal customs posts, shipping contracts, listings of regional

[36] San Niccolò 1913–15: vol. I, 66–194, II *passim*; Boak 1937; Johnson 1936: 392–400; cf. Carrié 2002.

[37] Weaving: Wipszycka 1965. Pottery: Ashton 2003.

[38] Kronion: e.g., *P. Mich.* II 123 verso and 127 (AD 45–7). Sarapion: *P.Sarap.* 55; 56; 66; 68 (c. 128). Other examples: Bandi 1937: 382–419.

specialities.[39] But the main change to trade in Egypt in the Roman period was the development of Alexandria as the commercial center of the eastern Mediterranean, mediating the east-west flows of goods and wealth, which often, it seems, passed through Alexandria rather than being shipped directly between Italy and Asia Minor or the Levant. Visitors marvelled at the number and varied origin of the ships and merchants in Alexandria's two enormous harbors.[40] One foundation of this situation was the imperial *annona*, the grain supply of Rome (see below), which chartered, and thus subsidized, an annual sailing of large private ships from Alexandria to the ports of Rome (first Puteoli, later Ostia). With no official cargo for the return voyage, they carried back Italian wine, Spanish and North African olive oil, and craft products such as North African pottery and Italian metalwork. Some of these wares were re-exported to other provinces, while some, as documents and archaeology show, percolated south through Egypt, and even reached India. However, there is also some evidence for a considerable private export of wheat and other produce to Italy, and presumably there were exports to other areas too where local supplies were unreliable.[41]

Most spectacular was the trade with Arabia and India, which is particularly well documented in the first century, but also flourished in the second to third centuries despite the disappearance of texts on ostraka (a change in writing practices?).[42] Although there was some export of produce and manufactured items such as wine and textiles, it is clear that the main exports (say 50 percent?) were gold and silver, to begin with as coin, subsequently mainly as bullion. The principal imports were perfumes and spices (especially pepper), precious stones, ivory, and some textiles, including Chinese silk, and tropical hardwoods. This is normally termed a "luxury" trade to belittle its importance. Admittedly these goods were for consumption and display, but in the developed urban, or rural urbanizing, lifestyle of the empire pepper was a basic condiment masking poor meat, perfumes were equally commonly used in domestic life and in private and public religious rituals, and jewelry inset with gems and small items made of ivory

[39] "Early" Aswan red slip: Ballet 1992: 103–7, 113–16, 141–2; Herbert and Berlin 2003: 28–30. Customs records: Drexhage 1982, with Alston 1998: 177–9. Shipping contracts: e.g., *M. Chr.* 341; cf. Johnson 1936: 407–24. Specialities: e.g., Strabo 17.1.14, 23, 25, 51; Pliny, *HN* 12.101, 15.46, 19.14, 23.97; Athen. 1.33d–f, 11.464b, 15.680a–b, 15.688f.

[40] We have no worthwhile study of Roman Alexandria; meanwhile, see Haas 1997: 19–44. The events of AD 68–70 illustrate Alexandria's centrality: it was the logistical base for Nero's planned eastern conquests, and the command center of the Flavian revolt and march west. Some visitors: Strabo 17.1.9, 13; Joseph., *BJ* 4.615; Dio Chrys. *Or.* 32.36–40; Galen (ined. work, cf. Bowman, Garnsey, and Rathbone 2000: 956).

[41] Amphoras: e.g. Empereur 1999: 393–9; Lawall 2003. Metal: e.g., *W. Chr.* 326 (AD 115–17), an Italian(-style?) sword bought at Coptos. Private wheat: *TPSulp* 45, 46, 51, 52, 79 (Puteoli, AD 37 and 40).

[42] The bibliography is enormous. Raschke 1978 remains fundamental. Some new points, and also odd ideas, in Sidebotham 1986; De Romanis 1996; and Young 2001.

were affordable to reasonably prosperous villagers (see below). The pseudo-statistic derived from the elder Pliny that in the later first century Rome was losing not less than 50 million sesterces a year on this trade through Egypt is an academic red herring. The only certain figure is that the return cargo of one ship from India in the mid-second century, after payment of the 25 percent import duty in kind, had an agreed market value at Alexandria of 7 million drachmas. At the contemporary median price this was worth almost 770,000 art. of wheat in Middle Egypt (over 23,000 tonnes), the net product (deducting 2 art./ar. tax and seed) of 77,000 ar. of private land, almost 1 percent of the productive arable land of Egypt.[43] The wealthy Italians and Alexandrians who could afford to finance trade on this scale will have profited most from it, but there was a substantial trickle-down effect. Some goods were manufactured at Alexandria, Coptos, and elsewhere, for export. The imported perfumes and spices generated a specialized processing industry, including adulteration and faking, for which Alexandria was the main center. The trade employed independent skippers and their staff, shipbuilders and repairers, donkey and camel trains across the eastern desert, and thousands of porters at transit nodes. Some of these worked full time in the trade, but for most it was a seasonal bonus in addition to their normal farming or employment.[44]

Transport in Roman Egypt was probably as easy and efficient as at any time before the steam age. The potential of the Nile to link the country was fully realized. Nile ships of the period ranged in size from 1.5 to 150 tonnes burden, with many of 15 to 45 tonnes. Most were Greek-style "galleys" (*akatoi*), built of wood by the shell method (which economized on wood), powered by sail and oar, though traditional Egyptian reed boats were still also used. The monster grain barges, from 180 to 540 tonnes burden, of the Ptolemaic era had disappeared along with the queens and courtiers who built them as status symbols. In the Roman period most ships, including seagoing ships, were of a medium size which a single owner-captain could finance and manage, and even larger ships of 200 to 400 tonnes burden, like some annonal grain freighters and the ships needed for the monsoon ocean crossing to India, were not that expensive. Furthermore, a special contract of "lease-sale" of ships, of Hellenistic origin, enabled an investor to build a ship and "lease-sell" it to a captain for a share in the operating profits.[45] Very little is known about the maintenance of roads. The government did maintain the routes through the eastern desert, and equip them with walled *caravanserai*, and Hadrian built a new road down the Red Sea coast from his foundation of Antinoopolis, but all this was mainly for access to the mines

[43] Rathbone 2000.

[44] Processing: Pliny, *HN* 12.28, 12.59, 13.16–17; Galen 12.216 (Kühn). Exports: *Periplus Maris Erythraei*; Pliny, *HN* 19.7 (flax, that is linen). Employment: Rathbone 2002.

[45] Poll 1996, but with many errors; Rathbone 2003 and 2007a.

and quarries and to help police the area. To meet the demands of increased quarrying and mining the camel was used more and special wagons and wheeled cradles were introduced. The use of camels and four-wheeled carts, which could carry respectively twice and four times as much as a donkey, first became common in the Egyptian countryside in the third century on the new large estates.[46] This indicates a growth in the quantity of surplus produce to be transported to market, and implies a greater percentage of land being devoted to fodder crops.

VI PRICES, PROSPERITY, MONETIZATION

The economy of Roman Egypt was highly integrated and fundamentally free market. Political unity and general peace helped, along with standardized systems of law and justice, and of money, weights, and measures. Major economic trends, such as urbanization, privatization of the land, growing wine consumption, were ubiquitous, like social and cultural trends in, for instance, hairstyles and burial customs (see below). Increasingly, and especially in the third century, the Alexandrian and nome elites merged into a provincial elite, with large landholdings over several nomes. Urbanization implies constant migration from the countryside, and the papyri attest a high level of individual mobility, including permanent settlement, and seasonal and occasional movements.[47] Through the taxman's eyes this mobility looked like *anachoresis*, flight to avoid paying taxes, but it made for a free market in labor and contributed to economic growth. Agricultural accounts all show a wide variety of types and rates of remuneration for long-term and casual labor, reflecting a changing and complex market as well as the different requirements of different jobs. Long-term laborers often received accommodation and wheat rations, but most remuneration was in cash, and therefore responsive to short-term fluctuations of demand and supply.[48] Slavery existed in Roman Egypt, and was relatively common in the domestic context, but the systematic use of trained groups of slaves in agriculture and urban production which was typical of Italy, is not found in Roman Egypt.[49] Attested prices of wheat, wine, and donkeys, which also mostly come from Middle Egypt, display the characteristics of free market prices: they co-vary broadly in the long term; in the short term they behave differently; those for wheat and wine fluctuate between years and seasons according to harvest and stock levels. No market is perfect, but the round

[46] Roads: Cuvigny 2003. Transport: Adams 2001; Nachtergael 1989; Bagnall 1985. Horses are also attested, but for riding only; because of the climate, they have never been used much as draught animals in Egypt.

[47] On mobility, Braunert 1964 says it all. [48] Drexhage 1991: 402–39; Rathbone 1991: 106–74.

[49] Biezunska-Malowist 1977: 73–108; cf. Bagnall and Frier 1994: 70–1. If Alexandria were better documented, we might find more slave-staffed production there.

numbers and limited range of wheat prices reflect the stabilizing effect of fairly heavy state intervention in the buying and selling of wheat (see below). Wine prices, uniquely, have a slow upward trend throughout the period, suggesting that increasing, and increasingly sophisticated, wine consumption was leading wine production. The price bands for other goods and wages display a remarkable stability from the AD 70s to the 160s, and then again from the 190s to AD 274. This indicates maintenance of a long-term balance between internal production and consumption, and unwavering confidence in the token coinage (see below). The sharp doubling of prices and wages in the later second century is best explained as a sign of temporary economic dislocation caused by the Antonine Plague. The system then regained its normal equilibrium until it was rudely disturbed by the coinage reforms of Aurelian and Diocletian.[50]

In the absence of decent statistics, attempts to calculate living standards in monetary terms are unsatisfactory. We can estimate that in the second to third centuries it took a rural laborer around seven days' full employment to earn the median price of an artaba of wheat, roughly equivalent to his food requirement for one month. But his tax dues and other living costs are difficult to price, and most households lived from a diverse portfolio of activities, often founded on farming a plot or two of land. A broader, if more impressionistic, approach can help. Roman Egypt had a small elite, part of the elite of the empire, with similar interests, activities, literature, food, houses. The "ordinary" people are of more interest. There were two serious revolts in Roman Egypt: that of the Jews in AD 115–17, and that of the *Boukoloi* ("cowherds") in the Delta around AD 171–2. The causes of the former were religious and ethnic rather than economic; although the latter surfaced in the wake of the Antonine Plague, its motivation is opaque, and may well have been millennarian rather than to do with taxes or oppression.[51] In petitions individuals sometimes complain of being ruined by their enemies or a disaster, but references to chronic destitution are non-existent, in striking contrast to late antique Egypt. Conversely, village cemeteries in the Fayyum show an extraordinary range of grave goods. Even bodies dumped in shallow graves on their palm-frond bier tend to have jewelry. Metropolites and richer villagers constructed plastered brick tombs to house their splendid mummies with painted or gilded masks, or, in particularly Romanized places like Philadelphia, inset naturalistic portraits. Many of the portraits represent these people finely dressed, coiffed, and adorned in the latest (more or less) imperial style, as if for one of the dinners to mark *rites de passage*, now including birthday parties (a Roman custom), with entertainers, flowers, and refreshments, now principally wine

[50] Rathbone 1996b and 1997a; cf. van Minnen 2001a on wine, with a different slant.
[51] Jews: Smallwood 1976: 389–427. *Boukoloi*: Alston 1999.

and pork (the Roman taste), held at home, or, more often, in special dining rooms in temple complexes, to which they were constantly inviting each other. Houses of the Roman period, mostly built in the traditional style out of mudbrick (still prized today for its insulation, solidity, and ease of repair), tend to be larger and grander than those of the Ptolemaic period, and the better ones had stone elements and were decorated with painted wall plaster with plant and animal motifs, scenes from Greek mythology, and images of Greco-Egyptian deities like Sarapis.[52] Many domestic utensils were made of wood, fibers, or clay in traditional style. Iron, which Egypt lacks, continued to be rare, to the extent that flint knives and scrapers were also used. The small quantity of imported ceramic finewares, in contrast to the preceding and following periods, implies a widespread use of more expensive glassware, under-represented in the archaeological record because broken pieces were recycled.[53] Change across time is even harder to assess. It has been argued that third-century wages were relatively higher against prices than before the Antonine Plague, because the labor supply was lower, which is possible but not yet convincingly documented.[54] However, the fundamental trend in the third century, seen elsewhere in the empire, was towards greater differentiation between rich and poor, not least as land was privatized more rapidly and absorbed by large estates. In demographic terms, Egypt of the first to third centuries was a low-pressure regime, with a low population in relation to aggregate resources, especially in the second century, and a tolerably open system of entitlement to the basic resource, land. After the Antonine Plague, population seems to have recovered faster than land was reclaimed, and was more urban based (allowing the possibility of some shortage of rural labor), which initially was matched by agricultural intensification (higher per capita output). But, by the fourth century, as access by the poor to land became more restricted and the urban economy began to falter, a higher pressure regime started to develop, one of whose features would be a low but chronic level of urban poverty.

By pre-modern standards the economy of Roman Egypt was highly monetized, and probably increasingly so from the first to third centuries. Wheat was still also used to store wealth and as a medium of exchange, principally in peasant autarky, taxation in kind of land, private "giro"-payments of wheat using deposits in state granaries, and rations for long-term employees on private estates.[55] But this was an adjunct to the money economy, often interlinked with money payments, or commutable into

[52] Burials: e.g. Jouguet 1901: 401–9; Hooper 1961; Walker and Bierbrier 1997; Walker 1997; Venit 2002. Houses: Alston 2002: 44–127; e.g., at Tebtunis: Gallazzi and Hadji-Minaglou 2000. Dinners (another topic in need of a general study): Alston 2002: 81–5; Perpillou-Thomas 1993: 3–28, 265–76.

[53] E.g., *P.Fay.* pp. 39–40, 46–7, 53–4, pls. IX, XV–XVII, supported by autopsy of other Fayyum sites.

[54] Scheidel 2002, but with Bagnall 2002.

[55] Preisigke 1910: 62–184; Foraboschi and Gara 1982; Rathbone 1991: 307–18.

them. Cash, credit, and monetary valuations permeate the papyri. Coin finds on rural sites are sparse but ubiquitous (there were few low-value coins in circulation to be dropped and not recovered), and the large dumps of demonetized late third-century tetradrachms show that coins had been in widespread use. Villagers paid some taxes in cash, rented some land or accommodation for cash, labored for cash, bought goods, materials, and foodstuffs for cash, and often took out small loans, or sold crops in advance, to meet cash-flow problems.[56] There was never enough coin in circulation to cover these transactions. The Romans had adopted the coinage system of the late Ptolemies, based on the Alexandrian tetradrachm, a billon (silver-tin) coin, with a secondary series of copper drachma units, never minted in large quantities.[57] The tetradrachm was a token coin, with much less silver content than the denarius, but notionally equivalent to it. Hence the tetradrachm circulated exclusively in Egypt, but physical transfers of money between Egypt and the rest of the empire were possible using mainstream imperial gold coins. Minting at Alexandria, as at Rome, was very irregular. It is normally supposed that the quantity of coin in circulation grew gradually but steadily, but it seems there were only two major bursts of output, under Nero and under Trajan to Hadrian, which included much reminting of earlier issues, and new minting may have achieved no more than to replace previous cumulative coin loss. In the late second and third centuries minting of copper coins faded out, and the silver content of the tetradrachm was reduced in steps to a mere wash, parallel to developments in the coinage of the rest of the empire. Prices, however, did not rise, probably because the government did not raise tax rates and took back its own coin at its face value, thus maintaining confidence in its token value. Monetized exchange functioned, and grew across time, through credit arrangements. At a basic level purchases and payments, including tax payments, were recorded on account and partially settled at irregular intervals in multiples of the tetradrachm. For larger transactions credit transfers could be made between individual accounts in private banks. Private and state banks, the latter purely for receiving tax dues and making public expenditure, existed in every city.[58] Contracts could be registered with private banks in place of the normal notarial authorities, presumably when the banks handled the money-transfers in the contracts, which implies common use of banks. Although most private banks were local to one city and there was no general

[56] Hoards: Christiansen 1985. Loans: Tenger 1993. Monetization: Gara 1988; Rowlandson 2001, trying to dissent.

[57] Burnett, Amandry and Ripollès 1992: 688–713; Burnett, Amandry and Carradice 1999: 319–41; Maresch 1996: 110–33, with Rathbone 1997a: 187–90; Christiansen 1988: vol. I, II–15, II, 7–10.

[58] Bogaert 1995; 2000; and 2001, laying sound foundations for an economic study of banking in Roman Egypt.

clearing system, it seems to have been possible to transfer money from an account in one bank to an account in another.

