

DESIGNING A SUSTAINABLE FINANCIAL SYSTEM

Development Goals and
Socio-Ecological Responsibility

EDITED BY

Thomas Walker, Stéfanie D. Kibsey,
and Rohan Crichton

PALGRAVE STUDIES IN SUSTAINABLE BUSINESS

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Thomas Walker • Stéfanie D. Kibsey •
Rohan Crichton
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Responsibility

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Introduction

Thomas Walker, Stéphanie D. Kibsey, and Rohan Crichton

Our current financial system is a legacy from a time when our understanding of socio-ecological systems, natural resource management, and environmental degradation was limited. Historically, utmost importance was placed upon economic growth and development, with little consideration for the integrity of the environment, sustainability, or the well-being of future generations.

In recent years—especially following the Paris Climate Agreement (COP21)—we have witnessed new ways of thinking and doing business emerge and gain traction among academics, practitioners, and policymakers. In the minds of many, the financial system is no longer a closed, isolated system; it has evolved into a larger socio-ecological system where finance, social well-being, and planetary health are highly interlinked. In fact, our world cannot move toward sustainability, address climate change, reverse environmental degradation, and improve human well-being without aligning the financial system with sustainable development goals.

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Academics, policymakers, and practitioners are currently developing a variety of new tools and products to include environmental and social factors in the way we make and evaluate business decisions; in some cases the proposed ideas and approaches have been controversial. This book aims to add to the discourse on the design of a sustainability-oriented financial and economic structure by exploring how a system can be designed that (a) is environmentally and socially responsible, (b) is aligned with planetary boundaries, (c) manages natural resources sustainably, (d) avoids doing more harm than good, (e) is resilient and adaptable to changing conditions, and (f) addresses climate change. We define a “sustainability-oriented financial system” broadly as a financial system that is in line with larger sustainable development goals to promote social and environmental well-being for current and future generations.

This transdisciplinary edited book presents chapters by some of the leading academics and practitioners on designing a more sustainable financial system. The first objective is to explore the system and sector-level designs of a sustainability-oriented financial system. We consider large-scale changes to the role of finance, banking, business, and economic theories and take a deeper look into the challenges and opportunities of moving from theory to practice with an example centered on carbon pricing. The second objective is to highlight some of the innovated best practices, tools, and financial products that make up a sustainable financial system. We look at new approaches to social and environmental responsibility and risk management, as well as financial solutions to sustainable development challenges. Finally, our third objective is to consider the role of regulation, codes of conduct, and policymaking. We discuss the implications for more or less regulation and the role of common standards and codes of conducts.

A transition toward a more sustainable financial system in order to support sustainable development goals is inevitable and is already in progress. We hope that readers will gain a deeper understanding of this important transition through the ideas, practices, policy recommendations, and first-hand experiences presented in the following chapters. Moreover, we hope this book will lead to further research, development, and implementation of new tools and methods—ultimately shaping a financial system aligned with sustainable development goals.

We explore the following topics:

1.1 SYSTEM AND SECTOR-LEVEL TRANSITIONS TOWARD SUSTAINABILITY

Chapter 2

An Alternative Finance Approach for a More Sustainable Financial System
By Rosella Carè, Annarita Trotta, and Alessandro Rizzello

The financial crisis of 2007–2009 has raised concerns about the role of the neoclassical finance approach. Specifically, over the last several decades, alternative voices have emerged in questioning the foundations of the traditional view. Recent critical perspectives reject the assumptions and paradigms of mainstream literature that focus on mathematical and statistical methods alongside rules and parameters in order to understand the dynamics of the financial world, which are ultimately more complex. At the same time, financial systems are experiencing new financial instruments, channels, and models that emerge outside of the traditional financial system. This phenomenon represents the first step toward a reaffirmation of the “finance” mission as the servant of the economy. Concepts such as “alternative financing instruments”, “alternative financing channels”, and “alternative forms of finance” can be found with increasing frequency, emphasizing aspects such as ethics, solidarity, and social justice. Moving from these considerations, this chapter explores—through a systematic literature review—the “alternative finance” landscape, by identifying nine key themes, discussing the linkages, interrelationships, and common threads that run through all these aspects. The work contributes to the ongoing efforts to understand the opportunities, challenges, and trends for a more sustainable financial system.

Chapter 3

Social and Environmental Responsibility in the Banking Industry: A Focus on Commercial Business

By Beatriz Fernandez Olit, Marta de la Cuesta González, and Francisco Pablo Holgado

This chapter carries out a review of the social and environmental responsibility of banks and suggests a different approach to defining and measuring it based on the diversity of banks’ models and their activities. Corporate Social Responsibility (CSR) within the banking industry should include several intra-sectoral approaches, adapted to better manage the higher risks of universal banks or to adequately disclose the positive impact of smaller banks on their communities. The chapter argues that the trend of current homogenization of the banking industry is going to be unfavorable in terms of future

sustainability and responsibility. This chapter will also look at a horizon of large, quoted banks with highly diversified activities. Alternative governance models (cooperative, public, semi-public savings banks), small and medium-sized banks, and entities focused on financial intermediation, and the retail markets are being undervalued and induced to disappear in Europe, as well as globally.

Moving forward in more sustainable financial systems requires a return to a business model that is closer to customers. Technology can be helpful on the democratization of financial services. However, it could involve new risks: standardization of products, less personal advice, and financial exclusion of population with insufficient access, knowledge, or confidence in technology. Banks should guarantee credit to SMEs and, at the same time, question their financial support to other less transparent agents. There is a need for CSR that has an impact on the behavior of the retail-banking sector, as this sector supports the (productive) economy. Policymakers should be able to evaluate if the banking industry is fulfilling its role of facilitating responsible and inclusive access to banking services.

A more relational and sustainable business model would help banking institutions address the UN's Sustainable Development Goals, specifically the 12th goal (responsible consumption and production) and the 10th goal (reduce inequality avoiding over indebtedness and financial exclusion).

Chapter 4

Seeking Greener Pastures: Exploring the Impact for Investors of ESG Integration in the Infrastructure Asset Class

By Roy R. Sengupta, Tessa Hebb, and Hakan Mustafa

This chapter looks at one of the most crucial aspects of sustainable development across the world, which is infrastructure. Infrastructure factors into the design and liveability of all communities in the world and will make a major difference in both developmental and environmental goals in the long term. Estimates have shown that it will require over \$30 trillion of additional infrastructure investment globally if we are to meet the Sustainable Development Goals by 2030. Governments acting alone do not have sufficient financial resources required to meet these needs. In order to get the financial system working in a sustainable way for communities, we must find a way to leverage the resources of private capital for sustainable infrastructure. This part of the book seeks to explore ways in which such private capital can be leveraged for infrastructure, which has positive Environmental, Social, and Governance (ESG) impacts.

This chapter considers the role in which economic theory plays in sustainable infrastructure investment, including the relevance of concepts such as information asymmetry, as well as the issues which sustainable infrastructure investment could help to solve, and some of the obstacles and trends in the field of sustainable infrastructure investment. The key argument of this chapter is that sustainable infrastructure (defined as infrastructure which scores well on Environmental, Social, and Governance factors over its lifecycle) is able to provide competitive returns for investors; returns that, over the long term, match or even exceed the returns of non-sustainable infrastructure. Overall, the chapter identifies both barriers to increased uptake of sustainable infrastructure investment, but also a general feeling of cautious optimism regarding the future of such investment, as evidenced in both the literature and the interviews.

Chapter 5

Pricing Carbon: Integrating Promise, Practice and Lessons Learned from the Chicago Climate Exchange (CCX)

By Paula DiPerma

Carbon pricing is an essential pillar in the architecture of any new sustainable financial system to help address climate change because it makes otherwise invisible costs visible. But moving from theory to practice has proven elusive. To help accelerate progress, this chapter presents lessons learned from the Chicago Climate Change (CCX), which operated from 2003–2010 and pioneered carbon pricing worldwide using the cap-and-trade mechanism, including spearheading a landmark joint that created the first carbon market pilot program in China, the Tianjin Climate Exchange (TCX). CCX, which began trading in 2003, was the world's first and only carbon market that covered all six greenhouse gases and had international links.

Fueled by passion, imagination, and bold investors, including a leading US philanthropy, CCX went from a hunch and an instinct to an expansive practical working system that covered many major companies in the United States. In fact, through CCX, the United States had more emissions capped and subject to a rules-based reduction schedule than any other nation in the world at the time even though the United States had no national regulatory structure to require greenhouse gas reductions. The chapter describes how CCX, voluntary but legally binding, coaxed and cajoled companies into action, building up an extensive network of early adopters who believed that

getting started on climate change before being forced to had commercial logic and made for visionary management.

The chapter takes the reader from the early days of CCX founding to the halls of the US Congress, the streets of China and traces the up's and down's CCX faced as it broke new ground. The chapter also makes recommendations for how the world can make up for lost time on carbon pricing, implement actual pricing systems, and credibly weave socio-ecological responsibility into financial system design.

1.2 INNOVATIONS IN BEST PRACTICES, TOOLS, AND FINANCIAL PRODUCTS

Chapter 6

Designing Carbon: Neutral Investment Portfolios

By Gianfranco Gianfrate

Designing a sustainable financial system will require profound innovation in the ways investors measure and manage climate-related risks. Currently, the main approaches to embedding environmental aspects in the investment process are “exclusion lists”, ESG ratings, active engagement with the management of companies more exposed to environmental risks, and the adoption of climate risks-adjusted valuation metrics. While those approaches have contributed to making investment activities more sustainable, this chapter introduces new evidence pertaining to the magnitude of climate change risks, which demand more decisive actions to reduce and mitigate the risks borne by institutional investors. In theory, the possible strategies to immunize investments from climate risks would include decarbonization, hedging, and insurance. Decarbonization consists of eliminating carbon polluters from investment portfolios and switching to carbon-free assets. Hedging could be carried out by using securities and financial instruments that linearly offset the exposure to carbon risks. Insurance would be based on contracts that protect the value of invested assets in case of extreme scenarios related to carbon prices and climate. As of today, none of these three strategies could be implemented satisfactorily by institutional investors because financial markets do not provide the appropriate tools yet. Financial innovation will drive the financial system toward the goal of sustainability by creating new markets and instruments. The innovation will most likely result either in new specialized intermediaries or in new markets serving the need for climate risk protection (or in a combination of these two). Policymakers should create the conditions for the financial markets to facilitate climate-related financial innovations.

Chapter 7

Sustainability Stress Testing the Financial System: Challenges and Approaches By Dieter Gramlich

This chapter looks at how sustainability stress test (SST) models in finance assess the resilience of financial institutions and markets against adverse conditions in the surrounding ecological and social system. Depending on the outcome from these models, individual institutions may work proactively to avoid potential failures and include their clients in preventive actions. Supervisors of the financial system may intervene to ex-ante mitigate the most critical factors and reduce the exposure of the overall system. SST approaches thus indirectly contribute to the design of a sustainable financial system.

In addition to the conventional risk factors from financial and real markets, SST models include adverse conditions from the socio-ecological environment and their interaction with the financial system. Up to now, the effects from climate change on the financial system are mainly considered. Further factors connected to the scarcity of resources and social imbalances must be incorporated. It is argued that SST models particularly have to account for the complex and mostly indirect connectivity between the financial and the surrounding socio-ecological system. A further challenge is to comply with the non-linear, dynamic, and simultaneous interaction between the systems in a forward-looking way.

The inclusion of stress factors from the ecological and social system will overlay conventional and purely economic structures of risk and risk connectivity. New patterns of common exposures and turning points will emerge. Due to the structural and behavioral complexity of the overall economic, ecological, and social system, SST models are not simply extensions of existing stress test models. Rather, they have to be conceived as a new conceptual approach of stress modeling.

Chapter 8

Responsible Investment Requires a Proxy Voting System Responsive to Retail Investors By Ian Robertson

This chapter looks at how a sustainable financial system supports and promotes responsible investment. Institutional investors have largely been able to work within the labyrinthine proxy voting system to practice responsible investment (RI) and express their views to companies on environmental,

social, and governance (ESG) issues. Though gaps and imperfections in the system are evident, remedies are routinely considered by regulators and institutional participants. For retail investors, however, the gaps continue to widen; though they are increasingly interested in RI, their proxy voting rates have declined considerably, regardless of whether they invest through a discount brokerage, full-service brokerage, or use the services of a discretionary portfolio manager.

Responsible investment has evolved from its values-based origins (e.g. avoiding tobacco companies). It now includes more broadly representative portfolios that integrate ESG factors into the analysis of investments and into the subsequent voting of proxies. Integrating ESG factors into research can uncover hidden risks, while the ESG-themed voting of proxies nudges companies to more responsible behavior (and according to recent studies, lower risk and better returns). Before the mid-1970s, retail investors who own shares directly overwhelmingly voted their proxies, but just as the centrality of proxy voting to responsible investment was rising, retail voting rates were declining precipitously.

The chapter traces the origin of property rights, the corporation, and the ownership rights of shareholders. It situates historic ownership rights within the social contract between government and citizen and traces the centuries-long ebb and flow of regulated and liberal market capitalism. The chapter concludes by noting that the decline in retail investor proxy voting coincides with the current era of (neo)-liberal capitalism and that re-engagement of this broad base of investors may both improve companies' ESG performance and help usher in a new era of responsible capitalism. A central recommendation is that stockbrokers, whose investment recommendations are currently held to a duty of "suitability", be considered "fiduciaries" and that this higher standard be applied expansively to include the responsible voting of proxies to reflect clients' interests.

Chapter 9

The Creation of Social Impact Credits: Funding for Social Profit Organizations

By Marcel Minutolo, John Stakeley, and Chloe Mills

Designing a sustainable financial system that facilitates development and socio-ecological responsibility is no small task. Aligning competing stakeholder requirements is challenging given the complexity of the global financial system disparate interests. This chapter builds on the concept of

social impact bonds to introduce a financial instrument that facilitates social development. The authors use the library system to illustrate the functionality of social profit credit. They find that there is an opportunity to align stakeholder interests through the creation of a market for these credits. In such a financial market, organizations traditionally known as non-profits are incentivized to innovate, increase performance, and serve social needs while potentially increasing the revenue needed to deliver on services. Key to the social profit credit is the development of sector-specific metrics to evaluate performance of any given organization within the space. Hence, museums, rehabilitation centers, and libraries, for instance, will not be evaluated on the same measures of performance but on measures that are agreed upon by the segment for being important to them. Further, like any other issuance of the type, participation is not mandatory, as the authors suggest, high performing organizations will opt-in driving others in order to improve their results raising the sector's overall value creation. Likewise, investors are expected to conduct more research into where they invest their resources beyond what mere giving does. The authors propose that the social profit credit will function as a financial instrument that will sustain the development and social responsibility for years into the future.