VII TAXATION AND THE STATE

No plan for the economic development of Egypt was ever drafted by the Roman government, but it had beliefs, practices, and interests which favored general prosperity and encouraged some economic developments, and which, whatever their immediate motivation, were recognized by rulers and subjects to have these effects. Taxation in Roman Egypt is an enormous and complex subject which is overdue for renewed study.[59] Arable land was assessed in kind, mainly wheat, on a system based on that elaborated by the Persians and Ptolemies from Pharaonic practice. The normal rate for private land was 1 art./ar. Public land attracted a rent which varied, in theory, according to the Nile flood. A normal range of rents from 2 to 7 art./ar. is attested, with a median of around 3 to 3.5 art./ar. The general trend in Roman times was to simplify by assessing average rates, probably first in target totals for nomes and villages, by the fourth century directly for all landholdings.[60] Tax on garden land was paid in cash. All male inhabitants aged fourteen to sixty-five of Egypt, excluding citizens of Alexandria and of Rome, paid an annual cash poll tax (*laographia*), a novelty introduced to Egypt, and the rest of the empire, by Augustus. The basic rate in most nomes was 16 dr., but there were inexplicable variations, including the uniquely high 40 dr. in the Arsinoite, and metropolites paid half the basic rate. Urban crafts and trades were liable to trade taxes (*cheironaxia*), which were a set annual sum per person.[61] There were also imperial customs dues, which were farmed to private contractors: a 25 percent levy in kind on imports into the empire, an internal cash duty of around 1.5 percent on goods moved between the Nile valley and the Delta (the "Memphis harbor" tax), and, probably, a 2.5 percent cash duty on goods moved between Egypt and other customs zones of the empire. There were also various sales taxes, often of 1 percent, which mostly, it seems, went to the civic authorities.[62] Fragmentary evidence and local variation make it impossible to estimate the tax burden by itemization, but some gross figures suggest that, despite major fiscal reforms in the early second and mid-third centuries, the total burden remained remarkably stable, and relatively low, from Roman annexation through early Arab rule. It also seems that much of the theoretical

[59] Wallace 1938; Johnson 1936: 481–634; Wilcken 1899: 422–663. These are still valuable despite the mass of new material; however, they say very little about third-century developments.

[60] Rowlandson 1996: 71–80, 292; Johnson 1936: 503–7. Fourth century: *P. Cair. Isid.* 11 introd.; *SB* XIV 12208, with *BL* VIII 379.

[61] Poll tax: Wallace 1938: 116–34; cf. Rathbone 1993: 86–8. Trades taxes: n. 33 above.

[62] Wallace 1938: 224–31, 255–76; De Laet 1949: 297–330; Sijpesteijn 1987; Rea 1982.

imperial tax-take was spent within Egypt on maintaining officials, army units and temples, or just went uncollected, and at most half was exported to Rome, of which about half was wheat for the *annona*, whose importance historians habitually exaggerate, and half in cash.[63] Civic revenues were spent locally on building and repair programs, the running costs of gymnasium complexes and civic temples, mounting theatrical, athletic, and other shows and spectacles, and providing distributions of wheat, and sometimes oil and pork, to privileged groups of residents.[64]

Roman taxation in Egypt was relatively fair in that only the poll tax was, in very broad terms, regressive. Both land taxes and trade taxes were fixed in practice, which gave an incentive to increasing production. The state never managed, or even sought, to collect all that it needed in kind: throughout the period it resorted regularly to compulsory purchases of wheat, and of all sorts of supplies for the army, at fixed but not unfair prices.[65] Government edicts, echoed by petitions from private individuals, constantly claim that the agricultural productivity of Egypt was its aim, and auctions of abandoned lands and other *ad hoc* tax remissions were practical manifestations of this.[66] This reinforced the general Roman ideology of good government, protecting individual property rights against officials and other individuals, whose effect was that documents about legal disputes constitute a high percentage of the surviving papyri. This should not be mistaken for a policy to protect peasant farmers; as had already happened in Italy, the Roman belief in private ownership facilitated the growth of large estates by legal acquisition and a consequent decline of independent peasant farmers. Apart from its compulsory purchases and control of mines and quarries, the Roman government intervened very little in the economy. There were imperial and civic checks on weights and measures, wheat and other distributions at Alexandria and some *metropoleis*, and various attempts to limit profiteering in times of dearth, but only a single case is known of the governor threatening to purchase all private stocks of wheat at a set price for re-sale.[67] Attitudes to trade were neutral: the 25 percent levy in kind on imports at the imperial frontier was high, but internal customs dues were few and low; transport was facilitated by the maintenance of roads, and suppression of piracy and banditry, even if these had other aims too; apart from mines and quarries, there was no attempt to create and profit from monopolies in production or trade (trade taxes and retail fees did not confer exclusive rights).

[63] Rathbone 1989: 171–6.

[64] Jouguet 1911: 415–54 – a new study is overdue; Lukascewicz 1986: 89–138. *P. Oxy.* XL (ed. J. R. Rea).

[65] The prescription of crops on state land had been abandoned long ago by the Ptolemies; cf. above, Chapter 16. Compulsory purchases: Rathbone 2007b, which attempts to lay the ghost of the *annona militaris*, a mythical third-century new system of taxation in kind to supply the army.

[66] El-Abbadi 1967.

[67] In AD 246, in the context of the only known case of poor inundations and crops over several consecutive years (see n. 12 above).

Roman provincial justice was flexible and, under the umbrella of Roman legal institutions, recognized local legal traditions and the hybrid contracts which often resulted, and was prepared to judge cases by precedent and common sense.[68] In modern terms, transaction costs were low.

VIII CONCLUSION

Like every province of the empire, Egypt had its peculiarities. The most striking economic oddities were the size and wealth of Alexandria (whose impact, through lack of evidence, is always underestimated, here too), the agricultural fecundity gifted by the Nile inundation, and the closed silver and copper coinage systems. But none of these cut Egypt off from the rest of the empire; indeed Alexandria and the wheat surplus were integrating factors. Rome drew Egypt in further. A simplistic "taxes-and-trade" model, whereby Egypt was stimulated to produce surplus goods for export to the rest of the empire to pay for the taxes extracted by Rome, does not explain the situation. The eastern trade alone probably gave Egypt an inflow of wealth several times greater than the notional tax-take, of which at most a half actually left Egypt. Far more important than taxation was the more indirect, highly variegated and equally pervasive institutional, commercial, and behavioral influence of Rome. It changed consumption patterns in Egypt: by the mid-first century even richer villagers were adopting Roman tastes in dress, food, funerary commemoration, and so on. Over the second to third centuries most *metropoleis* turned themselves into Romano-Greek civic centers with the appropriate monuments, entertainments, and wheat distributions on the Roman model. The sizeable Roman army presence in Egypt introduced to its many local recruits, and the surrounding population, Roman management practices, including paper salary accounts, Roman tools, equipment and techniques, especially in construction and mining, and the Roman economic mentality. It is noticeable that veterans and their families typically had complex financial affairs, making and taking loans of all types, assuming tax-collecting and public supply contracts.[69] Roman taxation expected high liquidity from top to bottom of society, and the Roman administration accepted its duty to provide and maintain an adequate coinage. It also deliberately fostered a general climate of probity and equity in public and private business. The Roman government imported its age-old preference for private ownership over public control of land, which enabled, while their administrative reforms encouraged, the formation of large private estates. Roman influences picked up by these estates included army-style salary accounts, barrack accommodation for workers (*kella*, from the Latin *cella*), the use of four-wheeled

[68] Lewis 1989; Taubenschlag 1955: 27–51. [69] Alston 1995: 117–42; Tenger 1993: 162–9, 190–7.

carts (*karron/karnon*, from *currum*), and wine-pressing installations made from fired brick and hydraulic cement. Brick and cement construction techniques influenced public building too, and if we knew more about the urban economy we would doubtless find more influences like the mass production techniques used for clay figurines. However, the main stimulus to economic development in Roman Egypt came from the Roman creation of a peaceful and open Mediterranean market, and the boom in demand caused by empire-wide urbanization. The market for Egyptian wheat was, in effect, limitless (in that the normal price in Italy was at least twice that in Egypt), and it was mass consumption patterns, not just elite profligacy, which drove the commerce with the east, and all the crafts and trades which rode on it, from which Egypt, especially through Alexandria, profited so greatly.*

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CHAPTER 27

THE FRONTIER ZONES

DAVID CHERRY

What survives to describe the frontier provinces of the Roman empire hints at a significant measure of economic development in some of the frontier zones, and perhaps especially in north Africa, until about the middle of the third century AD. But in the almost complete absence of reliable, quantitative information, it is generally impossible to determine what level of growth was achieved. There is no way even to estimate its per capita effect, which is surely what mattered on the ground. The inadequacies of the historical record are likely also to obscure important regional and even local variations in patterns of economic development. The picture described here will almost certainly need to be modified when there is systematic exploration of rural sites across the frontier zones, of the sort carried out in Tripolitania by the UNESCO Libyan Valleys Survey project.[1]

I LOCATING THE FRONTIERS

For a long time the Roman frontiers were understood to be lines of demarcation that separated the civilized (Roman) world from the barbarism that was believed to lay beyond it.[2] Hadrian's Wall, for example, could be said to have been designed, as the *Scriptores Historiae Augustae* put it, "to separate barbarians and Romans" (*Hadr.* 11.2; *qui barbaros Romanosque divideret*). It is a view that has been largely abandoned, in part because none of the frontiers' linear barriers appear to have been wholly defensive in purpose, partly also because the Romans themselves do not seem to have considered the frontiers to be lines either of defense or of demarcation. It is now widely agreed instead that the frontiers functioned as zones or borderlands, in so far as the Roman government was unable to achieve, as C. R. Whittaker has put it, "the optimum balance between its range of conquest (i.e. its military capacity) and the economy of its rule (i.e. where the military expenditure is no longer paid for by tax returns); and because the turn-over from economic viability to economic liability is necessarily gradual, unperceived,

[1] Barker, Gilbertson, Jones, and Mattingly 1996. [2] Whittaker 1994: 1–9.

and unstable."[3] It is unclear, however, whether the Romans themselves ever understood the frontiers to have behaved, militarily or administratively, as zones, or indeed as any other kind of territorially defined unit. Because the frontiers were often little more than the forward lines of advance established during military campaigns,[4] it is unlikely that many Romans, including even the soldiers on the ground, would have recognized or understood any of the kinds of demarcated borders that can be drawn on a map. There is also little reason to believe that the Roman authorities considered it to be their duty to protect provincial populations against those who lived beyond the frontiers (though they may sometimes have been expected to do so, perhaps especially from about the middle of the third century AD). And even if the imperial government had wanted to develop a coherent system of defensive barriers and fortifications, it is unlikely that it could have overcome the delays of communication and transportation that were a necessary consequence of the vast distances which separated the frontiers from the capital, and from each other.[5]

It has often been remarked that the location of the frontier lines coincided roughly with the outer perimeter of the provincial territory that was occupied by peoples whose social structure was easily adapted to the Roman administrative system, which aimed at governing the provinces indirectly through existing, local elites. It has been suggested of Roman military expansion in Germany, for example, that it stopped at the intersection of Celtic and of Germanic society, because the former, with its "centralised political system," was "far easier for the Roman state to incorporate."[6] But the idea that the Romans had sufficient knowledge of the peoples who lived near or beyond the frontiers, at the time that the frontier lines were established, to be able to distinguish between those who were adaptable to Roman administration and those who were not, is almost certainly wrong. There is nothing to indicate that the Romans systematically collected information about the lands or peoples who lay beyond the frontier lines. Nor can it be shown that the frontiers tracked the intersections of tribal cultures. In fact, the German frontier line cut across a region of social and cultural homogeneity, dividing, as Whittaker has noted, the peoples who were neither wholly Celtic nor German.[7]

The so-called "least effort subsistence model" of frontier zone economic development proposed by comparative historians of agricultural colonization predicts that frontiers will be located where full extension of the land can be accomplished with the smallest possible investment of labor and capital, and within the limitations imposed by natural environmental factors like precipitation and drainage.[8] Put another way, the frontiers are likely

[3] Whittaker 1983b: 113; see also Whittaker 1994: 85. [4] Isaac 1992: 417. [5] Millar 1982: 7.
[6] Hedeager 1987: 126. [7] Whittaker 1983b: 111; 1989b: 66. [8] Green 1979.

to be located in areas where there is an economic and ecological transition from intensive agricultural production to more extensive uses of the land, such as pastoralism. It might be supposed then that the determining factor in the location of the Roman frontiers was, as Whittaker has remarked, "the marginality of the land."[9]

II AGRICULTURE

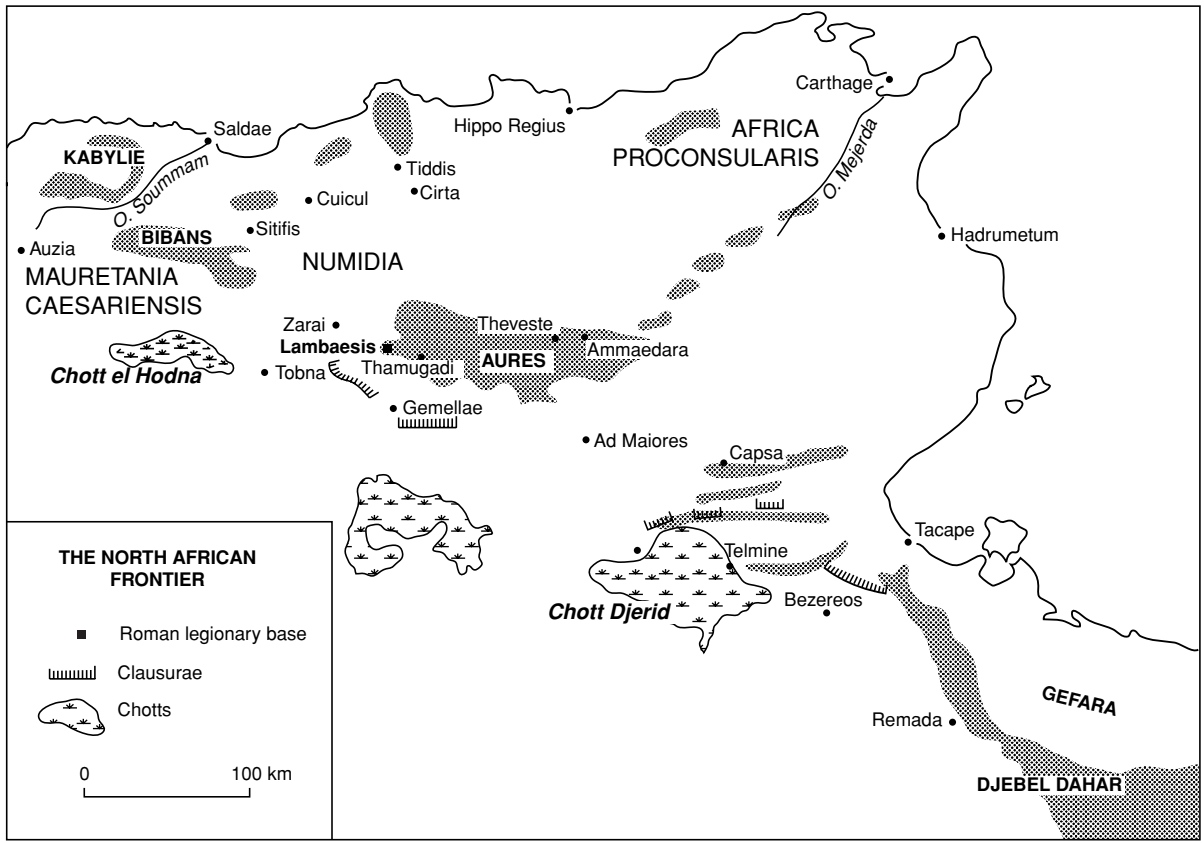
Any significant measure of economic growth in the frontier zones could have been achieved only by improving agricultural efficiency or by expanding the amount of land under cultivation. There is in fact little reason to doubt that agricultural output was increased in at least some of the frontier zones, like the Rhineland, where more intensive cultivation is attested in the lower Mosel-Main, the Wetterau, and the *agri decumates*.[10] The practice of allowing fields to lie fallow for years at a time was widely abandoned in many parts of northern Europe in the first and second centuries AD.[11]

It is less certain whether agricultural production was increased in Britain. It used to be thought that pollen diagrams indicated an increase in production in the highlands in the Roman period. But new diagrams and the re-dating of some old ones suggest that the increase in cultivation belongs mainly to the pre-Roman Iron Age and to the later years of the Roman occupation.[12] Improvements in agricultural techniques – in drainage and in harvesting tools, in plough technology and in horticulture – seem to have occurred either before the Roman conquest or after it.[13]

Site density in the Solway basin south of Hadrian's Wall was far higher than in the area to the north of it, though the quality of the land is broadly similar.[14] It has sometimes been supposed that the relatively prosperous agricultural economy south of the wall was a consequence of its construction.[15] However, because virtually nothing is known of settlement patterns in the period before the building of the wall, the differences that are evident in the Roman period cannot be attributed solely to its foundation. In fact, because some of the variation may go back to the period before the building of the wall, it might even be supposed that the differences were a factor in determining its location.[16]

In north Africa, as in Britain, economic growth on a large scale could not have been achieved other than by expanding agricultural production. Field survey has now demonstrated conclusively that production was increased,

[9] Whittaker 1994: 86; also Trousset 1986: 65.
[10] Whittaker 1983b: 115; see also Garnsey 2000: 692.
[11] Hedeager 1987: 134. [12] Jones 1982: 99–103.
[13] Breeze 1989: 229; Jones 1989: 131. It is, however, difficult to believe, with Martin Jones 1982: 105; 1989: 134, that the Roman occupation actually halted or even reversed the expansion of arable production in the lowlands until the later part of the third century AD.
[14] Birley 1981: 44. [15] E.g., Jones 1984: 86. [16] Whittaker 2000: 316.



Map 27.1 The frontier in North Africa
From Whittaker 1994: 41, Fig. 9. Reprinted with permission of The Johns Hopkins University Press.

and perhaps dramatically so, across much of the region.[17] The principal agent of expansion was the olive. A subsistence crop, it seems, in the pre-Roman era, its widespread cultivation in the frontier zone in the period of the Roman occupation, and perhaps especially in the second century AD, is attested by a wide range of archaeological evidence, including the recovery of numerous ruins of olive presses in the valleys of the Aurès mountains and in the plain-land to the north of them. Large parts of the pre-desert frontier zone in Tripolitania were brought under intensive cultivation, from the second half of the first century AD at least until the end of the second.[18] The UNESCO Libyan Valleys Survey project has demonstrated that a significant number of farms were producing surpluses, which they sold at coastal cities like Oea and Lepcis Magna, and possibly also at inland military bases such as Bu Njem and Gheriat el-Garbia.[19] That the region was actively involved in a market economy is indicated also by the large quantities of *terra sigillata* and African Red Slip recovered in remote parts of the frontier zone, and by references to cash payments in connection with the building of monumental tombs.[20]

There is no reason to believe that climatic or other environmental change was responsible for the agricultural development of the frontier zone.[21] The real question is whether any of it can be attributed to the coming of the Romans. There are, it seems to me, three ways in which the Romans might have contributed to the expansion of cultivation in north Africa: by introducing new or better methods of farming and/or of water management, by promoting the cultivation of marginal land, or by increasing demand for agricultural products. The notion that the Romans introduced better techniques of cultivation and of water retention and distribution in north Africa has nothing to support it. But it refuses to go away altogether. Agricultural expansion in the Roman period, it has been said, cannot be explained "if agrarian technologies or systems of water use were not changed."[22] However many of the rural water-control schemes of the frontier zone must necessarily have been constructed before the coming of the Romans because the centuriation lines that are visible on aerial photographs were drawn across the hydraulic systems.[23] Much of the *fossatum* was built on top of irrigated field systems – in the Jebel Mekriziani-Seba M'gata region, for example, and in the Hodna mountains. And at least some parts of the Roman-era water control systems lay outside the zone of Roman political control. Bruce Hitchner has demonstrated that the dry-farming methods practiced in the rich agricultural area around Cillium and Thelepte were

[17] Mattingly 1994b: 138. [18] Barker, Gilbertson, Jones, and Mattingly 1996: 155, 321.
[19] Barker, Gilbertson, Jones, and Mattingly 1996: 285, 324; also 347 on farm Lm4 in the Wadi el-Amud.
[20] Mattingly 1994b: 152. [21] Barker, Gilbertson, Jones, and Mattingly 1996: 263, 315.
[22] Carandini 1983b: 157. [23] Shaw 1984: 127.

indigenous.[24] Much the same can be said of the cultivation techniques employed in the pre-desert zone of Tripolitania.[25]

There is no reason either to believe that Roman soldiers or veterans were responsible for the agricultural development of the frontier zone. It is hardly likely that soldiers learned new or improved techniques of cultivation during their period of service. Brent Shaw has pointed out that the legion stationed at Lambaesis is unlikely to have discharged more than 100 men annually, only some of whom can be expected to have settled in the frontier zone.[26] And even where veterans are known to have settled, they cannot be shown to have had any discernible effect on the local economy.

It has sometimes been supposed that the imperial government played a role in the agricultural development of the frontier zone by promoting the cultivation of marginal land (*subseciva*). A Hadrianic law, which appears to have restated the provisions of a *lex Manciana* of unknown date, awarded possession to those who undertook to work marginal land that had gone out of cultivation, and offered them reduced rent on land that they planted with fruit or olive trees, figs, or vines.[27] But it probably applied only to imperial estates, most of which, it seems, were in the rich Bagradas valley southwest of Carthage and in the region around Sitifis.[28] In any case, the poor are unlikely to have had enough capital to pay for the planting of vines or trees.[29] The law's practical effect, it might be supposed, was to transfer possession of some marginal land to well-capitalized, local landowners.

In the end, it can be conjectured that the Romans' main contribution to the agricultural economy of the north African frontier zone was to open up new markets for its products, in the military bases that were scattered across the region, perhaps also in more distant parts of north Africa and Europe. It is not at all certain, however, that the increase in agricultural production will have resulted in a rise in per capita wealth. Three groups are likely to have benefited most: the landowning and politically connected families that were centered, and in at least some cases, resident, at Rome; the local African elites who were integrated into the Roman system of military rule; and those who were part of or closely connected to the army. I suspect that the effect over time was to widen the gap between the landowning elite and the mass of ordinary provincials.[30] It might be inferred, too, from Richard Duncan-Jones' calculations, which show that more than half of the surplus wealth of the local elites in north Africa in the second century AD

[24] Hitchner 1988; 1990.

[25] Mattingly 1994b: 138; see also Sartre 2000: 643, on Syria. [26] Shaw 1983: 140.

[27] The Hadrianic law is quoted on an altar found at Aïn Oussel: *CIL* VIII 26416, AD 209–12; for the *lex Manciana*, *CIL* VIII 25902, Hr. Mettich, AD 116/17.

[28] Garnsey 1978: 233. [29] Carandini 1983b: 156.

[30] The introduction of intensive agricultural practices in nineteenth-century Algeria seems to have accelerated the pauperization of the rural population, which in many areas was driven off the land into the cheap labor market: Lorcin 1995: 167.

was in the hands of "a very few families,"[31] that the Roman presence served also to increase the differences in income that separated the most powerful, moneyed families from the not quite so well connected.

III SUPPLYING THE ARMY

It has been said of the western frontier provinces that, in so far as it forced farmers to produce a surplus, the army's appetite for food was "the fundamental factor that led to the development of the frontier districts."[32] Parts of northern Gaul were given over to the production of cereals for the army stationed on the Rhine.[33] The absence of wheat in cereal finds at second and third century settlements in the Assendelver Polders, where there is pollen evidence for its cultivation, is probably an indication that it was all being shipped to the frontier army.[34] Ostraka recovered from the military outpost at Bu Njem in Tripolitania indicate that it was being supplied with grain and olive oil by small-scale cultivators of the pre-desert frontier zone.[35]

Comparatively little is known about how the army was supplied on the eastern frontier, which is generally not as well known archaeologically.[36] Some grain for the frontier legions was shipped from the Black Sea region through the port of Trapezus.[37] But because most of the Roman forces in the region were stationed in or around cities,[38] at least until the fourth century AD, it might be supposed that they were supplied mainly from existing civilian markets.[39]

The presence of the army stimulated cereal production in the south of Britain and introduced it to some areas in the north.[40] In Northumberland and East Lothian, grain production and stock-raising increased markedly during the Roman period.[41] New land was brought under cultivation in the regions around the North Sea basin, in the tidal wetlands of the Severn estuary, and in marginal areas in the north such as the middle and upper Dales.[42] On the other hand, pollen diagrams from the region east of the Pennines suggest that the main phase of agricultural clearance there predated the Roman military presence by at least thirty years, indicating

[31] Duncan-Jones 1963: 165–6.

[32] Drummond and Nelson 1994: 9; also MacMullen 1990: 58–9; Whittaker 1980: 91: the "decisive factor" in the development of the frontier zone was "the frontier itself and the large consumer market in the form of the Roman army."

[33] Middleton 1983: 81. At farms near Trier, stock-raising gave way to cereal cultivation by the early third century AD: Groenman-van Waateringe 1989: 100.

[34] Whittaker 1983b: 115.

[35] Barker, Gilbertson, Jones, and Mattingly 1996: 285, 328; Marichal 1979: 448; 1992: 99–106; Mattingly 1994b: 3.

[36] Isaac 1992: 3. [37] Whittaker 1994: 56.

[38] Isaac 1992: 133. [39] Elton 1996: 83.

[40] Frere 1978: 260; cf. Breeze 1989: 229; Jones 1990: 100; Rostovtzeff 1957: 231.

[41] Whittaker 1994: 114. [42] Garnsey 2000: 693.

Map 27.2 Britain in the second century AD
From P. Salway, *The Oxford Illustrated History of Roman Britain*. Oxford and New York: Oxford University Press, 1993, p. 124

perhaps that the army moved into an already productive area.[43] And there is increasingly good evidence for climatic improvement at about the time of the Roman occupation.[44]

It is sometimes supposed that, for any given region, the army's impact can be measured by calculating the minimum cereal requirements of the soldiers who were stationed in the area. A number of scholars have attempted to determine the requirements of the army in Britain, for example, with widely varying results. Rivet calculated that the army in Britain in the first century AD would have required 15,158 tonnes of grain annually, the product of about 42,915 hectares, which he concluded "must have represented a noticeable proportion of the total arable land."[45] Millett, working from the premise that the army requisitioned the grain it required, and that the soldiers stationed in Britain in the first century AD would have needed 8,000–20,000 tonnes of grain annually, calculated that they could have been fed from an area about 20,000 hectares in size, a burden that, in his view, the agricultural economy could have borne "without excessive stress being imposed."[46] Anderson has recently calculated that the roughly 17,000 auxiliary soldiers stationed in northeast Britain in the early third century AD would have required 5,584,500 kilograms of grain each year. Drawing on data from the experimental Iron Age farm at Butser Hill, which produced yields of 2 tonnes/hectare on soil without manure, and allowing for seed grain and "occasionally poor harvests," he concludes that the auxiliaries could have been fed on the product of 5,584 hectares.[47]

Much the same sort of argument has been advanced recently by Rüger in connection with the army stationed on the Rhine frontier. Reckoning that the 39,000 soldiers in Upper and Lower Germany would have required about 8,000 tonnes of grain per year, which he estimates to be the product of 10,700 hectares, he concludes that the army could have been fed on the surplus production of about 300 farms "of medium size." It is, he goes on to say, "easily conceivable" that the grain producers of Upper and Lower Germany could have supplied the army's requirements in the second and third centuries AD.[48]

In much the same way, Fentress once tried to calculate the grain requirements of the legion stationed at Lambaesis and their consequences for agricultural production in the region. Estimating that the 5,000 or so legionaries will have eaten 1,825 tonnes of grain annually, she concluded that, in an "average year," 91.2 square kilometers of grain-producing land

[43] Jones 1991b: 25. [44] Hanson and Macinnes 1991: 88. [45] Rivet 1969: 189–98.

[46] Millet 1990: 56–7; cf. 1984: 68: the army's impact "need only have been comparatively small."

[47] Anderson 1992: 99–100; for Butser Hill, Reynolds 1979. Calculations of this sort generally ignore the need for pasture, fallow, and woodland (Fulford 1984: 130), which there is probably no way to estimate anyway.

[48] Rüger 2000: 507. See also Savino 1999: 182–5, on Lower Germany.

would have been needed to supply the legion. Assuming further that one household could farm up to 20 hectares, and that it would have needed about 6 hectares to grow food for its own consumption, she calculated that the legion could have been fed by the surplus production of about 650 households.[49]

Others have tried to measure the army's effect on production by estimating its impact on the size of the population of the frontier provinces. It has been suggested, for example, that because the soldiers stationed in Britain were only 2–5 percent of the provincial population, their presence will have "required an equally small increase in overall production."[50] By the same reasoning, the roughly 120,000 soldiers stationed on the Danube in the second century AD can be expected to have produced an increase in production of perhaps 3 percent (assuming a regional population of 4,000,000).[51] The approximately 100,000 soldiers in the eastern frontier provinces in the second century were probably no more than 1 percent of the local population.[52] The 20,000–25,000 soldiers (legionaries and auxiliaries) who were stationed in north Africa in the first and second centuries appear to have been less than 0.5 percent of the total population (6,000,000–8,000,000).[53]

The various figures might be taken to indicate that the army's impact on the economy of the frontier provinces was not very significant. But calculations of this sort may be misleading, for several reasons. For one thing, the soldiers stationed in the frontier zones were not distributed evenly across the whole of them. It is reasonably clear also that not every agricultural producer in the frontier zones contributed equally to supplying what the soldiers required. The army generally tried to obtain the grain and other supplies it needed from nearby producers. So the presence of the army is likely to have required an increase in production, in the areas where the soldiers were actually stationed, that was, in the case of north Africa, for example, considerably greater than 0.5 percent.

It is not entirely clear either how much of the food that the army required was obtained from civilian farmers and how much was produced by the soldiers themselves. It appears that most units were provided with some land for growing crops or for grazing.[54] The legions posted to the lower Rhine are known to have controlled land on the right bank,[55] perhaps as much as

[49] Fentress 1979: 125. [50] Van der Veen 1989: 446.

[51] 120,000: Whittaker 1994: 99. 3 percent: cf. Whittaker 1994: 291 n. 3 (5–10 percent). 4,000,000: Frier 2000: 814; cf. Whittaker 1994: 291 n. 3 (1,000,000–2,000,000).

[52] Millar 1993b: 527.

[53] 20,000–25,000: cf. Daniels 1987: 235–6 (30,500). 6,000,000–8,000,000: Duncan-Jones 1963: 170 (8,000,000), Raven 1993: 88–9 (6,000,000–7,000,000).

[54] Breeze 1984: 277; Elton 1996: 67; but cf. Whittaker 1994: 101–2. The land seems sometimes to have been worked by the soldiers themselves, but was probably often leased instead to civilians: Breeze 1984: 277; Rostovtzeff 1957: 227–8.

[55] Rüger 2000: 501.

8,500 acres near Xanten.[56] Legionary land is attested also in Spain, Dalmatia, and Pannonia.[57] Inscriptions from Ribchester (*RIB* 583) and from Chester-le-Street (*RIB* 1049) suggest that land was attached also to auxiliary forts in northern Britain.[58] And the soldiers stationed at Vindolanda apparently kept livestock.[59]

It is unlikely, however, that large legionary bases could have obtained all of the food and fodder that they required entirely from military land.[60] Widely distributed inscriptions that mention military *conductores* ("contractors") and *pecuarii* ("cattlemen") suggest that required supplies were often obtained from independent civilian producers. Much the same may be indicated by the large number of homesteads in the vicinity of auxiliary forts in Britain, like Old Carlisle, Brougham, and Old Penrith.[61] It is reasonably clear also that grain for the frontier garrisons was sometimes transported over very long distances. Analysis of charred grain and beetles at York, for example, indicates that grain was being shipped there from southern Britain and from the continent in the late first century AD.[62] Pollen studies have shown that the soldiers stationed on the lower Rhine were fed, not on locally produced barley, but on imported wheat, some of which came from Britain.[63] Much of the grain consumed by the army on the Danube appears to have come from southern Russia, Bessarabia, and the Crimea.[64]

It is not known whether soldiers in the first two centuries AD were fed on wheat supplied mainly as tax in kind or whether the Roman authorities purchased grain for the soldiers, either at fixed prices or on the open market. Tacitus reports (*Agr.* 19) that Britons were required to supply grain to the army, suggesting perhaps that the grain was either being exacted as tax or purchased at fixed prices.[65] It has been pointed out that the number of inscriptions which record military suppliers in northern Britain is fewer than might be expected.[66] On the other hand, taxes were normally paid in cash.[67] And because the cost of their rations was deducted from the soldiers' pay, it seems unlikely that they were normally provided with wheat collected as tax in kind. The only certain examples of taxes collected in kind involve hides (Tac. *Ann.* 4.28) and soldiers (Tac. *Hist.* 4.17, 5.25). Accounts kept for Flavius Cerealis, prefect of the ninth cohort of Batavians at Vindolanda around AD 100, all refer to cash payments.[68]

[56] Petrikovits 1960: 63; cf. Rostovtzeff 1957: 228.

[57] It is unclear whether land was assigned to the legion at Lambaesis. An inscription from nearby Casae (*CIL* VIII 4322) refers to soldiers engaged in the cutting of hay. It is possible that they were working legionary land.

[58] Anderson 1992: 77; Higham 1989: 161. [59] Bowman 1994: 76. [60] Breeze 1989: 228.

[61] Higham 1989: 161. [62] Anderson 1992: 101; see also Fulford 1991: 38; Wacher 1996: 514.

[63] Elton 1996: 82; Fulford 1989b: 83. [64] Gren 1941; Whittaker 1983b: 115.

[65] Fulford 1989a: 181; see also Higham 1989: 168. [66] Breeze 1984: 282.

[67] Breeze 1989: 228. [68] Bowman 1994: 68.