Chapter 10

Crowdfunding Sustainable Enterprises as a Form of Collective Action

By Helen Toxopeus and Karen Maas

Crowdfunding is perceived as a particularly promising source of finance for sustainable initiatives (Calic and Mosakowski 2016; Lehner 2013; Lehner and Nicholls 2014). By undertaking an institutional, rule-based analysis of crowdfunding, this chapter introduces three key mechanisms that may create collective action among crowdfunders, thereby increasing availability of funds for sustainable enterprises. Firstly, the use of social networks can increase collective action, especially in the crucial early stages of a crowdfunding campaign. Existing (strong and weak) ties can decrease fears of moral hazard and increase trust about expected participation of other funders. Furthermore, smaller group sizes can enhance the feeling that an individual contribution really matters and can also lead to reputational concerns for not participating. Second, crowdfunding allows for heterogeneous contribution and payoff rules, ranging from debt/equity to rewards to impact and combinations of these. This creates new niche funding markets where the payoff is tailored to a specific crowd and also enables an enterprise to engage its value

chain as funders in particular users/clients. Third, crowdfund campaigns can lead to conditional cooperation, since campaign websites display who has already funded and provides a threshold (deadline) within a certain amount of funding needs to be reached. Making the cooperative behavior of others transparent has been shown to be a crucial factor for increasing cooperation levels and can be applied to sustainable entrepreneurial finance. Both entrepreneurs and crowdfunding platforms can use these three mechanisms to increase the success rate of sustainable entrepreneurial finance, which can open up additional sources of funds for a sustainable financial system.

Chapter 11

Palm Oil: Mitigating Material Financial Risks via Sustainability

By Gabriel Thoumi

This chapter looks at the environmental impact of the palm oil business. Palm oil is an inexpensive and highly versatile oil derived from the fruit of the oil palm tree. It is found in half of all consumer goods on the shelves today in Western grocery stores. Due to its high yields and many uses, palm oil is the most actively traded oil crop in the world. With annual sales of \$50 billion, palm oil is big business. Indonesia and Malaysia have expanded their plantations and tripled production over the past 15 years, and today account for 85 percent of global production.

Palm oil has been identified as a driver of both tropical deforestation and climate change. Material financial risks often accompany the environmental impacts and human rights abuses associated with palm oil expansion. In 2015, fires associated with palm oil expansion in Indonesia destroyed over 2 million hectares of tropical forest and may be responsible for 100,000 deaths throughout SE Asia.

Capital markets in SE Asia and globally are raising capital to expand palm oil expansion. Currently, there are over 7000 institutional investor equity positions invested in publicly traded companies in the agriculture sector in Indonesia, Malaysia, and Singapore. Many regional and global banks are also providing loans to support palm oil expansion in the region while debt markets likewise expand capital to support palm oil expansion.

These investors and banks are facing material financial risks associated with their financing activities supporting SE Asian palm oil expansion. Likewise, the numerous publicly traded companies and private companies in the palm oil supply chain in Indonesia, Malaysia, and Singapore also are facing material financial risks associated with their palm oil expansion.

Finally, millions of SE Asian retail investors who invested in these regional companies are facing similar material risks.

1.3 THE ROLE OF REGULATION, STANDARDS, AND POLICY

Chapter 12

Towards a Theory of Sustainable Finance

By Joakim Sandberg

This chapter outlines a useful theoretical model for a more sustainable role of finance in society. It is argued that recent developments have clearly demonstrated the flaws of the dominant theory of finance rooted in neo-classical economics and laissez-faire politics. However, a central question that reformers now face is how social and environmental responsibilities should be divided or distributed between the state and market actors. It may seem self-evident that increased regulation is needed, but this suggestion risks leading to ineffective bureaucracy and non-cooperation by industry. A popular alternative is self-regulation by market actors in the form of social responsibility policies, but also this suggestion has flaws as the policies risk becoming too cumbersome for the actors and thereby both unrealistic and inefficient. Sandberg presents a middle-way solution that preserves the best aspects of both sides, which he calls the two-level model of sustainable finance. The central idea of this chapter is that market actors should have leeway to pursue private goals except in cases of considerable clashes with the common goals of society. The role of public policy should primarily be to support self-regulation by the market except in cases of severely misaligned incentives.

Chapter 13

Mobilizing Early-Stage Investments for an Innovation-Led Sustainability Transition

By Friedemann H. J. Polzin, Ulrika Stavlöf, and Mark W. J. L. Sanders

This chapter looks more at the financial system as consisting of a multitude of actors that cover a variety of risk/return profiles and therefore finance different companies' projects and infrastructure, which makes it more stable and thus more resilient to shocks. It so happens, such a diverse and resilient financial system also allows for innovation in green tech sectors to be financed, contributing directly to a sustainability transition in the real economy. Hence, mobilizing private early-stage equity capital is important to achieve a more

sustainable financial system. When approaching the problem of lacking private investment in green tech products and services, an effective policy strategy should consider the most affected stakeholders, investors, and entrepreneurs. Based on a series of interviews, a survey, and reflection upon the behavioral biases and self-interest of green tech investors and entrepreneurs, this chapter suggests a policy mix consisting of two central elements. First, policymakers should address green tech disadvantages in current markets, for example, through fiscal and financial incentives such as seed funding or systemic policies such as green procurement and networking and information. Second, it is pivotal to also ameliorate the framework conditions (i.e. intellectual property legislation, labor-market rules, and tax policy) in order to attract investors into the otherwise difficult market for green technologies. By shifting the burden of financing, the transition to the private sector, budget constrained governments can, at the same time, stabilize financial markets, boost private economic activity, and foster green innovation and growth.

Chapter 14

Financial Sector Sustainability Regulations and Voluntary Codes of Conduct: Do They Help to Create a More Sustainable Financial System?

By Olaf Weber

This chapter discusses the role of voluntary sustainability codes of conduct and sustainability regulation in helping to create a more sustainable financial system. Voluntary codes of conduct that are analyzed are UNEPFI, UNPRI, the Equator Principles, GABV, and IRIS. Furthermore, financial sector sustainability regulations, such as the Chinese Green Credit Policy, the Nigerian Sustainable Banking Principles, and the Environmental Risk Management Guidelines for Banks and Financial Institutions in Bangladesh will be discussed. Additionally, newer developments, such as the FSB Task Force on Climate Related Disclosures and climate risk related reporting regulations for institutional investors will be presented. Most of the described voluntary codes of conduct and regulations focus on financial risks for the industry connected with environmental and social risks. Hence, both voluntary codes of conduct and regulations can help to create a more sustainable financial system, particularly if they work in tandem. However, in order to address sustainability issues, these mechanisms should focus not only on financial sector risks, but on decreasing negative impacts of the financial sector on sustainable development and on increasing positive contributions to sustainable development. Enforcement is also a common issue. While voluntary codes of conduct usually do not have any

enforcement mechanisms, sustainability regulations are still relatively new. Therefore, experiences about their enforcement are rare. But both might be able to provide the governance framework that is needed to create a more sustainable financial system.