The bulk of the evidence then suggests that the army normally paid for its supplies.[69] The practice of providing soldiers with food collected as tax in kind probably did not become commonplace until sometime in the third century AD.[70] There is no good evidence either to show that grain was normally purchased at fixed prices, and therefore no basis for believing that provincial farmers who supplied grain to the army benefited less than they would have had they sold it on the open market.[71]

Grain was only one item, though probably the largest, in what was undoubtedly a long list of supplies required by the frontier armies. It is estimated that the garrisons on the Rhine and Danube alone will have required the skins of 750,000 calves to make and to repair their tents.[72] According to Tacitus (*Hist.* 4.15), when the German rebellion broke out in AD 69, there were traders (*lixae* and *negotiatores*) all over the region.[73] In fact, there is reason to believe that many of the larger frontier forts in Germany had regular trading centers in front of their walls.[74] The frontier armies on the middle and upper Euphrates routinely bought supplies from traders in Syria and Asia Minor.[75] Papyri from Egypt record state contracts for military equipment such as uniforms and blankets (e.g., *P. Berl.* 1564). Wine amphoras types Dressel 2–4, which were manufactured mostly at Pompeii, are found almost exclusively on the frontiers.[76] Olive oil, too, was shipped in large quantities from Spain to the Rhineland and to Britain,[77] much of it probably for the frontier garrisons. Other materials like wool, textiles, and glass, which may also have been transported long distances to the frontiers, are hard to track archaeologically.[78]

It seems to me that the available evidence generally bears out the hypothesis advanced by Keith Hopkins,[79] according to which the frontier provinces can be expected to have imported goods on a very large scale, primarily from what he called the "inner ring" of tax-producing provinces, such as Spain, southern Gaul, north Africa, Asia Minor, Syria, and Egypt. It is entirely possible, too, that re-supply of the armies stationed on the frontiers will have had a significant "multiplier effect," whereby provisioning of the army will have led to an increase in trade also to the civilian populations of the frontier zones.

The only real exception to the pattern of long-distance supply is pottery, which seems normally to have been purchased from local suppliers,[80] except

[69] Fentress 1979: 176; Hassall 2000: 341; cf. Whittaker 1989b: 68–9, 72.
[70] Hopkins 1983a: 86. [71] Cf. Birley 1981: 46. [72] Drummond and Nelson 1994: 80.
[73] See also *FIRA* 3.137, a wax tablet found at Tolsum in Friesland, which records the purchase of cattle by a man named Gargilius Secundus, who was probably a military contractor.
[74] Rüger 2000: 505.
[75] Rostovtzeff 1957: 169. From the time of the Severan emperors, merchants who supplied goods to the army were exempt from taxation (*Dig.* 39.4.9.7).
[76] Whittaker 1989b: 70. [77] Rhineland: Remesal Rodriguez 1986. Britain: Harris 2000: 718.
[78] Anderson 1992: 58. [79] Hopkins 1980; see also Savino 1999: 34–7.
[80] Greene 1979: 99; Peacock and Williams 1986: 58.

in areas where there was no native tradition of pottery manufacture, like the territory of the Silures in what is now southeast Wales.[81] A number of centers for producing *terra sigillata* were established in central and eastern Gaul during the first century AD, probably in response to the opportunities provided by the military market in the frontier zone. Of the thirteen inscriptions that record pottery traders in Gaul, eight were recovered in the frontier zone, two others nearby at Trier and Metz. The other three, which were all found at Lyon, include a legionary veteran who had served in Lower Germany.[82] In the period after about AD 70, a pottery manufacturing industry was established on the Rhine on pockets of tertiary clay that had previously been used by military potters. Much the same can be said of the clay industry that was developed on the middle Rhine north of Koblenz and of the pottery manufacturing centers that were established around Nida and Rheinzabern.[83]

More specialized wares, however, were generally imported, sometimes over long distances. Northern Italian *terra sigillata*, for example, appears in large quantities in the camps and associated settlements of the Carpathian basin from about the end of the first century AD.[84] In fact, sometimes even coarse pottery wares appear to have followed official supply lines. So Brockley Hill pottery, which was manufactured in the region between London and Verulamium, was commonplace on the northern frontier from the time of the Flavians.[85] It might even be supposed that the army sometimes went out of its way to purchase materials from long-distance suppliers. How else are we to explain why certain kinds of amphoras used for storing or transporting *garum* (fish-sauce) – Pelichet 46; Dressel 7–11, forms C, D, and E – have been found only at Vindonissa and at other sites in what is now Switzerland? As Whittaker has remarked,[86] the pattern of their distribution does not look like one produced by a free market. The same is true of certain types of cheap kitchen pottery in Britain, like the so-called Black Burnished ware of the second century AD (Dorset black burnished category 1, Thames Estuary black burnished category 2).

If the army routinely bought manufactured goods from long-distance suppliers, local artisans may not have benefited much from the military market.[87] In fact, a case could be made that spending by individual soldiers will have had at least as great an impact on the local economy. Legionaries were paid regularly, and, by the standards of the time, reasonably well.[88] The approximately 40,000 soldiers in Britain in the last part of the first century AD collectively earned about 32,000,000 sesterces a year.[89]

[81] Millett 1990: 56. [82] Middleton 1983: 80–1. [83] Rüger 2000: 506.
[84] Wilkes 2000: 593. Samian ware and *mortaria* were shipped to the army in Britain in the period immediately after the invasion: Millett 1990: 56.
[85] Fulford 2000: 575–6. [86] Whittaker 1994: 105–6. [87] Higham 1989: 163–4.
[88] See also Duncan-Jones 1990: 44. [89] Cf. Millett 1990: 58 (26,000,000).

An Egyptian papyrus of AD 81 (*P. Gen. Lat.* I) preserves the pay accounts of two Roman legionaries, Quintus Iulius Proculus of Damascus and Gaius Valerius Germanus of Tyre.[90] It records various pay stoppages: 240 sesterces (drachmas) annually for food; 36 for boots and straps (*caligas fascias*); 30 for *faenaria* (bedding?); 206 for clothing, in the case of Quintus Iulius Proculus, 246 in the case of Gaius Valerius Germanus; 20 for something, perhaps a dinner, at the time of the Saturnalia (*saturnalicium*); and 4 *ad signa*, which has been variously interpreted as referring to a burial club or a ceremony associated with the standards.[91] It also appears that each of the soldiers received about 150 sesterces annually in spending money.[92] If this interpretation is correct (and it is by no means certain that it is), the roughly 5,500 men who comprised a typical legion will have had about 825,000 sesterces each year to spend on goods and services in the surrounding region. It is perhaps no coincidence that civilian settlements (*canabae* and *vici*) grew up rapidly alongside legionary bases and forts,[93] or that many of them failed after the garrisons were removed.[94]

The settlements that grew up around the camps can be expected to have provided a variety of services, including gaming, taverns, and brothels.[95] It is entirely possible, too, that soldiers spent money on goods from across the frontiers, especially slaves.[96] It is impossible now to say what measure of economic growth was, or might have been, achieved.

The amount of money paid out to soldiers in north Africa every year – well over 10,000,000 sesterces – probably vastly exceeded the entire amount of money that was in circulation in the period before the coming of the Romans.[97] It is not unreasonable then to think that the army was responsible for diffusing a money economy in at least some of the frontier zones, which in turn is likely to have had the effect of lowering transaction costs. Tacitus reports (*Germ.* 5) that Roman coins were used by those Germans who lived nearest the frontier garrisons. A rather different situation appears to have obtained in Britain, where very little Roman coinage is known to have circulated in the countryside.[98] The very erratic supply of official and semi-official bronze coinage in Britain can be taken to imply that monetization was limited to the major towns, fortresses, and forts.[99] It would be difficult, therefore, to maintain that the Romans introduced a money economy to the region,[100] at least until the late third century AD, when the value of

[90] Text with translation in Watson 1969: 220–1. [91] Watson 1969: 103.
[92] Watson 1969: 107. [93] Anderson 1992: 76, on northern Britain.
[94] Mattingly 1994b: 134, on Tripolitania. [95] Breeze 1984: 279. [96] Birley 1981: 47.
[97] Fentress 1979: 175. [98] Higham 1989: 166.
[99] Fulford 1989a: 181. Coins are almost never found outside military sites in Wales either: Whittaker 1994: 128.
[100] Hanson and Macinnes 1991: 87; Macinnes 1989: 111.

coins had declined to the point that they began to be used in everyday transactions.[101]

In many parts of the frontier zones, the Roman army built new roads or made improvements to existing ones.[102] It also provided a measure of peace and security, the conditions under which it was possible to transform traditional arrangements for landholding.[103] It is now fairly clear, for example, that economic growth in north Africa was connected to changes in proprietal relationships.[104] Agricultural expansion in the Tripolitanian pre-desert was at least partly a product of sedentarization and of land delimitation in favor of the elite in the late first and early second centuries AD.[105] The result, it seems, was a marked increase in private or individual land-ownership.

In the end, however, it must be admitted that there is no way to accurately measure the economic impact of the Roman army, because there is no way to isolate production for the army in the archaeological record. No one would maintain that the army's presence is enough to explain the dramatic increase in agricultural production that is attested over much of the north African frontier zone. A part of the increase must have been intended for external markets. How are we to weigh their effect on production against the impact of military demand or even against what may have been longer-term, local trends toward increased cultivation?

There can be little doubt that the effects of military demand were felt mainly in the areas closest to the army bases.[106] It has been suggested that the large and constant military market explains the relative prosperity of the inhabitants of Upper and Lower Germany.[107] Much the same has been said of the Danube frontier.[108] But the small number of coins and inscriptions recovered there suggests that, at least until the time of Hadrian, the economy of the region was largely internal to the army and to the groups who were associated with it.[109] It might even be supposed that military expenditure will have resulted in what one historian has called "an unhealthy excess" of cash in the region, causing prices there to be higher than elsewhere.[110]

IV ACROSS THE FRONTIERS

Because the frontier garrisons required a variety of supplies, at least some of which could not be obtained locally, we might suppose that their presence led to an increase in trade across the frontiers, and perhaps therefore to some increase in prosperity among the peoples who lived beyond them.[111]

[101] Reece 1991: 31. [102] Isaac 1992: 109, 416.
[103] Barker, Gilbertson, Jones, and Mattingly 1996: 324–5. [104] Carandini 1983b: 157.
[105] Barker, Gilbertson, Jones, and Mattingly 1996: 347; Mattingly 1986: 48; 1994b: 138, 140, 147.
[106] Finley 1985: 128.
[107] Rüger 2000: 506. So, too, Rostovtzeff 1957: 223, on the merchants of Trèves.
[108] Gren 1941: 147–8. [109] Wilkes 2000: 594.
[110] Birley 1981: 50. [111] See also Whittaker 2000: 317.

There are serious obstacles, however, to determining the volume, or even the nature, of the trade. For one thing, it is often impossible to decide on the real meaning of Roman artifacts recovered in the regions beyond the frontiers. Goods or coins may be evidence, not of trade, but of diplomatic exchange, or of the payment of subsidies, or of plunder, especially in the period after about AD 250.[112] And because there has been little systematic study of Roman material culture at native sites on the Roman side of the frontier lines,[113] there is often no meaningful standard of comparison.

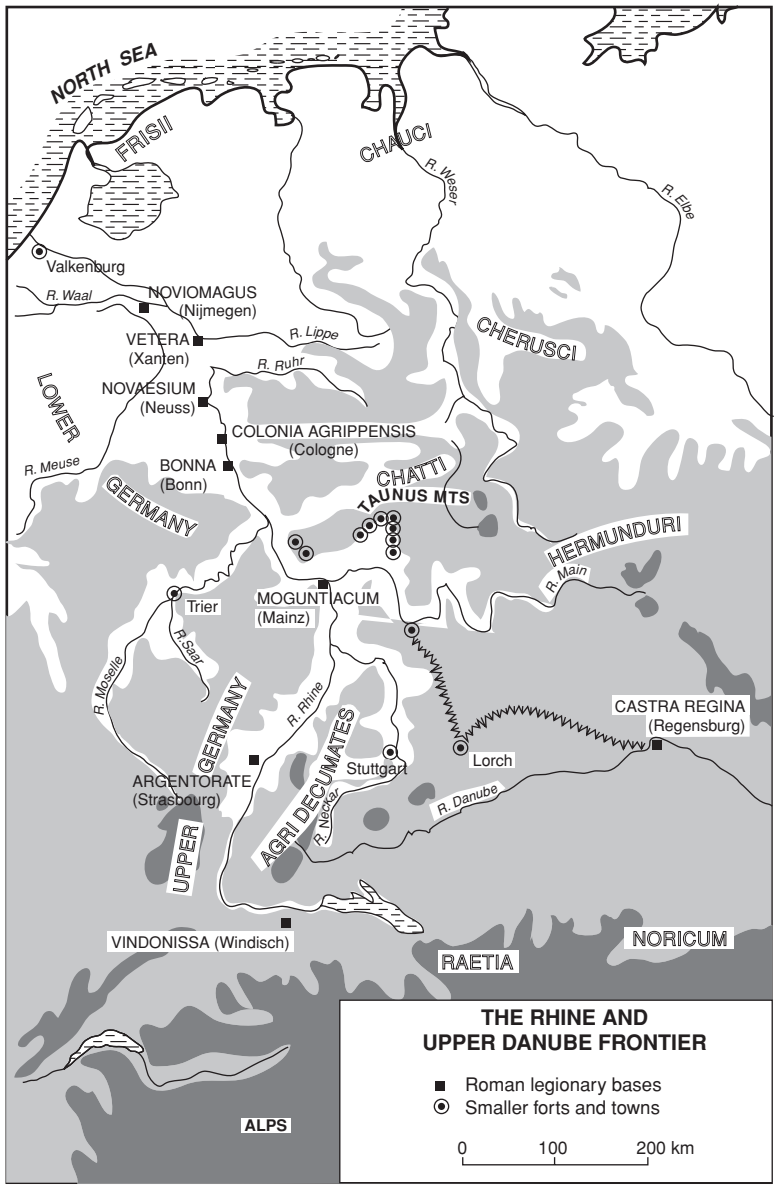
(a) *Europe*

It has been said recently that trade across the Danube frontier was a major element in the economies along both sides of the river.[114] Roman goods were exported to Moravia, Slovakia, and Bohemia.[115] An inscription (*CIL* III 3653) records that one small fort on the Danube was given the name *commercium*, "because it was constructed for that purpose" (*burgus cui nomen commercium qua causa et factus est*). We know from Tacitus (*Ann.* 2.62) that there were Roman traders resident at the capital of the king of the Marcomanni in AD 18.[116] Pottery, glass, and metal objects (especially bronze vessels and iron weapons) were exported to Germany on a fairly large scale.[117] From about the second half of the second century AD, Roman coins and Samian ware are found in large quantities on the North Sea coast.[118] And the large amount of low-quality pottery and brooches recovered in Frisia suggests that access to Roman goods in the region was not confined to the local elites.[119]

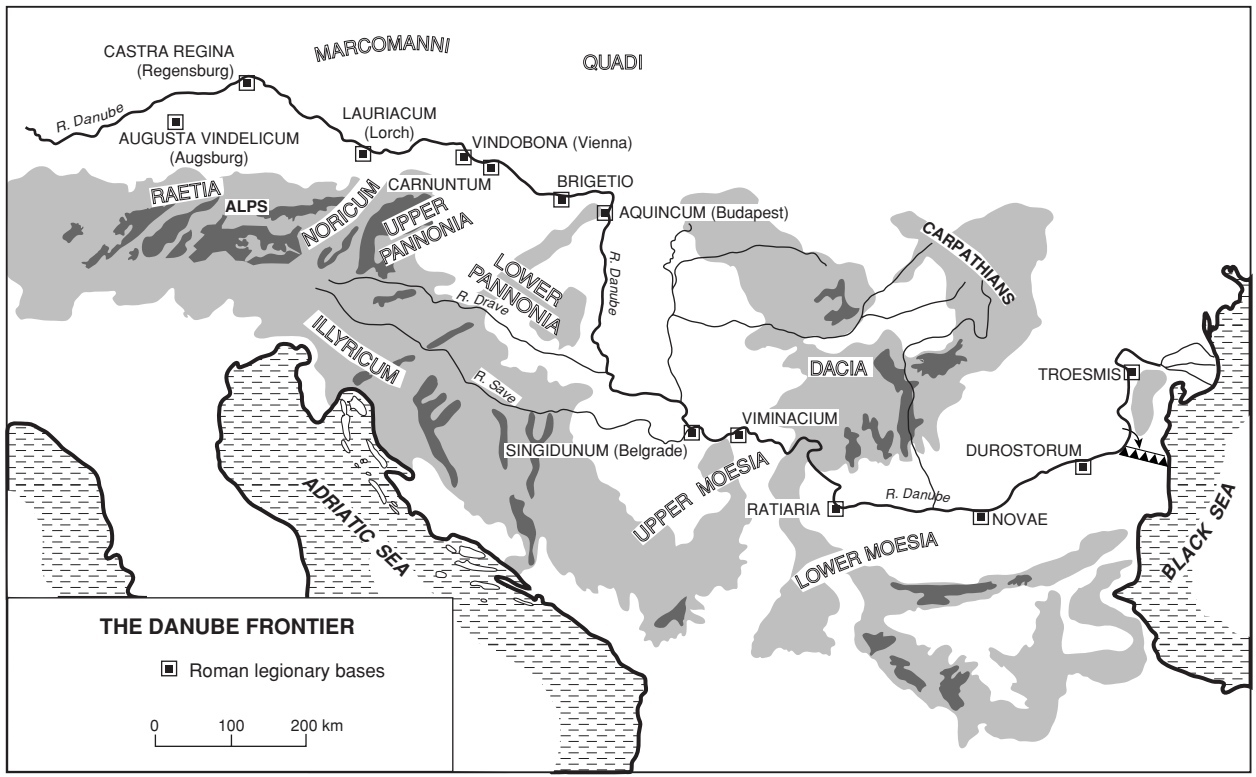
At the same time, it is clear that Roman goods sometimes arrived beyond the frontier as diplomatic gifts, like the silver vessels that Tacitus says were given to German envoys and chiefs (*Germ.* 5), or as subsidies, like the payment that was made to the Maeatae in Scotland by Virius Lupus in the late second century AD (Cass. Dio 65.5). Many of the high-quality Roman goods that have been found in graves in Germany are likely to have been gifts or payments for military service.[120] It is not unlikely either that some were brought there during repeated pillaging of the frontier zone in the period of the later empire.[121]

The disproportionately large number of Roman goods recovered in Denmark and the Netherlands may signify only that those areas have been subject to more systematic exploration and excavation. It is possible, too, that differences in the distribution of Roman goods reflect differences in

[112] Elton 1996: 86. [113] Fulford 1989b: 85; cf. Whittaker 1994: 290.
[114] Wilkes 2000: 594. [115] Whittaker 1994: 91. [116] See also Wheeler 1954: 8.
[117] Rüger 2000: 505. [118] Bloemers 1989: 189. [119] Fulford 1989b: 87.
[120] Whittaker 1983b: 116. [121] Wheeler 1954: 53.