Chapter 15

Why Self-Commitment Is Not Enough: On a Regulated Minimum Standard for Ecologically and Socially Responsible Financial Products and Services

By Andreas Oehler, Matthias Horn, and Stefan Wendt

A crucial requirement to supporting the distribution of ecologically and socially responsible financial products within a sustainable financial system is high-quality information for consumers about the achievable financial products. This chapter points out that an ambiguous understanding of what ecological and social responsibility actually means is one of the main obstacles for consumers to engage in ecologically and socially responsible financial products. Without a clear definition of specific ecological and social criteria that must be fulfilled in order to categorize financial products and services as being responsible, and without information about the performance impact, individuals are unable to determine if ecologically and socially responsible investments fit their personal needs. To tackle this problem, it is proposed that a regulated minimum standard of ecological and social responsibility should be implemented both on a global and on a local level. This minimum standard must apply to the entire value chain to avoid greenwashing and must go beyond existing legal requirements for firms, financial service providers, and consumer information. The proposed minimum standard is based on knock-out criteria measured as fulfilled/not fulfilled while avoiding scoring or rating approaches and tolerance thresholds. The minimum standards' underlying principles and functioning as well as other key features of the financial products and services have to be presented in a transparent and comprehensible way that also allows for comparison between different products or services. Information about key characteristics must be clear and verifiable and should address the products' and services' fit to personal consumer needs. A sustainable financial system would benefit from the introduction of the proposed minimum standard because it allows consumers to understand and compare financial products and services, and it provides a level playing field for intermediaries and strengthens competition.

PART I

System and Sector-Level Transitions
Towards Sustainability

An Alternative Finance Approach for a More Sustainable Financial System

Rosella Carè, Annarita Trotta, and Alessandro Rizzello

2.1 INTRODUCTION

The recent crisis has induced some critical reconsideration for the role of “mainstream finance” (Kramer and Porter 2011; Rappaport and Bogle 2011; Shiller 2013; Zingales 2015). Many academics and practitioners suggest that the crash was the result of bad or poorly applied theories (Zingales 2015), even useless or harmful (Scherer and Marti 2011), and a systemic failure of the economics profession (Colander et al. 2009). In the most recent years, a growing number of scholars have been put the need to diversify finance approaches under a magnifying glass by overcoming the limitations related to the crucial (and mechanistic) assumptions of the classical finance view and by recovering the newest view able to create

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shared value (Kramer and Porter 2011). However, some authors have highlighted that financial systems would have to reappropriate the fundamental and basic useful functions for a good society (Shiller 2013), sustainable development and social justice (Weber and Feltmate 2016).

The main criticism of the “traditional” financial theory is that the financial models and frameworks fail to explain the real financial world. About this, several questions on how finance should be reconsidered in its ontological, epistemological and methodological assumptions are posed (Lagoarde-Segot 2015, 2016a; Schinckus 2015; Lagoarde-Segot and Paraque 2017). The debate on these contentious issues highlights the major key gaps in traditional finance, which uses a positivism approach and quantitative models, resulting in theories and models in which ethical considerations are irrelevant, with the consequence of having a remarkable separation between facts and values.

For this reason, a number of scholars have argued that the assumptions of theoretical constructs are largely unable to understand several real-world phenomena (Lagoarde-Segot 2015). Currently, new approaches are emerging by questioning the foundations of the traditional view. However, it is only after the recent crisis that we are witnessing a growing academic movement that is formally opposed to the neoclassical financial approach (Lagoarde-Segot 2016a) by underlining that the turmoil can be considered a symbol for the failure of the mainstream (Blommestein 2009, p. 70) and by forcing the reconsideration of academic finance (Lagoarde-Segot 2016b). The crisis undoubtedly leads to evidence that concepts such as irresponsibility, morally dubious behavior and financial misconduct have had a disruptive impact on the financial and economic systems. Therefore, the crisis emphasizes a preexisting trend, and it becomes an opportunity to promote the possibility of substantive change in the discipline of finance (Gendron and Smith-Lacroix 2015).

Regardless of the theoretical debate, it is important to note that in recent years, the financial systems provided experience in developing innovative financial forms and models, which emphasizes concepts such as community and values. In several countries, including the USA, the UK, Australia and Europe, innovative forms of funding are being developed, in which people, in addition to considering risk and return characteristics, take into account concepts of sustainability, solidarity and social impact. The most prominent examples are crowdfunding (in particular, civic, equity and lending), microcredit and social impact investing models, which will be discussed below.

In this light, new approaches are growing in theory and in practice, and these are often referred to as an “alternative” to mainstream finance. Therefore, alternative finance represents a small but interesting field of research (Maurer 2012): concepts such as “alternative financing instruments” (OECD 2015), alternative financing channels (Allen et al. 2012) and “alternative forms of finance” (Harrison and Baldock 2015) can be found in the recent literature with increasing frequency. In its approach, the Cambridge Centre for Alternative Finance states the following:

Since the global financial crisis, alternative finance – which includes financial instruments and distributive channels that emerge outside of the traditional financial system – has thrived in the US, the UK and continental Europe. In particular, online alternative finance, from equity-based crowdfunding to peer-to-peer business lending, and from reward based crowdfunding to debt-based securities, is supplying credit to small and medium-sized enterprises (SMEs), providing venture capital to start-ups, offering more diverse and transparent ways for consumers to invest or borrow money, fostering innovation, generating jobs and funding worthwhile social causes. (Wardrop et al. 2015, p. 9)

Allen et al. (2012) underline that alternative finance is an important source of financing for firms in both developed and developing countries. Scholars agree that these new concepts refer to an alternative view to mainstream finance and include, in practice, “financial instruments and distributive channels that emerge outside of the traditional financial system”. It is interesting to observe that in 2015, following a seminar at Kedge Business School, several researchers proposed a manifesto (From crisis to viability: Finance reconsidered) that represents a milestone in efforts at addressing the attention toward the constitutions of a post-crisis financial movement, that focuses on the following aspects: “economy and finance must be embedded in environmental and social welfare in order to confront the challenges we face, rather than the other way around” (Lagoarde-Segot 2016a, p. 11). Despite all this attention and activities, in this field, extant knowledge is fragmented, and various deficiencies exist. Currently, the landscape of “alternative finance” is not yet well defined, and there is a need for more investigations to improve understanding of the structure, characteristics and thematic areas of this field of research. The “alternative finance” may thus be broken down into several topics and offers a vast research agenda. Much remains to be done in order to fully understand its contribution for a more inclusive and sustainable society.