Map 27.3 (a) and (b) The European frontier
From Whittaker 1994: Fig. 7, p. 39 and fig. 8, p. 40. Reprinted with permission of the Johns Hopkins University Press.



Map 27.3 (b)

local burial customs, and therefore tell us little or nothing about their distribution in Roman times.[122]

It has long been remarked that the distribution of Roman goods in Germany hints at the existence of a 200-kilometer wide "buffer zone," where the use of simple Roman articles like brooches and pottery was commonplace, in contrast to the regions farther beyond the frontier, where archaeologists have recovered mostly high-quality articles of bronze, glass, and silver.[123] The use of low-value copper coins also seems to have been common among those Germans who lived nearest the frontier,[124] suggesting perhaps that the area had some kind of money economy.[125] A similar pattern is detectible on the Danube frontier, with marked differences in the volume and quality of Roman goods between the regions north and south of the Carpathians and the Transylvanian plain.[126]

Curiously, the distribution patterns of certain kinds of pottery suggest that the European frontier may sometimes have acted as a barrier to trade. Gallo-Belgic wares produced in the period 100 BC – AD 50, for example, are widely distributed across the provinces of Upper and Lower Germany but rarely found beyond the frontier. The same is true of central and east Gallic wares of the second to mid-third centuries AD, and of Argonne ware of the late third to early fifth centuries.[127]

The Roman authorities sometimes tried to limit trade with the Germans, at least in a general way. In the time of Tacitus, for example, only the Hermunduri were allowed into Roman territory to trade (*Germ.* 41). Cassius Dio records (72.11.3, 15) that Marcus Aurelius established fixed days and places for trading with the Marcomanni and Quadi. The goal, it seems, was to prevent the Germans from acquiring materials that they could not produce themselves. From at least the third century AD, it was forbidden to sell grain, iron, salt, or whetstones to the enemy (*hostes*; *Dig.* 39.4.11.pr.).[128]

What the Romans obtained from the Germans is largely unknown. It is likely to have included slaves, furs, amber, dried fish, hides, cattle, and horses (which Marcus Aurelius acquired from the Quadi; Cass. Dio 71.2). The army on the Rhine required a great deal of leather, which could not be supplied from within the frontier zone, where grazing land was scarce. Tacitus records (*Ann.* 4.72) that Drusus made the Frisians pay a tribute of ox-hides. It is not unlikely either that the Romans traded for high quality iron products.[129] From the regions beyond the Danube frontier, they are likely to have imported minerals, horses, mules, hides, timber, and slaves.[130]

[122] Wheeler 1954: 31. [123] Hedeager 1978: 207; Whittaker 1994: 122.
[124] Harl 1996: 296. [125] Hedeager 1978: 209; 1987: 126. [126] Whittaker 1983b: 116.
[127] Fulford 1989b: 87. [128] See also Braund 1989: 19; Whittaker 1994: 119.
[129] Whittaker 1983b: 115. [130] Elton 1996: 83; Wilkes 2000: 594.

Map 27.4 The Eastern frontier in the time of Septimius Severus
From D. Williams, *The Reach of Rome: A History of the Roman Imperial Frontier 1st–5th Centuries AD*. New York: St. Martin's Press. 1996: 192

(b) *The east*

Beyond the eastern frontiers, Roman merchants sold ceramics, art, and agricultural products. However most of the trade seems to have involved luxury items imported from the east, such as silk, spices, gold, and ivory. A list of fifty-four items that were subject to taxation at Alexandria is preserved in *Dig.* 39.4.16. It is probably a fairly reliable guide to the kinds of goods that were routinely imported from the east. The most commonly listed items are spices, precious stones, and textiles. The list also includes ivory, animals, and eunuchs.[131]

Traces of Roman goods have been found in India and in Sri Lanka.[132] From southern India, the Romans obtained spices, muslins, pearls, and jewels.[133] However, almost none of the Roman coins found in India were issued after the time of Tiberius, an indication perhaps that the trade with India fell off sharply from about the middle of the first century AD.[134] In fact, it can be said that, while trade with the east was undoubtedly important in terms of its value, it was probably always fairly small in volume. The notion that there was a constant flow of merchants and caravans criss-crossing the deserts of Arabia, Syria, and Mesopotamia is, as Sartre has remarked, "absurd."[135]

Silverware, bronze vessels, lamps, glass, and pottery were exported across the southern Egyptian frontier to Meroë. Almost nothing is known about what was obtained in exchange, but it is likely to have included ivory and gold.[136]

(c) *North Africa*

An inscription found at Zarai in 1858 (*CIL* VIII 4508) records the customs duties that Roman soldiers were expected to collect on goods transported across the north African frontier in the early third century AD. Tariffs (generally of less than 3 percent) are listed for a variety of products, including woollen goods (tunics, blankets, and cloaks), animals (horses, mules, asses, cows, bulls, pigs, sheep, goats), leather, hides, dates, figs, peas, nuts, glue, resin, pitch, wine, fish-sauce (*garum*), sponges, and slaves. From south of the Sahara, the Romans also obtained ivory, precious stones, gold-dust, and ostrich feathers.[137] The Garamantes of the Fezzan are known to have buried Roman glassware with their dead.[138] But in its scale and in its impact on the regional economy, trans-Saharan trade was probably of little importance.[139]

[131] See also Elton 1996: 85. [132] Elton 1996: 80; Begley and de Puma 1991.
[133] Wheeler 1954: 137. [134] Elton 1996: 87; Sartre 2000: 662.
[135] Sartre 2000: 659. [136] Kirwan 1977: 25–6. [137] Wheeler 1954: 97.
[138] Wheeler 1954: 106. [139] Mattingly 1994b: 156.

PART VIII

EPILOGUE

CHAPTER 28

THE TRANSITION TO LATE ANTIQUITY

ANDREA GIARDINA

I INTRODUCTION

A few years ago, the last chapter of an economic history of the ancient world would undoubtedly have had a different title, such as, "The Crisis of the Roman Empire," "The End of the Ancient World," or "The Transition (or The Passage) from Antiquity to Feudalism." One might say that it used to be easier for scholars dealing with these questions: in discussing the causes of the fall of the empire, they shared a basic framework that devoted considerable space to economic processes. According to this conventional template, the crisis of the Roman world had started in the third century AD, triggering a decline that was to lead to the end of the Roman empire in the west, and to the protracted decline of the Byzantine empire in the east.

Matters are far more complicated today. Some scholars argue that the concept of crisis does not capture the processes of transformation of the Roman world from the third century AD onward. There is a widespread tendency to refuse to consider certain characteristics of fourth- and fifth-century society as proto-feudal.[1] Terms such as "decline" or "decadence" are frequently judged to be inappropriate. The vision of a direct passage from antiquity to the Middle Ages has thus been replaced by a more complex perspective, which leaves room for an autonomous intermediate period, so-called "Late Antiquity." This is the historiographic climate which creates the problem of a "Transition to Late Antiquity." This formulation divides the closing centuries of Roman history, and presupposes the existence of a double transition: the first leading to late antiquity, and the second from late antiquity to the Middle Ages.[2]

As a concept of political economics, "transition" refers to the analysis of the decline and creation of socioeconomic formations. The expression "transition period" is thus used to indicate the passage between two periods, during which the conditions are created for a change that is so significant that it affects overall periodization. In the social sciences, as in the natural

[1] For the non-existence of feudal-like conditions in late antiquity, cf. e.g. Hindess and Hirst 1975: 107.

[2] Wickham 1984.

sciences, "transition" is a potent concept, and not simply a synonym for transformation: even in its most generic and reductive meaning, it implies the link of a comparison between forms. Without a morphological analysis, therefore, no question of transition can be raised, and the very use of the word is incongruous. As we shall see below, in our case the lack of documentation does not permit a full reconstruction of the two systems that are to be compared. In particular, we are unable to acquire sufficient knowledge about the modes of production that were prevalent in the various provinces of the empire during the period preceding the beginning of the transition. This serious limitation, however, does not allow us to ignore the need for a morphological comparison, a need that remains, irrespective of the odds of bringing it to full fruition.

II THE AUTONOMY OF LATE ANTIQUITY

The affirmation of the autonomy of late antiquity dates back to the coining of the adjective *spätrömisch*; this term was used by the art historian and theoretician Alois Riegl (1858–1905), one of the leading exponents of the so-called "Vienna school," to define a precise phase of art history, roughly corresponding to the period from the Edict of Milan (AD 313) to the beginning of the reign of Charlemagne (AD 768).[3] This view was based on the concept of *Kunstwollen*, which is Riegl's most original contribution to art criticism: as it possessed its own characteristic *Kunstwollen*, this period was thus defined in its own right, and no longer seen as a degeneration of classical art. For its "discoverer," late Roman art stood for the emancipation from classicism and the refusal of decadence.

Like the concept of "baroque," the concept of "late Roman" also extended beyond the strictly artistic sphere, and took on an epochal significance. In this general sense, however, the term *Spätantike* has prevailed, which was likewise envisaged, though not adopted, by Riegl.[4] In fact, the recognition of an original artistic aspect that was characteristic of that particular period of history raised the possibility of parallel investigation in other spheres, both cultural and material. But Riegl's ideas, which received only belated acceptance among art historians, spread even more slowly among historians of other fields, who long disregarded the opportunity to apply this new perspective to their own fields of research: the idea of late antiquity as an autonomous period became established in all the other fields only in the

[3] Riegl 1927: 18 = 1985: 15, but with an addition of one or two centuries "for that part of Austria-Hungary which was under Byzantine influence."

[4] For the (not wholly compelling) motivations that led the Austrian scholar to prefer *spätrömisch* (late Roman) to *spätantik* (late antique), cf. Riegl 1927: 16–17 = 1985: 14–15.

early 1970s, especially as a result of the influence of a famous book by Peter Brown.[5]

Sociocultural considerations played a decisive role in the creation of this consensus, which rapidly became so widespread as to assume the character of conformism. At present, however, largely thanks to the contribution of archaeology (it is no exaggeration to speak of a true "archaeological revolution"),[6] economic studies of late antiquity are experiencing a period of exceptional vitality and outstanding growth, both at the qualitative and the quantitative levels. The boundaries of research are being extended in space and in time. However, the speed and scale of this development have also engendered a crisis of growth: the overall brilliance is marred by various grey areas, and at times, the exuberance takes on a magmatic appearance.

III DECLINE AND PROSPERITY

When Riegl proposed the existence of a late Roman *Kunstwollen*, he underlined, at the same time, its value as a necessary stage in the development which centuries later was to lead to modern art, and advanced the possibility of extending this line of reasoning to other fields.[7] Scholars of our times have re-evaluated, radicalized and unwittingly distorted this approach. Regarding the relationship between a modern audience and late Roman art, Riegl made a distinction between emotional and aesthetic impact and critical analysis: the man in the street might be disconcerted by the manifestations of late Roman art, considering them distant from his own taste; the critic, by contrast, sensitive to the originality of that *Kunstwollen*, was able to appreciate its importance as a *passage*, or a *phase of preparation* in the development of modern art.[8] According to the scholars of the present period, however, late antique art arouses strong emotions because its "contemporary quality" emerges *tout court* as a fascinating, tangible fact, which imposes itself in an unexpected, striking epiphany.[9] After its discovery in the figurative arts, the modernity – or even the contemporary character – of late antiquity has been revealed and exalted practically everywhere: in the thought of Plotinus and Augustine, in music, in political symbolism, in bureaucracy, in juridical consolidations, in the passage from the scroll to the codex, in clothing, in fundamentalisms, in the fragmentation of power, and in many other fields. There are two routes that lead to enunciations of

[5] Brown 1997a (first edn. 1971). In dating the start of the spread of the definition of late antiquity as an autonomous age to 1971, I am referring to the beginning of the diffusion of this point of view, without underestimating certain precedents of considerable importance. On the historiographic and broadly cultural context of the work of Peter Brown, as recognized by himself, cf. Brown 1997b.

[6] Ward-Perkins 2001: 167. [7] Riegl 1927: 12 = 1985: 11.

[8] Riegl 1927: 10 ff. = 1985: 10 ff. [9] Brown 1997a: 7.

this kind, and they are not always clearly distinguished: root metaphor and analogy.[10]

The rhetoric of the modernity of late antiquity is rich, especially with respect to its cultural dimension. Fortunately, economic historians now mostly steer clear of this trend. During the 1920s, the socialist system in the Soviet Union invited interpretations of the economic system of late antiquity based on modern "dirigisme" or "state socialism"; these were founded on the conviction that, starting with Diocletian, the Roman government had controlled, and coercively directed the main activities of production and distribution, with suffocating consequences.[11] These interpretations, which had a certain influence on subsequent historiography, implicitly enunciated the topicality of the economy of late antiquity. This topicality, however, was negative and not at all modern: modernity, equated with progress and development, was only recognized in free enterprise and the market economy. So far nobody has maintained that the late antique organization of agriculture or manufacturing included elements of modernity. Evidently, land tenancy or coarse pottery do not possess the same power of suggestion as the mosaic of Junius Bassus or the *Confessions* of Augustine. At the same time, students of material culture have also joined the struggle against the concept of late antique decadence, and have on occasion begun to advance highly optimistic readings of the economic history of late antiquity, dominated by images of widespread abundance.

The notion of "prosperity" is increasingly employed in archaeological data-based studies dealing with the economic history of late antiquity, even when it remains difficult to deduce a realistic picture of material living conditions from such data.[12] Despite the existence of recent pessimistic interpretations of the economy of late antiquity,[13] there is now a widespread conviction that whereas concepts such as "decline" or "decadence" are ideologically charged and consequently misleading, the use of the concept of "prosperity" is more respectful of the empirical evidence as interpreted by impartial scholars.[14] However, if "decline" "is not a fact, but a model, an ideology,"[15] the same can be said for prosperity, as the debate in question shows.

This current enhancement of the economic achievements of late antiquity is regularly associated with the rejection of generalizations, and with an insistence on the great diversity of local contexts. This position prolongs the vision of the economy of the early Roman empire as "a mosaic

[10] Giardina 1999: § 1. [11] Persson 1923 especially 116 (132 Engl. ed.); Horstkotte 1988.

[12] Ward-Perkins 2000: 365–9.

[13] The usefulness of the concept of "decline" is supported with good arguments by Liebeschuetz 2001; according to McCormick 2001: 30, "The overall economic trend of the Roman world from c. 200 to 700 was downward" (cf. also 38 ff. and *passim*); among archaeologists, the most significant (and extreme) position of this line of thinking is that of Carandini 1993; cf. Ward-Perkins 1997.

[14] Cameron 2001: 238 claims that "decline" implies a value judgment. [15] Whittow 2001: 243.

of local micro-economies which only in certain circumstances, and often for limited periods, get plugged into the larger-scale political and market economy."[16] Distinctions and clarifications abound, sometimes in an exaggerated manner, while appeals to the priority of regional histories exert profound influence on the orientation of recent research and the interpretation of the evidence. The strength of this tendency is a function of progress in archaeological investigations, including excavations, field surveys, and studies of the circulation of artifacts. Its limitation lies in the fact that the concept of "region" – one of the most widely debated and disputed concepts in modern culture – often appears to be used in a vague, *ad hoc* fashion to indicate an intermediate level between smaller units (a village, a town) and larger entities (a province, a *pars* of the empire). Even so, the commitment to local investigations is a great asset to contemporary research.