Moving from these considerations, the main aims of this chapter are (i) to explore the domain of “alternative finance”; (ii) to map and to assess the intellectual territory of this research field; (iii) to provide a critical analysis of the current state of the art in this new finance approach through the analysis of the ontological, epistemological and methodological issues posed in academia and (iv) to identify and discuss the main emerging streams of research. The chapter also contributes to the ongoing debate on the role of alternative finance for a more sustainable financial system by exploring new concepts, instruments and dynamics of the alternative finance in the service of human welfare and dignity. To clarify the spectrum of concepts, instruments and approaches around the field of the study of “alternative finance”, the research—through an exploratory analysis—is based on a systematic literature review and uses a theme development process.

The chapter proceeds as follows. The next section illustrates the research design, methods and sample characteristics. Section 2.3 presents the results of the literature review. At the same time, nine themes are discussed. Sections 2.4 and 2.5 highlight the key points useful to illuminate the linkages between different thematic areas, the interrelationship and the interdependence of parts, and the common threads that run through all these. Finally, the last section offers suggestions and future research directions.

2.2 METHOD AND SAMPLE CHARACTERISTICS

This study has been addressed using a systematic review and thus using a qualitative approach. Qualitative studies are based on a really different frame of meaning construction that allows one to explore and better understand social science issues at a deeper level (Kaczynski et al. 2014, p. 128). In underlining that capital markets’ research has profoundly influenced the contemporary finance literature, Bettner et al. (1994, p. 15) suggest the use of qualitative methods to supplement the future research direction of finance discipline. Starting from the best practice on management and other disciplines, the analysis uses a hybrid method that involves both a data-driven inductive approach (Boyatzis 1998) and a deductive and theory-driven approach (Crabtree and Miller 1999) through a theme development process. Thematic analysis is a search for themes useful for the description of a phenomenon (Thorpe et al. 2005) based on pattern recognition within data and where emerging themes become the categories for investigation (Fereday and Muir-Cochrane 2006). This methodological pattern is particularly valuable for the engaged investigators to assess the

intellectual territory of the nascent fields by identifying the emergence of different research streams. In light of this consideration, we organized our analysis in three main steps: (i) sampling and design issues, (ii) themes identification and validation and (iii) themes analysis.

2.2.1 *Sampling Issues*

This work uses a process of “literature identification”, and to ensure the reliability of our analysis, a research protocol has been developed. The protocol aims to minimize bias in the study by defining in advance how the systematic review is to be conducted, embodies the detailed plan and the action required for the review and specifies the process to be followed (Tranfield et al. 2003). A keyword search was performed in order to ensure that no relevant articles were missed. An initial and exploratory reading of relevant literature (Walker et al. 2008) allowed us to identify a set of keywords that represents our Boolean strings used to search in research databases. Considering the explorative nature of this study, we have not considered only the most important journals of the field, but we decided to use the following databases for the investigation: ISI WoS, Scopus, Google Scholar and SSRN. Database analyses were performed in January 2017 and included all works published as of that date. The search covers only papers published in international scientific journal, introductions to special issues, introductions to books, books, book chapters, reports and working papers. The search terms that we used are “sustainable finance”, “alternative finance”, “mainstream finance”, “sustainability” and “finance”, “finance theory”, “neoclassical finance”, “alternative finance approach” and “sustainable financial system”. The same search criteria were used for all databases. With respect to the time period, we selected the algorithm “every year”. In the second stage, a manual search for potentially relevant studies was performed as a secondary search form in order to avoid the omission of a significant number of articles in our topic. The first author screened articles, titles, abstracts and keywords appearing in regular journal issues selected on the following criteria: journals in which relevant articles were published and journals in which important authors published articles. Moreover, the titles listed in the references of the identified papers were further screened. The different searches were combined, and the resulting list was cleaned up manually, and articles without any apparent relationship with our topic were excluded from the analysis. The first two authors evaluated the full articles independently in order to verify that they were adequate. Each

decision was then discussed in line with our research protocol. With regard to the exclusion criteria, we first excluded articles that did not address our topic area and articles where the topic area played only a minor or less significant role. A total of 192 articles were reviewed. Of these, 86% have been published since 2007. The development of the literature on the topic under investigation is depicted in Fig. 2.1.

During the period 2007/2017, 170 works have been published, while only 32 articles refer to the period 1996/2000. From 2007, there was a significant increase in published works. The phenomenon has been even more pronounced since 2012. Moreover, our analysis found that over half of the research in this field has been published as journal articles. The journals with the major numbers of articles are the *Journal of Sustainable Finance & Investment* (7), the *Journal of Business Ethics* (6) and *Research in International Business and Finance* (5). The latter—*Research in International Business and Finance*—published in January 2017 a special issue entitled “Finance Reconsidered”.

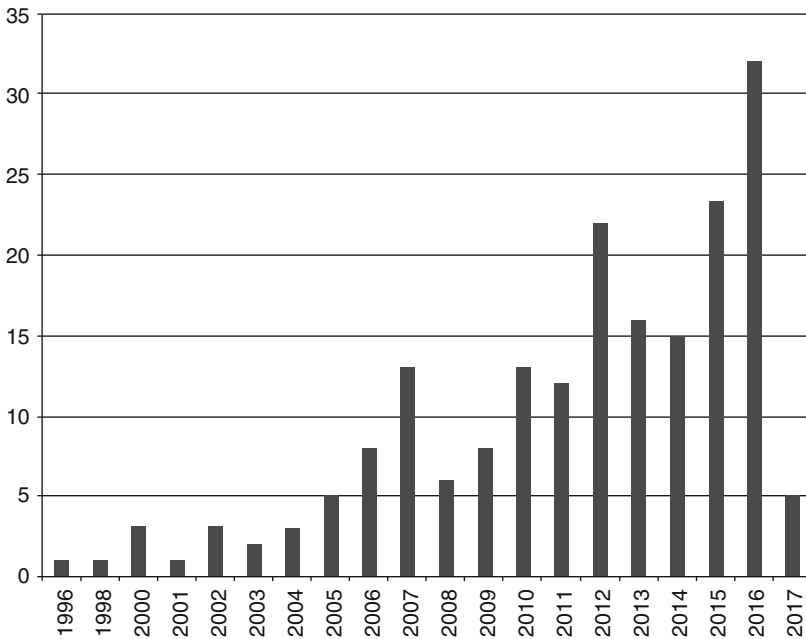


Fig. 2.1 Sample description by year

2.2.2 *Themes Identification and Validation*

In the first stage of the process of themes identification and by following the suggestions provided by Jones et al. (2011), a systematic interpretative synthesis of articles has been performed, with the main aim to avoid the deductive application of as few preconceptions as possible (Jonsson and Tolstoy 2013). Each article has been analyzed by two researchers independently and by following a holistic approach. Thus, we determined a preliminary list of themes through the identification, classification and organization of the subjects. In the second stage of our iterative process of themes identification and by following a deductive approach, our list of themes was then refined and synthesized. In this phase, each theme was discussed by two researchers. Although some overlap between themes is unavoidable, we considered them as distinct research streams (Jonsson and Tolstoy 2013). Finally, each article included in our samples has been allocated to the respective theme (Table 2.1). In the case where articles subjects overlapped, we assessed which theme dominated and labeled the article accordingly.

2.3 REVIEW RESULTS

Our sample description (see Sect. 2.2.2) provides an overview of the structure and evolution of research over the past 20 years. The following thematic analysis will include nine selected major themes in which research has been focused. We organize our analysis in nine sub-paragraphs based on the themes detected. Table 2.1 provides an overview of the themes that have been identified and of the sample distribution between them.