The insistence on the diversity of local situations helps portray the economy of late antiquity as a heterogeneous system, where areas of equilibrium, or even of strong growth, alternate with areas of depression. In a hypothetical economic map of the Roman world, the prevalence of one or the other would vary depending on the various districts and the inclinations of individual scholars. On the whole, however, areas of prosperity would be concentrated in the east.[17] In the past, historians who were sensitive to the endogenous causes of the fall of the empire used to contrast the productive and financial weaknesses of the declining west with the greater vitality of the east. The latter, however, was to be interpreted as a relative vitality, given that the Byzantine economy likewise appeared to be in trouble and declining, at least compared to conditions in the early empire. Nowadays, by contrast, we encounter strong insistence on "economic growth" and "prosperity" in large parts of the east in late antiquity, in particular of regions such as Syria, Palestine, and Egypt. In interpretations of this kind, certain features are not judged in favorable terms merely because they point to recovery from the crisis of the third century and a return to levels of performance that were typical of the early empire, but also because they suggest, in certain areas at least, considerable growth relative to that earlier period. At times, this description, whose "impressionistic" character is often apparent,[18] shows a bias towards quasi-modernizing outcomes: some studies have even underlined the "boom" of the late antique economy and the "explosive growth"

[16] Cf. recently Paterson 2001; but for a balanced examination of the problem of "integration" in the Roman economy of the imperial age, cf. Harris 1993b: 18–20.

[17] Kingsley and Decker 2001a; in the conclusions of this volume, Ward-Perkins defines the liveliest regions of the east as "economically prosperous and sophisticated in the fourth to sixth century" (175); he underlines, however, that other eastern regions show clear signs of stagnation or decline (168).

[18] Cf. the appropriate caution of Kingsley and Decker 2001b: 16. On the mixture of vagueness and peremptoriness which characterizes certain recent descriptions of late antique prosperity, cf. e.g. Cameron 1992: 423–8.

of many regions, recognizing "clearly historically unprecedented levels of monetization and monetary expansion."[19]

IV THE IMPACT OF LAW

The "regional" perspective also stresses the diversity of social relations of production: the conglomerate picture of late antiquity thus envisions various types of farm tenancy, wage labor, autonomous smallholders, and slavery, with none of these types clearly dominating the others. However, as archaeological and literary sources very rarely provide any precise information on the relations of production that were typical of a given territory,[20] it is extremely difficult to find any tangible connection between specific relations of production and particular economic areas.

It is a well-known fact that starting in the year AD 332,[21] the laws collected in the *Codex Theodosianus* and the *Codex Justinianus* repeatedly deal with a category of agricultural laborers who were tied to the land and defined as *coloni* (see below, Section V). This ancient term referred to a new institution, which was grounded in public law, and was defined by a law of AD 342 as *ius colonatus*.[22] Together with various other documents, including some that are not of a juridical nature, this evidence has long supported the image of an "age of the colonate," which is supposed to have laid the ground for the transition to mediaeval serfdom. By now, this deterministic vision has largely gone out of fashion, even if there is still a lively debate about the origins of *colonatus*, its nature, and its real historical significance.[23]

This rejection of generalizing definitions stems from a lack of confidence in the juridical sources, and in particular in the norms regulating *colonatus*. Whereas imperial constitutions were once thought, for this as well as other aspects, to offer a reliable reflection of social phenomena, nowadays it is fashionable to claim that they present us with the image of society as the Roman government wished it to be, and not as it really was. Hence, in the dialectic between "global" and "local," the former is considered to belong above all to the ideological, virtual sphere of laws, and the latter mainly to the diverse and concrete field of material testimonies. Consequently, the opposition between global and local also involves an opposition between

[19] Banaji 2001 especially 212 ff., 220–1, arguing that the social formation of late antiquity consisted of the combination of "aristocratic dominance with free labour" (217); however, this interpretation ignores the incidence of slavery, and qualifies as "free" a labor force (think of the *coloni* bound to the land) which, while theoretically enjoying a free status, in reality was not free.

[20] Scheidel 2000: 728.

[21] *Cod. Theod.* 5.17.1; the tone of this fragment shows that the bond linking *coloni* to the land had already been introduced some time before. For the problem of legislative precedents for this norm, cf. now Rosafio 2002: 159–76.

[22] *Cod. Theod.* 12.1.23.

[23] For a review of the debate, recently invigorated by contributions from Carrié, cf. Lo Cascio 1997c.

different types of documents and disciplines. At present, it is the material evidence and the archaeology of settlements and commodities that have the upper hand. The force of this point of view thus stems from a reductive evaluation of the effectiveness of law: nothing appears to have guaranteed that imperial constitutions were applied consistently, or at all. The phenomenon of the repetition of laws, which were reaffirmed several times by various emperors, or even by the same emperor, is seen as a clear sign of impotence.

The consequences of this assessment on the interpretation of the economic and social history of late antiquity are clear: if the norms regulating *colonatus* are seen not as the reflection of actual and widespread conditions but as the frustrated aspirations of the legislator, it becomes much more difficult to interpret this institution as a specific and significant productive relationship peculiar to late antiquity. This period would then appear to be characterized by a plurality of coexisting forms, a disjointed set of various relationships. It would no longer be the age of *colonatus*, but a socially polychromatic period, devoid of any unifying character apart from this polychromy itself.

The effectiveness of law is thus the crucial problem. It is necessary to avoid modernizing viewpoints in evaluating its impact. Roman legislation differed in too many ways from that of modern states: its rhetoric, archival resources, the relationship between norm and time, the mechanisms to enforce norms, and the concept and practice of the "code." If we consider these peculiar characteristics, we may understand that the repetition of laws was not an involuntary indication of the impotence of the government but signalled instead the legislator's interest in a given subject, as well as sensitivity to the expectations of influential categories of citizens. In this way, the risk of obsolescence, which is innate in systems of this kind, was averted: "A dead law . . . – it has rightly been said – was not one that was repeated but one that was never evoked."[24] Thus, if the repetition of laws cannot be used to argue for their irrelevance, and may indeed be an indication of exactly the opposite, the main argument supporting the minimalistic theory of *colonatus* crumbles.

V *COLONATUS*

The *coloni* were not a homogeneous social category, but appear in our sources mostly as small tenants of low social standing who cultivated the land directly, formally free but lacking one of the fundamental requisites of the condition of full freedom: the ability to abandon their workplace and

[24] Harries 1999: 87. For the problems deriving from the use of the *Digesta* as a source for economic and social history, cf. Sirks 2002b.

to move elsewhere. In time, other restrictions were added, regarding, for example, the right to sue one's landlord, to contract marriage freely, or to sell one's possessions without constraints.

The norms regulating *colonatus* must be set in a broad context of documents which indicate the central government's intention to influence the economy and relations of production in various sectors by means of fiscal policy, monetary policy, and, more generally, the regulations governing certain services or duties (curials, maritime transporters, soldiers, public administration employees, arms factory workers, bakers, and others). The old image of a late antique militarized society, in line with the abovementioned model of "state socialism," is not suitable to describe this situation: private activities, in actual fact, continued to flourish – in the manufacturing sector as in trade and services – and social mobility is clearly attested.[25] However, it would be absurd to reduce to the level of a merely virtual reality laws which aimed to control those citizens whose activities were important to the state. Utopian reforms fizzle out rapidly (we may remember the case of Diocletian's edict of maximum prices, or the succession system of the tetrarchy): by contrast, the regulations in question form a coherent whole, foreshadowed by certain measures in the third century, formally elaborated in the age of Diocletian and Constantine, and perfected during the following decades. In this system, which characterizes the social morphology of late antiquity, the institution of *colonatus*, the cornerstone of relations of production in the countryside, is undoubtedly the most significant aspect.

There is no law that indicates which types of contract determined the relationship between *dominus* and *colonus*, the amount of rent or the extent and character of other services, which regulations governed the use of the *instrumentum*, or which agreements covered ameliorations, investments, or *remissiones*.[26] These silences come as no surprise: on the one hand, the contractual instruments of Roman law were in various ways intertwined with local custom; on the other, even though the state was not ignorant of or indifferent to their impact on the relations of production,[27] it was primarily interested in the fiscal dimension of the problem, that is to say, in the immobility of the *colonus*, which was an essential condition of the stability of the tax system.

[25] On the relationship between public trading and administered trading, cf. Carrié 1994; Garnsey and Whittaker 1998: 316–22; Lo Cascio 2003b.

[26] Vera 1997: 201.

[27] The constitution *Cod. Just.* 11.51, which in AD 386 introduced *colonatus* in Palestine, specified that up to that moment, the landowners of that province had not benefited from the regulations governing *colonatus*. The juridical protection of the interests of landowners is also clear in *Cod. Just.* 11.52 (AD 393: Seeck 1919: 132), which, in abolishing capitation in the *dioecesis Thraciarum*, maintains the bond linking the *colonus* to the land (cf. also *Cod. Just.* 11.53, of AD 371, with the interpretation of Carrié 1997: 101–2).

The imperial constitutions show how difficult it was to define the new condition of the *coloni* within the framework of classical law.[28] It was much easier to define slavery than to formalize a limited kind of freedom. Consequently, the legislators' formulations often fell back on the short-cut of analogy: the first extant law on *colonatus* already states explicitly that *coloni* who have attempted to run away "must be chained and reduced to a servile condition, so that they will be compelled to carry out those tasks which they would perform as freemen."[29] These words do not mean that the *coloni* were made slaves, but the concrete reference to the coercive measures against runaways shows that this is not merely metaphorical language.[30] It was against the law to reduce *coloni* to slavery,[31] but in exercising his functions as *iudex*, Bishop Augustine had serious doubts on the matter, which led him to seek the advice of an expert.[32] Evidently, the pressure exerted by the landlord's coercion was such as to make this kind of possibility credible.

It is true that the bond that tied the *colonus* to the land was similar, for example, to the one that bound the *curiales* to their municipal functions, the maritime transporters to their profession, or the sons of veterans to the army, although this did not mean that *curiales*, transporters, and sons of veterans were considered to be individuals of an almost slave-like condition.[33] But there was a basic difference: unlike the other categories, the obligation of the *colonus* was not based on the relationship between the individual and the community, but on an unequal relationship between two individuals. When Cicero stated an opinion shared by members of his social class, that all artisans practiced a squalid trade, because nothing worthy of a freeman could be found in a workshop,[34] he was speaking on a moral level, and not a juridical one. By contrast, when the later emperors proclaimed that *coloni* were obliged to act as if they were slaves, they were not just expressing a moral precept: the law established that in the relationship between *dominus* and *colonus*, one party could dispose freely of his own person, whereas the other could not, that one party fully possessed a legal capacity, whereas the other did not. The analogy with slavery – the most pernicious one imaginable, involving as it did free individuals – was conceivable only in a framework of relations of production which intimidated the laborers, oppressing them and limiting their freedom. These relationships are reliably reflected in the imperial constitutions, with their harsh, cruel tones, continually verging on contempt.

[28] Lepelley 1983: 335.

[29] *Cod. Theod.* 5.17.1; cf. also e.g. *Cod. Just.* 11.52 cit. (where the reference to the owner's authority, *domini potestas*, enlarges the semantic spectrum of the analogy).

[30] Marcone 1998: 356–9.

[31] *Cod. Theod.* 5.6.3 (AD 409): this prohibition, which was formulated in order to protect *coloni* of barbarian origins, must have been valid *a fortiori* for non-barbarians; cf. above all Lepelley 1983.

[32] Aug. *Ep.* 24*, *CSEL* 88, 27, 1–5.

[33] Carrié 1997: 87–8; Vera 1992–3: 318.

[34] Cic. *Off.* 1.150.

We may assume that some *coloni* were satisfied and did not want to move away, because they preferred safety to freedom of movement. Situations of this kind were probably more common in the imperial properties. Far more often, however, *colonatus* appears in our sources to be a propagator of social suffering, an institution that produced oppression, arbitrary abuse, and exploitation. What emerges is an inventory of material and moral maltreatment: illegal increases in rents and corvées, physical violence, intimidation, compulsory conversion, reduction to slavery. This is the image on which the traditional vision of the decadence of late antiquity has largely been based. The reaction against the concept of decadence has therefore almost inevitably resulted in a reductive interpretation of *colonatus*. This logical link is understandable but unnecessary. An examination of the material data may sometimes give the impression of sound economic vitality, in some cases even of growth, but it never tells us anything significant about the living conditions of the workers. Productivity and suffering, as is known, may well go hand in hand, and in the abstract, *colonatus* may well have created, at the same time, a high level of suffering and a lively economy, exactly as had happened in the system of the villas that employed slave labor.

A certain amount of transgression of the norms was predictable. Of course, there was a risk that an increase in the demands for control would reveal the weaknesses of the state. In the particular case of *colonatus*, however, control rested for the most part in the hands of the landowners, and its effectiveness depended on the power of the individual *dominus*, on the ramifications of his clientage and friendships, and on his powers of coercion. The sources of the period often refer to *coloni* who fled, and we know that unscrupulous *domini* were ready to welcome these fugitives, thus obtaining tax-free labor: rather than demonstrating the ineffectiveness of the bond linking *coloni* to the land, these documents testify to the oppressive coercion to which they were subject, and the socially pervasive character of large properties: if someone ran away from one large landowner, he was welcomed by another.

The conditions of society and production in the countryside in late antiquity appear to have been quite varied,[35] but the principal elements, in the context of the rapidly increasing accumulation of land, were the spread of large parcelled-out properties and of farm tenancy. In the economic strategies of the ruling classes, there had been an increasing tendency during the imperial age to privilege the stability and the certainty of profits, rather than more dynamic and risky investments.[36] During late antiquity, this tendency was reinforced, and expressed in the prevalence of rent compared

[35] Furthermore, it should be remembered that *coloni* could occupy various roles at the same time: Vera 1992–3: 335.

[36] Kehoe 1997.

to direct management, in the fragmentation of landed patrimonies, and in the distribution of large patrimonies over various regions.[37] In this period, the figure of the *idoneus conductor*, the rich tenant who invested in dynamic market-oriented activities, may be considered to have disappeared. Instead, the great *conductores* of the period appear to be entrepreneurial figures that are substantially identical to the great *rentiers*.[38]

Large numbers of slaves are attested in late antiquity, but we are unable to determine, even very approximately, what percentage of the total workforce was comprised of unfree laborers. However, the essential fact is that slaves and *coloni* seem to have been used in analogous functions within the same organization, as farmers of small allotments who paid rents (in kind, in money, or mixed) to the landowners and provided services outside their farms.[39] Although various status groups were employed in the fields, *coloni* and slave tenants together represented the most salient aspect of the economy of late antiquity. We might define this as the dominant mode of production, that is to say, a mode of production which coexisted in parallel, and was partly integrated, with other modes of production. Observations regarding the relationship between the tax system and *colonatus* confirm the rule that the predominant production method is the one which is most closely related to the state.[40] The problem of the transition to late antiquity thus coincides, in the sphere of economic history, above all with that of the birth of *colonatus* and the spread, within the framework of the *ius colonatus*, of a large class of agricultural workers whose freedom was somewhat limited in various ways.

The ways in which this process of transition took place are largely obscure. The relatively large number of documents of the fourth and fifth centuries that have survived are preceded by a few sparse indications of change which only refer to certain moments and areas. In spite of hopes that are frequently expressed, it is highly unlikely that new archaeological excavations will tell us anything conclusive about the rural economy of the third century (and in particular about the crucial problem of the spread and the use of slave labor in the provinces).[41] From this point of view, the transition to Late Antiquity will remain a subject that is open to speculation.

VI TRANSITION

The term "transition" is fashionable in research on the economic history of late antiquity, but it would be a mistake to consider this a fitting application

[37] Vera 1986a: 381–9; Whittaker and Garnsey 1998. [38] Vera 1992–3: 323.

[39] On the "equalization" between slaves and *coloni*, cf. Mazzarino 2002: 252 ff. The confusion between *coloni* and slaves was favored by the state's waiver of, or inability to impose, military levies: Whittaker 1989c: 134. On freemen and slaves in the late antique countryside, see in general Whittaker and Garnsey 1998: 294–7.

[40] Wickham 1984: 12. [41] Harris 1993b: 25–7.

of the concept. We find that it is mainly used in an arbitrary manner, with meanings that are not present in any of the disciplines that have adopted and enhanced the term since the nineteenth century. For example, the use of "transition" appears to be based on the conviction that the term is appropriate for transformations that are slow and protracted, transformations which lead to a different scenario, but in a linear manner, without any tensions or accelerations or sudden interruptions.[42] Nevertheless, the substance of this concept, as it has been traditionally used in the various social and natural sciences, is totally free from any kind of conditioning by the time factor. The latter is only an aspect of the *manner* of a transition, which may be slow or fast, smooth or by fits and starts, without affecting in any respect the legitimacy of the concept.

It has been argued that in the back-and-forth between "decline" and "continuity" that still largely characterizes the debate on late antiquity, the concept of transition may be particularly useful by virtue of its "neutrality."[43] However, this conviction, too, appears to be groundless. As a descriptive, explanatory concept referring to change, "transition" necessarily presupposes a refusal of "continuistic" hypotheses; on the other hand, it may be applied to the account and the interpretation of a decline, even if not all transitions are declines.