2.3.1 *Theme 1: Critical Perspectives and Finance Reconsidered*

An interesting work of Gippel (2013) analyzes the state and the development of the field of finance over the last 50 years. The main findings note that research breaks with mainstream finance, searching for “different and innovative” approaches based on social sciences (and other disciplines) theories. In particular, in the past two decades, several emerging sub-disciplines of finance have appeared, and among these, behavioral finance is “the best-established challenge to the neoclassical paradigm”. The author affirms, “there is no particular crisis that could pinpoint an emergence of competing paradigms in finance in the 1990s and 2000s.

Table 2.1 Sample distribution by theme

| | |
|--|--|
| Critical perspectives and finance reconsidered | Amato and Fantacci (2014), Ansart and Monvoisin (2017), Ardalan (2000, 2002), Bader-Saye (2013), Blommestein (2009), Engelen et al. (2010), Faugère (2016), Gendron and Smith-Lacroix (2015), Gippel (2013), Haugen (1996), Hawley (2011), Hockett and Omarova (2016), Keasey and Hudson (2007), Lagoarde-Segot (2015, 2016a, b), Lagoarde-Segot and Paraque (2017), Leyshon and Thrift (2007), Nesvetailova (2007a, b, c, 2014), Nesvetailova and Palan (2010), Paraque (2016, 2017), Paraque and Pérez (2016), Pérez Caldentey and Vernengo (2010), Renneboog and Spaenjers (2012), Ross (2002), Schinckus (2015), Tymoigne (2012) |
| Sustainability issues | Amaeshi et al. (2007), Arjaliès (2010), Baker and Nofsinger (2012), Boissinot et al. (2016), Busch et al. (2016), Chemeva (2012), Coulson and O'Sullivan (2013), Dumas and Louche (2016), Fatemi and Fooladi (2013), Haigh (2012), Hertrich (2013), Krosinsky et al. (2012), Louche and Hebb (2014), Louche et al. (2012), Miles (2005), O'Rourke (2003), Randjelovic et al. (2003), Richardson (2005, 2009a, b), Richardson (2011, 2014), Ryszawska (2016), Salzmann (2013), Schaefer (2012), Scholtens (2006), Soppe (2004, 2009), Sparkes (2008), Sun et al. (2011), Umlas (2008), Weber (2005, 2006, 2014b, 2015, 2016), Weber et al. (2015), Wiek and Weber (2014), Wilson (2010) |
| Social banking and social finance | Artis (2017), Azmi (2011), Bachel (2012), Becchetti (2011), Benedikter (2011), d'Andria (2012), Geobey and Weber (2013), Geobey et al. (2012), Glemain (2011), Hangl (2014), Lovera (2015), Maccarini and Prandini (2009), Mahfuzur and Barua (2016), Milano (2011), Naszályi (2012), Nicholls (2010a, b), Roux (2012), Weber and Duan (2012), Weber and Remer (2011), Weber (2011a, b, 2012a, b), Westall (2010) |
| Microfinance | Anaduaka (2014), Arun and Hulme (2008), Attuel-Mendes (2012), Buss (2005), Chawla (2013), Dash (2012), Edward and Olsen (2006), Glaubitt et al. (2007), Haque (2000), Hartungj (2007), Johnson (2009), Khan (2008), Koveos and Randhawa (2004), La Torre and Vento (2006), Mader (2014), Mago (2014), Maksudova (2010), Manos et al. (2013), Marino (2004), Matin et al. (2002), Mersland (2005), Navajas et al. (2000), Nawai and Shariff (2010), |

(continued)

Table 2.1 (continued)

| | |
|--|---|
| Islamic finance | Ngugi and Kerongo (2014), Oluyombo and Ogundimu (2006), Oluyombo (2007), Poudyal (2007), Robinson (2001), Schwittay (2014), Shetty (2008), Tyson (2012), Underwood (2006), Wanchoo (2007) Biancone (2014), Causse (2012), Chaar (2016), Furqani et al. (2015), Hasan (2007, 2009), Oseni et al. (2013), Paranque and Erragragui (2016), Rarick and Han (2010), Sairally (2007), Saleh and Kamarudin (2013), Toumi et al. (2012) |
| Impact investing | Brandstetter and Lehner (2015), Bugg-Levine and Emerson (2011), Höchstädter and Scheck (2015), Jackson (2013), Mendel and Barbosa (2013), Michelucci (2016), Trotta et al. (2015) |
| Access to finance for SMEs, microenterprises and start-ups | Allen et al. (2012), Asongu and De Moor (2015), Baeck et al. (2014), Beck and Demirgüç-Kunt (2008), Beck et al. (2009), Bellavitis et al. (2016), Bruton et al. (2015), Château Terrisse (2011), Gandja et al. (2015), Harrison and Baldock (2015), Jung and Eriksson (2006), Mariage and Le Pendeven (2015), Mosley and Hulme (1998), Nicholls (2013), Rupeika-Apoga (2014), Wales (2015), Wardrop et al. (2015) |
| Crowdfunding as an alternative way of funding | Baucus and Mitteness (2016), Borello (2016), Bottiglia (2016), Brown et al. (2015), Brunetti (2016), Caytas (2015), Chishti (2016), Culkin et al. (2016), De Crescenzo (2016), Dibrova (2016), Hernando (2016), Hollas (2013), Hörisch (2015), La Torre and Mango (2013), Lam and Law (2016), Lambert and Schwiendbacher (2010), Langley (2016), Lehner et al. (2015), Lesur (2015), Pelizzon et al. (2016), Pichler and Tezza (2016), Sharma and Lerthnuwat (2016), Turan (2015), Vismara (2016) |
| Behavioral finance | De Bondt et al. (2010), Dhankar and Maheshwari (2016), Huang et al. (2016), Shiller (2006) |

More likely, several factors combined have inspired a growing number of researchers to explore new paradigms” (p. 135).

As has been stated above, the meltdown of 2007 represents an opportunity for a fundamental change in financial studies and in the practices of the financial systems.

It is interesting to note that today, the dominant paradigm remains largely unquestioned by several researchers and core finance journals do

not seem to significantly encourage diversity in research styles, approaches, methods and ideas (Keasey and Hudson 2007; Gendron and Smith-Lacroix 2015). Anyway, a recent wave of criticism of traditional academic finance rejects the assumptions and the paradigms of the mainstream literature (EMH, CAPM, M&M, rational behavior and expectations, and market completeness) that focus on mathematics and statistics methods, rules and parameters to understand dynamics of financial world, which are much more complex and interdependent, in terms of variables, correlations, events and processes. With regard to this aspect, a number of scholars believe that the mainstream literature “is more interested in demonstrating its mathematical power than solving genuine practical problems” (see Ardalan 2002, p. 71).