Besides its arbitrary use, the concept appears at times to be arbitrarily rejected. The claim is made that it is inherently contaminated by the vice of teleology, which leads the historian to seek for only those elements of a previous period which characterized the following one. In this way, one would fail to grasp the dramatic, complex nature of the courses of history.[44] Historical reconstruction is by nature teleological, and all we can do is to limit as far as possible the effects of this genetic virus, debilitate it, compel it to inactivity, in the knowledge that it cannot be eliminated. In this case, therefore, it is necessary to distinguish the concept from its use.

Another inconsistency concerns the relationship between the concept of transition and that of the autonomy of epochs. As regards the closing centuries of Roman history, the concept of transition may have two different applications. We may speak of a "transition to late antiquity" (as the editors have decided to do in this volume), meaning late antiquity as a specific period. Or we may speak of late antiquity as a "period of transition," meaning it as the phase of passage to a subsequent period.[45] The only thing

[42] Halsall 1995: 49 thinks that transition means a "slow process from one pre-defined state of affairs to another" and that it aims to determine a "single line of development"; he goes so far as to contrast transition and "change" (48). An empirical approach to the problem of the duration of a transition is not particularly helpful, as shown by the attempt of Clover and Humphreys 1989 (on which see Giardina 1999: 172 n. 45).

[43] Christie and Loseby 1996: 2. [44] Halsall 1995: 38.

[45] Cf., among others, Foraboschi 1976; Carandini 1979: 134; Cameron 1993: 8; Schiavone 2000: 27; Bowden 2003: 3.

that does not appear to be possible is to speak of late antiquity as an age of transition and at the same time to interpret it as an autonomous epoch.[46] It is understandable that this diversity of views results in veritable declarations of surrender, such as "all periods are transition periods in some way," or "all points in history are points of transition," or again "towns are always in transition."[47]

As we shall see, the transition to late antiquity lasted about 120 years, between the ages of Marcus Aurelius and Diocletian. It was a dramatic phenomenon, sparked off by external causes – the plague and the wars – which interacted in various ways with the economic and social structures of the Roman world. The process of transition was accompanied and characterized by a series of state interventions which led to its conclusion, exerting a decisive influence on the form of the new socio-economic reality which we call "late antique." This complicated process, which can only be reconstructed in its main outlines, finds a kind of historical "premise" in the exhaustion of the so-called slave mode of production.

VII ITALY AND THE SLAVE MODE OF PRODUCTION

In the economic history of the Roman empire, the most noticeable transformation took place in those Italic regions which, between the second century BC and the second century AD, had represented the core of the so-called slave mode of production. Slave villas had been set up above all in Etruria, in Latium, and in Campania, though they were present practically all over the peninsula (in localities that were not far from ports, or could easily be reached by river or by road). These estates mainly produced oil and wine, and were clearly orientated towards Mediterranean markets. Their workforce was composed of regimented slaves, who were subjected to severe duress in order to achieve objectives of efficiency and a high level of productivity; the specialization and general management criteria guaranteed an appreciable standardization of products; during periods of heavy seasonal work, slave labor was supplemented by the contribution of hired freemen.[48]

The growth of the villa system, which is attested by literary sources, rural archaeology, and the study of pottery containers (above all wine and oil amphoras), took place between the second and first centuries BC. The

[46] It may be useful to recall, on this point, Cantimori's decisive criticism 1971 (first edn. 1955): 563 of Burckhardt's interpretation of the Renaissance.

[47] Cf. respectively Morony 1989: 25; Halsall 1995: 39; Christie and Loseby 1996: 1.

[48] On the typology of the slave villa, cf. above all Carandini 1989a; Kehoe, Chapter 20 in this volume; on the problem of growth without take-off, Schiavone 2000; a certain degree of flexibility of the system was ensured by the combination of direct management with the practice of tenancy: Capogrossi Colognesi 1992–3: 223 ff.

slowdown and subsequent decline of the system are attested by documents covering quite a lengthy period of time. From approximately 40 BC on, the exportation of Italic wine to the west began to decline; at the same time, Hispanic and Gallic wines started to spread relentlessly in Rome and other Italic and provincial markets; this development continued and became consolidated in the following decades. Similar trends can be observed for other Italic foodstuffs and for certain categories of manufactured goods (the destiny of the slave villa is thus symmetrical to that of the urban slave workshop). This process came about without the introduction of any protectionist measures aiming to favor Italic productions. Thanks to a partial process of productive re-conversion, the introduction of new vines which were less prestigious but more economical, and the identification of new markets, the slave villas continued to resist for a few more decades. However, between the end of the second and the beginning of the third centuries AD, with the growing success of land tenancy and the *colonia partiaria*, the great experience of the slave villa in its classical form could be said to have come to an end.[49]

Some scholars believe that the economy of slave villas occupied a dominant position, which was able to influence also those economic areas which lacked production units of this kind. Others believe that the phenomenon only affected certain Italic regions, and that the economic life of the rest of the empire was not significantly influenced. Both these viewpoints, however, must face up to the problem of the duration of the system and its irreversible decline.

As the lively discussions among scholars confirm, the reasons for this process are not clear. The inevitable sterility of explanations that indicate a single cause can only be overcome by a consideration of the multiple factors which contributed, in succeeding periods and finally all together, to the collapse of the system centered on the slave villa: the integration and the political rise of provincial *elites*; the imbalance in prices between Italy and the provinces, caused by the movement of capital; and the transformation of the slave supply.[50]

The consequences of the collapse of this system on the Italic economy are likewise a matter of lively debate: some claim that the peninsula suffered serious repercussions, while others deny this, and go so far as to speak of a lasting prosperity. Even if it is not appropriate to evoke scenarios of desolation, some signs of recession are clearly visible both in the archaeological and in the literary documentation. We should remember, however, that the crisis of a mode of production does not necessarily coincide with economic regression: it would thus seem incongruous to deduce from the presumed non-existence of a process of regression the non-existence of the crisis of a

[49] Carandini 1989a: 114 ff. [50] Giardina 1997: chap. 5; Tchernia 2006.

mode of production. As we shall see, the problem of the crisis which was to have severe effects on Italy, together with the provinces, during the third century, is a completely different question.

Chronology shows that the crisis of the slave mode of production did not lead directly to the development of the late antique *colonatus*. The exhaustion of the villa system should therefore be considered as an antecedent to the process of transition to late antiquity. The active, mature phase of the transition to late antiquity is set in the third century, and involves the whole of the Roman world.

VIII THE CRISIS OF THE THIRD CENTURY

From the time of Marcus Aurelius onward, for the whole of the third century, the empire went through one of the most dramatic periods in its whole history, second only, in its severity, to the catastrophe which led to the fall of the west in the fifth century. The leading protagonists of the period were plague and war. The plague (probably a smallpox epidemic)[51] broke out in the autumn of AD 165, in the military camps of the east. The movement of armies, discharged soldiers, and individuals who for various reasons gravitated towards the camps, spread the disease all over the empire. Successive waves of the epidemic returned in a more or less virulent form for about twenty-five years; in the year AD 250, the plague broke out again, and continued to claim victims for more than twenty years.

Scholars differ in their opinions about the mortality rate, but even a conservative estimate as low as 20 percent (which is rather unlikely)[52] is enough to let us understand the long-lasting demographic repercussions: as comparisons clearly indicate, in the context of the demographic "ancien régime," the return to previous population levels was always laborious and slow; and if, as in the Roman empire in this period, epidemics struck at brief intervals, it became even harder. The advanced degree of urbanization of certain regions, together with the size of some cities, further increased the spread of the epidemic.[53] Even if the coastal areas and those most involved in long-distance traffic were worse hit than inland territories, the spread of the disease, which is attested by direct and indirect evidence, involved the Roman world in its entirety.

These epidemics came upon the empire at a time when it was necessary to face external aggression on two fronts, the eastern one and that of the Rhine-Danube. Military expenses were increasing as a result of the larger

[51] Littman and Littman 1973.

[52] On the various mortality hypotheses, cf. now Scheidel 2002: 99–100.

[53] Lo Cascio 1991b: 709–16 and Scheidel 2002: 108–9; on the duration of the consequences of the Antonine Plague, van Minnen 2001b; the reductive interpretation has again been recently proposed, among others by Carrié and Rousselle 1999: 513 ff.

number of regulars, the cost of the war campaigns, the strengthening of the cavalry, and the rise in the pay and gratuities given to soldiers. Defense costs also included the sums paid on various occasions to foreign *gentes* in order to appease them: the instrument of the remunerated alliance (*foedus*), albeit at times almost fictitious, became an increasingly common practice. The presence of military garrisons could have stimulating effects on the local economies, but the overall disadvantages must undoubtedly have outweighed these limited benefits. Supplies and hospitality for armies in movement were guaranteed by regular tributes, but our sources also attest to the frequency of unlawful requisitions and vexations endured by local communities.[54] The *annona militaris*, which had previously been an occasional indemnifiable tribute (in kind), now became a permanent additional tribute, which was also applied in Italy, a region that was otherwise exempt from tributary exactions.

In this period of distress, the special status of Italy, which was exempt from provincial taxation and was characterized by an administrative deficit that made the government of its territories difficult,[55] began to be perceived as anachronistic. The designation of new magistrates, often called *correctores*, with specific responsibilities, is the clearest sign of this new orientation, which culminated in the reform of Diocletian, who applied the provincial statute to the whole peninsula.

Defense of the frontiers required greater resources at a time when the number of taxpayers was declining. The losses caused by epidemics and wars were compounded by the number of peasants who ran away, driven by the need to elude the burden of tribute. Egyptian documents confirm that several villages were abandoned, and severe hardships were caused by the principle of collective responsibility, which maintained the level of taxation unchanged in a given district, despite the fact that some of the taxpayers had left the area. The pressing fiscal requirements also eroded the ancient tax privileges enjoyed by some towns in various provinces, at least *de facto* if not *de iure*. Furthermore, on several occasions the military emperors of the third century requisitioned the resources of the towns. This process reached its peak in the age of Diocletian, when the emperor undertook a determined reform of public law which led to a further standardization of town statutes and imposed rigorous control on their financial resources.[56]

There were thus fewer public and private resources available for urban improvements and infrastructure: the decline of traditional euergetic activities is clearly attested by epigraphy and archaeology. The local elites met with increasing difficulties in the execution of their traditional tasks, and the town councils encountered problems in maintaining their size.

[54] de Blois 2002: 210 ff. [55] Eck 1979: 267 ff.; Millar 1986: 296.
[56] Lepelley 1996: 218–19; 1999: 243 ff.

A more or less substantial drop in the amount of cultivated land is attested virtually everywhere. The chronic problem of the exploitation of uncultivated land (imperial or otherwise) now became more pressing, but the invitations and incentives promoted by the central government came up against the obstacles of population decrease and the limited possibilities of investment of small farmers. Instead, the social and economic pressure exerted by the ruling classes favored large-scale acquisitions which resulted in the concentration of landed property in certain regions: the origins of many of the large properties of the fourth century go back to this period. The class of the large landowners benefited most from the crisis.

The growing tax burden lay on the shoulders of farmers who were very often not only taxpayers but also tenants. By entering into competition with rents, there was a danger that tribute would undermine the strength of the landowning classes to whom the state traditionally entrusted the management of the cities and the collection of taxes.[57] This tension, which in some cases led to dramatic consequences,[58] accounts for the decision to fall back on other means in order to meet the growing financial requirements of the state. Two of these were particularly important: the first, which was permanent and fairly effective, consisted of the expansion of the imperial property through the traditional mechanism of confiscation, and of the granting of incentives to its tenants;[59] the second, which proved ephemeral and counter-productive in the long run, involved monetary interventions, which mainly took the form of debasement of the *denarius*. During the reign of Septimius Severus, the silver coinage, which was the traditional basis of the Roman monetary system, contained only 50 percent of fine metal, but this percentage was to be reduced even further in the following decades: under Gallienus, in a tragic period for the destiny of the Empire, the *antoninianus*, the new silver coin introduced by Caracalla, contained as little as 2–3 percent of fine metal. Aurelianus tried to restore some order by issuing a new type of silver-coated copper coin of somewhat better quality than previous specimens: but the immediate consequence of this reform, the details of which are unknown to us, was a sharp rise in prices, expressed in units of account (Egyptian papyri speak of an increase in prices as much as tenfold). It is telling that a jurist like Paulus went so far as to define money no longer as a *merx*, that is to say, an asset that possessed an intrinsic value, but as a *pretium*, established by the issuing authority.[60]

[57] Lo Cascio 1991b: 715–16.

[58] On the African revolts in the age of Maximinus the Thracian, cf. Mazzarino 1962: 318–35.

[59] On the relationship between the agriculture in the Bagradas valley in Tunisia and supplies for the capital, cf. Kehoe 1988a.

[60] Lo Cascio 1986; on the problem of the currency in the crisis of the third century, more generally, Mazza 1973: ch. 6.

The traditional defense of the *denarius*, which had by now become a coin of silver-coated copper, also expressed the political desire to defend the purchasing power of the middle and lower classes, who were the main users of this currency. The last great advocate of this policy was Diocletian: as confirmed by a recent epigraphic discovery, he attempted to assign a *geminata potentia* to the silver coinage (*potentia* in the sense of value in terms of units of account) in the sphere of indebtedness (both private and fiscal), with inevitable repercussions for the pricing of goods and services.[61] But economic trends were stronger than attempts to govern the economy by resorting once again to the traditional instruments of monetary policy. The turning point came with Constantine, who realized that it was impossible to continue to defend the *denarius*, and created a new system based on a gold coin, the *solidus*, corresponding to 1/72 of a pound, and abandoned fractional coinage to its destiny. The relationship between the gold *solidus* and the base metal coinage, reduced to its "natural" value, brought about the collapse of the purchasing power of the poorer classes, and an enormous increase in prices expressed in units of account. As the anonymous writer of the treatise *De rebus bellicis* was to underline some decades later, the rich, who possessed gold currency, became even richer, whereas the living conditions of the *afflicta paupertas* took a sharp turn for the worse.[62] The importance of Constantine's monetary reform was decisive in modeling the society of late antiquity: by conferring on society a "pyramidal" structure, with the owners of gold money at the top and the *afflicta paupertas* at the bottom, this reform conditioned relationships between classes, social alliances, the relationship between the tax system and society, and the equilibrium between monetary economy and natural economy, both in taxation and in exchanges.[63]

While the defense of the frontiers enjoyed absolute priority, civil harmony was also of importance. In spite of the fact that the emperors' activities very often took them far away from the capital (or perhaps for this very reason), the central government was particularly attentive to the living conditions of the Roman plebs. In the third century, especially from the reign of Septimius Severus, the government gradually considered it expedient to extend the traditional distribution of *frumenta* to cover other commodities as well: with the passing of time, therefore, foodstuffs such as bread, oil, wine, and pork, were distributed freely or at reduced prices. A decisive moment in the extension of gratuities to the Roman plebs came during the reign of Aurelianus (AD 270–5), who dedicated enormous efforts to this sector, as shown by the creation of new administrative functions and

[61] *AE* 1973: 526; cf. above all Mazzarino 1981.

[62] *De rebus bellicis* 2; Mazzarino 2002: 89 ff.; cf. Giardina 1989: 51–5.

[63] Mazzarino 2002; for a historiographic examination of Mazzarino's hypothesis, with particular reference to the most recent studies, cf. Lo Cascio 2002.

the construction of new infrastructural elements. The role of the African provinces was to become increasingly important in providing supplies for the capital, especially when Egyptian agriculture was instrumental in supporting the population of Constantinople.[64] In the fourth century, the association of Africa and Italy under a single prefecture, together with the creation of a *praefectus annonae* in Africa, reflected, on the administrative level, a new framework for both production and distribution in the economic life of the empire.[65]

Within this strategy of production and distribution, the state aimed to reduce the role of private intermediation in the trading of certain products, as is shown by the *tituli picti* of Dressel 20 amphoras (the typical container of Iberian oil destined for Rome and the armies stationed along the Rhine); the service of maritime transporters (*navicularii*), like other public utilities, began to be perceived also as compulsory, as a *munus*. The attempt to eliminate or reduce the intermediation of private contractors in the collection of indirect taxes is another example of this trend.[66]

In an abstract "free" economy, the demographic consequences of epidemics should have led to a strengthening of the position of farm laborers, compared to that of landowners. And in actual fact, this happened, at least initially, also when plague struck the Roman empire: the contraction of the agricultural labor force reduced the value of land, of its produce, and of its income (and consequently of rents); at the same time, the cost of wages and the duration of tenancy increased.[67] But the mechanisms of liberalism cannot be applied to the Roman world of the third century: the pressure exerted from the bottom was countered, from above, by means of all available instruments of economic and extra-economic coercion.[68] The widespread application of different punishments depending on the social status of individuals (*pro qualitate personarum*), which is first attested in the age of Hadrian, offered a significant legal and moral background to this economic and social pressure.[69]

The documentation referring to labor relations in the countryside in this period has led scholars to propose two different interpretations of the origin of *colonatus* (and consequently of the transition to late antiquity: see above, section V). According to some of them, the late antique *colonatus* was a direct descendant of earlier forms of farm tenancy; according to others, on the contrary, it was a juridical invention of the ages of Diocletian

[64] However, the link between Egypt and Constantinople was never as close as the bond linking north Africa to Rome: Kingsley and Decker 2001b: 4–5; on the "African hegemony" in terms of commodity production, Panella 1993.