Consistent with this reasoning, many scholars suggest diversifying finance by opening up to social sciences methods, concepts and practical tools (Lagoarde-Segot 2015). About this, Schinkus (2015) highlights that existing techniques used in the field and diversification of research in finance are complementary rather than conflicting:

a diversification of research in finance does not necessary lead to reject all existing techniques currently used in the field. Because the current methodology is mainly based on a numbered analysis of financial reality, a modification of the key assumptions (a priori statements) of the field can also be accompanied by their theorization/quantification in order to make them compatible with the existing methodology. (p. 105)

The reconsideration of ontological, methodological and epistemological assumptions of finance theories is the focus of the criticism. Modern finance develops theoretical models, by adopting an objectivist ontology approach. On an epistemological level, it favors methodological individualism (Lagoarde-Segot 2016b). In addition, the methodological individualism of the neoclassical paradigm justifies the adoption, in the financial world, of a shareholder paradigm, with the maximization of shareholders' value results (Paranque 2017). From a methodological view, traditional finance analyzes financial sectors, by using a positivism approach. As a result, facts and values may be considered separately. Modern finance does not include “moral and ethical considerations and reflections on social well-being” (Lagoarde-Segot 2015) and in a neoclassical financial scheme “personal interactions and authority are absent. Consequently, all behavior is ethically neutral” (Blommestein 2009, p. 72).

The shareholder-based ideology does not favor an improvement of social welfare (Paranque 2017). In contrast, most of the criticisms place greater emphasis on the linkages between facts and values. Lagoarde-Segot (2015) underlines that “in the real world, facts and values are inextricably entangled” and “academic finance has moral, philosophical and political aspects” (pp. 96–97).

The subjectivist ontology represents the core assumption of the domain of a finance that adopts methods of social sciences. In this case, “notions of ethics, values, and intentionality become key-concepts” (Lagoarde-Segot 2015, p. 106).

The comparison of characteristics of traditional and emerging research approaches (e.g., behavioral finance, neurofinance, evolutionary finance and sociofinance) reveals interesting differences in methods that are useful to studies. In particular, the emerging approaches also make use of qualitative analysis and observatory-inductive methodology, thanks to commingling with social science paradigms. About this, Gippel (2013, p. 127) notes that the normative implications related to these new approaches are very important because they require advances in providing education and improving aspects of social welfare.

Some staggering consequences are generated from these new approaches. First, different ways to do finance (in the theory and in the practice) are emerging. A number of works explore the role of the responsibility at different levels. In particular, individual responsibility is greater in religious people. A strand of literature focuses on the relationship between religion and finance (Renneboog and Spaenjers, 2012). This is the case of the growing thematic area of “Islamic finance”. Moreover, ethics become central in the emerging and newest approaches. However, “ethics are inseparable from human intentionality” (Lagoarde-Segot and Paranque 2017, p. 657), where intentionality is the key point of the social impact investment that differs from socially responsible investments (SRIs). The financial world is inhabited by people who take decisions also based on feelings and emotions. This allows discussing how people contribute to the noble purpose for finance, which is to channel resources into the most deserving social and/or economic activities that raise community and societal welfare (Faugère 2016). Social sciences introduce the field of social, green and sustainable finance, whereas standard financial theory is considered an obstacle to ecological and social sustainability (Lagoarde-Segot 2016b).

Then, several scholars stress the need of rethinking the financial system. Modern finance has led to an over-dimensioning of the international

financial system (characterized by financial innovation, globalization and deregulation) by encouraging the use of financial practices that have increased the fragility of financial systems and the vulnerability of the financial institutions. With regard to this, Perez Caldentey and Vernengo (2010, p. 7) state: “(t)he core theorems of finance provide a premier and perhaps unique case where academic research has affected to a great extent real world views on finance, research on financial economics as well as the daily practice off all these engaged in financial transactions”.

Therefore, financialization is under the magnifying glass of several authors (i.e., Leyshon and Thrift 2007; Ansart and Monvoisin 2017), who often propose a reconceptualization of financial innovation based on a moral view (Engelen et al. 2010). Financialization is defined by Aalbers (2016: 2) as “the increasing dominance of financial actors, markets, practices, measurements and narratives at various scales, resulting in a structural transformation of economies, firms (including financial institutions), states and households”. Amato and Fantacci (2014) underline the need to change the logics of the current financial systems, by creating the conditions for a finance conceived to be concretely in the service for the economy: “There is finance and finance, and not all forms of finance are equal. (...) the fact remains that there are some situations that encourage, and others that discourage, the human tendency to act against self and others” (p. 28). All these aspects lead to a call for finance reconsideration: academic finance to be reconstructed (Lagoarde-Segot and Paranque 2017) on the theoretical level.

Alternative finance phenomena are growing spontaneously in the real world. As noted by Ansart and Monvoisin (2017, p. 750), following the financial crisis, alternative financial and monetary innovations are constantly multiplying, by developing a strong reaction to the conventional approaches. On the practical level, these alternative initiatives are the first step toward a reaffirmation of the mission of the financial system as the servant of the economy.

According the authors, the phenomena have two fundamental key characteristics in practice: (i) people take charge of issue through the creation of the communities, and (ii) it emphasizes the concepts such as “values”, “social”, “ethical”, “responsible”, “solidarity” and “collaborative”. More in detail, as it has been observed: “Beyond a desire ‘to act differently’, it turns out that a key qualifier is added ‘together’. The notion of community—the ‘together’—is omnipresent” (Ansart and Monvoisin 2017, p. 757).

In conclusion, our analysis highlights the vibrancy of the debate, which raises very interesting issues (including the relationship between finance, ethics, human intentionality and social welfare). Academia is experiencing a new phase of financial thought informed by critical perspectives, which are working to redefine the functions of finance and financial systems.

2.3.2 *Theme 2: Sustainability Issues*

The facts and effects of the financial crisis have led institutions (and particularly financial institutions), regulators and researchers to reflect on the impact of finance on society and on the question of the sustainability of financial system (Sun et al. 2011). It follows that sustainability and responsibility are intertwined areas of research (Haigh 2012). Following Amaeshi et al. (2007), sustainable finance has emerged at the core of the corporate social responsibility (CSR) movement and has found expressions in practices such as SRIs, green banking and responsible lending, and in the broader discourse of sustainability (Amaeshi et al. 2007; Baker and Nofsinger 2012). CSR and SRI operate among the most fruitful research areas in the field of sustainability (Salzmann 2013, p. 559). Busch et al. (2016) regard the concept of “sustainable investments” as a term for investments that try to contribute to sustainable development by integrating in their investment decisions the long-term environment, social and governance (ESG) criteria. With regard to the long-term perspective, Krosinsky et al. (2012) argue that preventing future market meltdowns and avoiding catastrophic climate change requires a new era of long-termism in investment. Salzmann (2013) recognizes environment, social justice and corporate governance (ESG) as the three central areas of concern in determining the sustainability of an investment. During recent years, the market share for sustainable investments has grown exceptionally (Busch et al. 2016).

2.3.2.1 *Social Investment, Responsible Investment and SRIs*

Current developments on financial markets reveal an increasing attention for both SRI and sustainable corporate responsibility (Busch et al. 2016; Soppe 2004, 2009). Sustainability can be considered as a societal phenomenon in which CSR and SRI play a primary role (Soppe 2009). Early definitions of SRIs referred primarily to “ethical investments” (Sparkes 2008; Umlas 2008; Arjaliés 2010; Schäfer 2012; Hertrich 2013) and to moral principles promoted by religious organizations (Richardson 2009a; Schäfer 2012; Hertrich 2013; Salzmann 2013; Louche and Hebb 2014).