[65] Jaïdi 2003: 92–4. [66] Lo Cascio 2003a.

[67] Duncan-Jones 1996: 122 ff.; Scheidel 2002: 100; on the increase in prices, documented mainly by Egyptian papyri, cf. above, Chapter 26.

[68] Mazza 1986: 186 ff. [69] Garnsey 1970; Rilinger 1988.

and Constantine. These two interpretations coincide with two different visions of the relationship between law and society: the former emphasizes the influence of social dynamics in the juridical sphere whereas the latter underlines the state's desire and capacity for social engineering. But this is a specious alternative. On the one hand, the figure of the small tenant without resources, subjected to economic and extra-economic coercion, appears to be more similar to that of the late antique *colonus* than to any other social figure in Roman agriculture: the two types are in fact chronologically and sociologically contiguous. On the other hand, legislation regulating *colonatus* cannot be considered a merely mechanical formalization of preexisting social relationships: the *ius colonatus* was an original juridical elaboration, which took several decades to reach its maturity, and to extend to the whole of the empire. Furthermore, its social and economic function can be appreciated only within the complex, innovatory tax system whose basic nucleus stems from the ingenuity of the emperor Diocletian, and his vigorous drive for reform: since the full implementation of the *capitatio-iugatio* system required the integration of personal and capital taxation, it consequently presupposed an immobilized labor force. As was already pointed out in the earliest studies on *colonatus*, and as is also clear from the ancient sources, the bond of *coloni* under the new tax regime satisfied the needs of both the state and the large landowners. The fact that a dramatic event like the subjection of Italy to provincial taxation did not provoke any reaction among large landowners is perhaps the clearest sign of this convergence of interests.[70]

The transition to late antiquity appears to be a dynamic process that wove together social factors, economic stimuli, and normative interventions. These interventions took place throughout the third century, and the process was far from linear: phases of acceleration alternated with pauses, and the state's grip on society tightened or loosened depending on the frequency of external threats and the attitudes of particular sovereigns. But with the passing of time, this set of experiences led to the development of a new style in the relationship between central power and its subjects, and to a new ideology. Alarm became a tradition, and emergency became a *mos*.

The transition came to a close with a series of forceful governmental activities, which occupied most of the reigns of Diocletian and Constantine, and played a crucial role in the definition of the social and economic formations of late antiquity. Despite a few second thoughts, the approach followed in this period was developed and expanded during the subsequent history of the fourth century, and in some cases during the fifth century, as well. Legislation regulating *colonatus*, too, appears to have stretched over several decades. We can distinguish profound changes from partial modifications, simple amendments from more innovatory transformations, short-lived reforms from vigorous additions, but in any event, the work of Diocletian

[70] Giardina 1997: 289–300.

and Constantine stands out for its magnificence, for its ramifications, and for a conspicuous aspiration to uniformity and control.

The traditional explanation of the crisis of the third century, which combines demographic contraction, the ravages of war, growing military expenses, tax pressure, economic decline, the coercion of workers and state interventions, thus maintains its full validity: in spite of the intrinsic limitations of archaeological readings,[71] the data are consistent and in agreement. The perception of contemporary witnesses is unanimous.[72]

Minimalistic interpretations of the third century crisis, which have mostly been advanced in recent years,[73] are marred by debatable procedures: first of all, they adopt a method of decomposition, examining the data one at a time, in order to judge them singularly unconvincing, thus ignoring the coherence of the overall picture; furthermore, they separate the unequivocal data from the mass of the documentation, with the aim of underlining their exceptional nature; lastly, they base their opinions on an unrealistic idea of the crisis, as if a crisis, in order to merit this label, must necessarily coincide with a total collapse of productive activities and economic initiative. On the contrary, in the space of more than a century (from AD 165 to the 280s) and in an entity as complex as the Roman empire, one would expect to find, even in the midst of serious disturbances, some territories that were more prosperous or less distressed than others,[74] moments of recovery, and a striking capacity for resistance. The crisis of the third century was not a cataclysmic event, but it was sufficiently serious to trigger reactions that engendered significant long-term changes.

Hence, the most convincing reassessment of the traditional paradigm of the crisis does not lie in reduction to minimal terms, but in placing the process in a different setting within the subsequent and overall development of imperial history. The traditional point of view interpreted the crisis as the breaking point of Roman civilization, followed by an uncontrollable decline culminating in the fall of the west. On the contrary, the vision of late antiquity as an autonomous age gives a different pace to the closing period of history of the empire, and forces us to consider the crisis, not as the beginning of a long phase of decline towards the Middle Ages, but as the *manner* in which the transition to late antiquity took place.

[71] Millett 1981; de Blois 2002: 207.

[72] Mazzarino 1966; Alföldi 1989: 319 ff.; Potter 1990; Herrmann 1990; in general, cf. now Duncan-Jones 2004.

[73] Cf. for all of them Witschel 1999.

[74] Duncan-Jones 1996: 134 ff. deals with the problem of the "regionality of the plague" in a balanced manner. According to de Blois, Pleket and Rich 2002: XVI, "most crises were predominantly regional affairs, with the sole exception of the plague, which ranged about AD 250 to 280," but on careful examination, the regional plurality of the crises is nothing other than a general problem. The signs of the crisis are clear everywhere, including the regions which were to become more prosperous than others in the fourth century: for the crisis in Palestine, cf. Bar 2002. Even if it was less serious than elsewhere, the crisis is likewise evident in the African provinces: Lepelley 1979 (but cf. Lepelley 1992: 55 for a more optimistic view); on the crisis in Cyrenaica, cf. Wilson 2001b.

Inevitably, this substitution of a sinusoid in the place of a straight line reflects on our evaluation of the phenomenon: the crisis may appear to be less serious or less pervasive simply because it did not lead directly to the catastrophe. But aside from being logically unnecessary, this downgrading carries with it the risk of underestimating the level of material and human costs that society sustained in order to recover from the crisis, and of slighting the creative role institutions and politics played in this process. On careful examination, the interpretations that play down the extent of the crisis, or even deny its existence, appear to be heavily influenced by the very idea that they would like to demolish: faced with the obnoxious ghost of corruption and decline, they cannot find any other solution than to deny its existence; they are unable to imagine, therefore, that the Roman world possessed the material, cultural and – why not? – the moral energy to face up to a potentially deadly problem and solve it. As it was this effort that initially shaped the economic and social system of late antiquity, any excessive critique of the scale of the crisis also interferes with our understanding of late antiquity itself. This inconsistency is clear in those (quite numerous) interpretations which, unaware of the contradiction, proclaim at the same time the autonomy of late antiquity, and its substantial continuity with respect to the previous phase.

IX HEAVENLY PROFITS

The transition to late antiquity is also visible in the relationships between economy and mentality. The predominant value system of the Greco-Roman world is well expressed in a famous passage of *De officiis*, in which Cicero reviews "the trades and earnings" (*artificia et quaestus*) which are worthy or unworthy of truly free men. The top positions among despicable figures are occupied by tax collectors (*portitores*) and usurers (*feneratores*). These are followed by the *mercenarii*, those who offer their service in return for money and are deplorable because their wage is a "token of slavery": "Those who buy goods from merchants and resell them immediately," that is to say, shopkeepers, are likewise vulgar: "they would not earn anything if they did not keep telling lies." The fact that all artisans practice a sordid trade appears to be so obvious to Cicero that it does not require any explanation: "there cannot be anything worthy of a freeman in a shop." The review of socially despicable figures ends with a reference to the activities connected with the pleasure of the table and entertainment. By contrast, those occupations which on top of being socially useful also require intellectual ability, such as medicine, architecture and the teaching of the liberal arts, are to be considered honorable (the specification "in the case of those for whose social position they are becoming" clarifies that members of the higher social classes should, however, abstain from practicing them). Unlike retailing, large-scale importing appears not to have been

wholly undignified, thanks to its social utility. It may, however, become unconditionally respectable if it is converted into agriculture, by investing maritime profits in farming. As expected, agriculture occupies the top position among honourable activities.[75]

These opinions were formulated in the socially restricted sphere of the aristocracies, but were also an expression of their political, economic, and cultural hegemony. Thus, they shaped general sensitivities whilst at the same time prompting mimetic behavior and attitudes among the socially mobile. The consistency and strength of this system ensured its long life. The function of "masking," which is typical of any system of values, guaranteed at the same time a tolerable deviation of actual behavior from enunciations of principle. For some time after the victory of Christianity, the "Ciceronian" system still survived in the mentality and the behavior of aristocratic, and not necessarily pagan, circles, and even in certain sectors of the ecclesiastical hierarchy.[76] However, the spread of the new religion brought about significant changes in the evaluation and perception of trades and profit. Generic formulas such as the "new dignity of human labor," "rehabilitation of humble jobs," and the like, do not exhaust the complexity of a phenomenon which, on the contrary, appears to be rich in shades and contrasts.

Ciceronian ethics, which Cicero himself defines as "traditional," had elaborated a remarkable sample of objections and censure regarding the figure of the artisan: manual specialization caused physical asymmetry; artisans' workshops were often unhealthy and dirty; free citizens worked there in close contact with slaves; artisans often sold their products personally, and this earned them the same condemnation as retailers; furthermore, their activity was too time consuming, and kept them away from their friends and from public life; lastly, the direct commissioning of work placed them in a condition of awkward subordination, which recalled slave-like dependency.[77] Confronted with this collection of defects, Christian morality assumed different positions: some were considered to be irrelevant; others, such as the question of the direct sale of manufactured goods, continued to arouse concern; others still were inverted in a process of radicalization. This is the case of the dependency of the artisan on the customer, an age-old subject, which Basilius of Caesarea dealt with in a particularly incisive manner:

> Just as the blacksmith who forges an axe bears in mind the person who gave him the commission, and keeps him in his mind, and tries to achieve the shape and the dimensions specified, and directs his efforts in accordance with the desires of the customer [. . .], so the Christian, in orientating all his actions, whether big or small, towards the divine will, carries out his work conscientiously at the same time, and retains the memory of the one who gave him the commission.[78]

[75] Cic. *Off.* 1.150–1. [76] Cf. Salamito 2003: 89.
[77] For some of these aspects, see Vernant 1985b: 295–301.
[78] Bas., *Regulae fusius tractatae* in *PG* 31, coll. 921–2.

Christianity did not condemn dependency, nor did it denounce any consequent moral humiliation; on the contrary, it exalted its spiritual value. In this way, a true morality of subordination was created, which reflected, in human relationships, the asymmetry of the bond between the believer and God.[79] One of the reasons for the success of Christianity lies in the fact that, rather than spreading a subversive message, this overturning of conventional values further reinforced well-established social relationships. In other words, the inversion of values had the paradoxical effect of reinforcing the social order.

Finally, Christian appreciation of artisans' work was part of a more general reassessment of all activities that involved manual labor (*labor*, *ponos*) and the transformation of materials. Regarding other activities, Christianity confined itself to radicalizing the traditional framework. This was to be expected in the case of agriculture, which was always considered to be the most honorable of human activities. And the same is true of the condemnation of employment in the world of entertainment and pleasure. More interesting, in view of its unexpected outcome, is the case of *tenuis mercatura*, small-scale trading, which Cicero had included in the group of despicable occupations. According to general opinion, influenced by the authority of Ernst Troeltsch and by a logic of apparent common sense, Christianity overturned the traditional mentality, by emphasizing, in the activity of the *kapelos/tabernarius*, both moderation in profits and humility; on the contrary, it condemned, for the opposite reasons, large-scale merchants.[80] But matters were not so clear cut, as a striking passage of Gregorius of Nissa demonstrates, in which the retailer is compared to the most repugnant social figure, the usurer, with a harsh judgment that would appear to allow no chances of redemption.[81] A condemnation like this can be explained by the inability, typical of all ancient culture, to understand the mechanism of price formation between producer and consumer.[82] As a result, the shopkeeper's profit was explained by his unscrupulous way of speaking ("they would not earn anything if they did not keep telling lies," according to Cicero). Christian morality reassessed the dignity of "work," and thus also the figure of the artisan, but as it did not consider small-scale trading to be a *ponos*, that is to say, an activity requiring physical labor, it found it difficult to include it in the list of respectable occupations. Agreement with the traditional pagan morality also emerges with respect to large-scale merchants: the customary reasons for commendation (or moderate disapproval) – their courage, their civic function – found support from the Christian point of view in its appreciation of the substantial charitable donations that large-scale merchants were able to make.

[79] Giardina 1991; MacCormack 2001. [80] Troeltsch 1912.
[81] Cf. Giardina 1991: 279–80. [82] Veyne 1976: 126.

Christian reflections regarding work and profits accompany the economic transition to late antiquity, attaining further completion and elaboration in the process. As always in these cases, it is difficult to say how far moral treatises and the mentality actually influenced reality. However, we may exclude the possibility that Christian morals significantly affected economic behavior or relations of production. They did, however, have a considerable influence on two of the most conspicuous, closely connected aspects of the transition to late antiquity: the decline of euergetism with the growth of Christian charity, and the formation of the ecclesiastical economy.

The former of these two phenomena finds a striking expression in epigraphic language, with the passage from the traditional epithets, *amator populi* and *amator civium*, which were used to celebrate the benefactors of towns, to the epithet *amator pauperum*, which expressed the new trend, typical of Christian generosity.[83] The change of motivation was radical: the benefactor donated in order to acquire social prestige, out of patriotism or public spirit, and his eyes were fixed mainly on the earthly reality. The attention of the Christian donor was above all turned to the heavenly sphere, and his purpose lay in the acquisition of heavenly benefits, of credit with God. The benefactor donated to the people, seen as the community of citizens, whereas the Christian donor gave to the poor, a social and moral rather than a civic category.[84]

The decline of traditional euergetic practice, which is documented by urban archaeology and by the sharp decrease in epigraphic dedications, began to be apparent in the third century in consequence of economic distress.[85] Subsequently, there were moments of recovery which slowed down the process: the civic ideal of public generosity continued to survive for a long time. On the whole, however, late antiquity is characterized by a regressive trend.[86] From the fourth century on, this trend was undoubtedly strengthened by the Christian ideology of charity which modified the identity of the recipients and the manner of donations. Resources that had previously been allocated to the construction and restoration of traditional civic buildings were now spent on ecclesiastical buildings.[87]

In the third century, Christian believers were called upon to shoulder new burdens, besides the offerings that were traditionally donated for the

[83] Giardina 1988; Brown 2002 especially chapter 1.

[84] Veyne 1976: 44 ff.; cf. Marcone 1998: 340–4.

[85] Cf. now de Blois 2002: 215. On the crisis of euergetism in a specific context, cf. now Van Minnen 2002; on the relationship between the third-century crisis and the "evaporation of the classical Roman municipal ethos," cf. now Keay 1996: 19, 25–6. Among the most recent synthetic works, King and Henig 1981.

[86] Lepelley 1979 and 1981, on the African provinces, remains the most complete analysis; the author quite rightly insists on the slowness of this development, and replaces the description of a rectilinear decline with an analysis of the various conjunctures following the crisis of the third century.

[87] Garnsey and Whittaker 1998: 330–2.

benefit of orphans, widows, the sick, and the poor in general. Now it was a question of guaranteeing the full support of bishops, and the partial support of all the other members of ecclesiastical organizations.[88] The alms offered by believers were increasingly channelled and distributed through the mediation of bishops, while administrative tasks assumed substantial importance in the activities of individual churches. Considerations of a religious and charitable nature also influenced concessions of credit, both in the final destination of the profits and in the fixing of interest rates (from this point of view, it is no exaggeration to speak of "Christian banks").[89] The ecclesiastical economy essentially performed a "democratic" function which the state economy could not provide (apart from the socially limited practice of distributions on behalf of the Roman plebs). The coexistence of and competition between these two economies were among the most significant aspects of the transition to late antiquity.

The Christian ideology and experience of charity have their roots in the ancient Jewish tradition, but the scale and nature of this practice in late antiquity are not a predictable outgrowth of that tradition or a banal consequence of the end of persecution. Constantine's tax-related measures played a crucial role: the landed property of the recognized church benefited from exemptions, and the bishops and members of the clergy were exempt from tributes and personal services. These measures not only had a quantitative impact on the resources of the churches. They marked the passage from a model of society "in which the poor were largely invisible" (and benefactors recognized the existence of citizens rather than poor people) to another model, in which poverty assumed a central position, in the collective imagination as in the redistribution of wealth, in the growth of the ecclesiastical institutions as in the relationships between State and Church.[90]

State privileges and the unceasing flow of donations led to a continual growth in ecclesiastical property. The Church was thus a protagonist in the more general process of accumulation of landed property which characterized the Roman economy from the third century onward. Some of the profits of the ecclesiastical economy ended up in the hands of new beneficiaries, the poor, who had been excluded from, or largely unaffected by, the traditional practices of redistribution. However, the relations of production found on ecclesiastical properties were identical to those of the lay properties: churches had their *coloni* and their slaves, who were organized in accordance with the relations of production that were typical of late antiquity.

[88] Schöllgen 1998; in general, on ecclesiastical wealth, Hunt 1998: 257–62.
[89] Mazzarino 1962: 291–304. [90] Brown 2002: 74 ff.

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