However, whereas ethical investing comes from religious traditions, SRI comes from the varying ethical convictions of individual investors (Salzmann 2013). SRIs can be considered as an umbrella term (Hertrich 2013) that includes investments and investment strategies that consider in addition to the traditional criteria—such as risk and return—ethical or moral principles (Schaefer 2012) and include a wide range of tools, investment strategies and instruments (Louche and Hebb 2014). In general, responsible investing is based on the idea that the activity of investing is not purely a mathematical formula focused on financial returns but is based on the idea that investments have societal and environmental impacts and thus are interconnected and interdependent to society (Sun et al. 2011). Terms such as sustainable, social responsible, socially conscious investments, green or ethical investments are used in a myriad of ways. Despite the question of what can be considered SRIs and what can be considered responsible investments (RIs), it seems clear that both these investment typologies have a common starting point that can be found in the overcoming of the traditional investment approach exclusively based on risk and return. Behavioral or the individual's irrational beliefs, ethical or religious preferences are the common thread of these sustainable investment approaches that go beyond the financial aspects of investing. The investment logics are well described by Nicholls (2010a), who proposes three major typologies of social investment. More in detail, the first investment logic focuses on the creation of only social and environmental returns, and the second focuses on the creation of pure financial returns while the third—through the idea of blended value creation—combines both financial returns and social/environmental outcomes. Due to this heterogeneity, a wide range of social investment products is available (Nicholls 2010a). The actual structure of the social investment market is clearly related to a contamination of different investment logics and approaches that do not permit the affirmation of this field of studies and practices. Moreover, in defining what the concept of sustainability entails, Salzmann (2013) provides a common framework for sustainable finance and highlights that the main connection between investors, financial markets, entrepreneurs and financial intermediaries are SRIs, sustainable banking and sustainable corporate finance.

Our analysis highlights that during recent years, a wide range of sustainable financial products has been developed. These new products are characterized by the capability to create both financial and non-financial returns

to consider religious preferences and to embody green, social and ethical perspectives.

2.3.2.2 *The Contribution of the Financial Sector to Sustainable Development and Environmental Engagement*

Another lens of analysis can be found in the understanding of the contribution that the financial sector can provide to the sustainable development both in terms of products and services and in terms of the new configuration of financial institutions.

Fatemi and Fooladi (2013) highlight that the approach based on shareholder wealth maximization could not be still considered as a valid guide for sustainable wealth. Firms that ignore their social and environmental responsibilities will be in a condition of value destruction rather than in a condition of value creation (Fatemi and Fooladi 2013). Despite the connection between the financial sector and the concept of sustainable development is mainly indirect, a great impact can arise from projects and businesses financed by the financial industry (Weber 2014a; Weber 2015). However, it is also true that the financial sector considers the sustainability aspects as a business, prescribed by regulators and demanded by clients (Wiek and Weber 2014), and only a small number of specialized financial institutions seek to address these emerging sustainability issues through the products and services they offer (Weber and Remer 2011). Moreover, in our sub-sample, further sub-research areas such as green credit policy or environmental management practice and financial sustainability of banks (Weber 2006; Coulson and O'Sullivan 2013; Weber 2016), environmental, social and sustainability criteria and credit risk assessment (Weber 2005; Weber et al. 2015) have been retrieved. This field of study highlights that the financial sector has become a prominent stakeholder in contributing to global warming in climate policy by pricing climate risks and addressing investment in renewable energy or green energy (Richardson 2009b, 2014; Boissinot et al. 2016) and pollution reduction (Wilson 2010). More in detail, Richardson (2014) refers to this contribution by using the term "climate finance". Through this lens, sustainable finance can be defined "as a finance supporting sustainable development in three combined dimensions: economic, environmental and social" (Ryszawska 2016, p. 188). However, other terms such as green finance (Weber 2015; Ryszawska 2016), carbon finance (Schäfer 2012; Weber 2015; Ryszawska 2016), environmental finance or environmentally sustainable finance (Richardson 2005) and other investment approaches such as green venture capital

(Randjelovic et al. 2003) or sustainable environmental funding (Miles 2005) can be referred to in this broad field of studies. In this approach, the sustainability transition is considered as a multilevel process in which the achievement of the sustainable development goal is based on the transformation of the economy toward a green one and by combating climate emergencies (Ryszawska 2016).

Studies reviewed in this theme reveal that during past years, academia, practitioners and financial institutions have been paying attention to the impact that finance may have in terms of sustainable development. In particular, a major trend emerges and refers to the environmental sustainability of financial practices and products.

2.3.3 *Theme 3: Social Banking and Social Finance*

Social banking and social finance are considered relatively new developments in the international banking and finance landscape. The increased number of papers in recent years can be seen as the sign of understanding the meaning, importance and potential of this thematic area. Social banks differ from mainstream banks for a series of main characteristics such as legal status, size and goals (Benedikter 2011; Weber 2011a) and are conceived as banks conducted by social, ethical or alternative banks including cooperatives and credit union (Weber 2011a). As noted by Weber and Remer (2011), a clear definition of social banks does not exist, but generally, many academicians note that social banks are financial institutions that follow the concepts of social finance and blended value and conduct their business with the aim to create social or environmental benefit (Weber 2011a; Weber and Remer 2011; Weber and Duan 2012). Weber and Remer (2011, p. 1) clarify that “to many, social banking sounds such as an oxymoron, combining what does not belong together. To others banking is inherently social and to them the phrase social banking is almost tautological. Some refer to social banks as those that serve socially oriented or charitable clients. Others use the term social banking to refer to banking based on the new social media, such as the Internet and related software. In some regions, social banking is equated with government banking; in others, it is equated with microfinance. Finally, some argue the social part in social banking could and should be replaced by sustainable or ethical, while others insist that these terms are not to be used interchangeably”.

Despite most social banks having developed locally in competition with mainstream banks, their rise is related to the development of social

movements during the 1980s and 1990s, and their consecration as part of the global financial and economic system occurred after the recent financial crisis (Benedikter 2011). The origins of social banking can be found in the Monte di Pietà (Maccarini and Prandini 2009; Milano 2011; Weber 2012b), banks formed with donations and charitable proceeds that became the symbol of defiance against usury in Italy. These banks were acting regionally (Milano 2011; Weber 2012b) and can be considered as relatively similar to those that we know as credit unions (Weber 2012b). With the industrial revolution, credit unions, cooperative banks and saving banks were established (Milano 2011; Weber 2012b; Geobey and Weber 2013). The phenomenon of cooperative banks grew significantly after the crisis due to their funding models that appear capable to respond to certain needs that the traditional banking models do not satisfy (Bachet 2012). By exploring the topic of “ethical finance” and “ethical banks”, Maccarini and Prandini (2009) focused on the relationship between finance and the civil sphere by noting that ethical banks represent a “new spirit of money” able to introduce a culture alternative to the modern culture of money. Many other terms have been retrieved in our sample of analysis. Lovera (2015) defines “alternative finance organizations” as those that implement financial practices differently from most traditional banks and through a more cooperative and solidarity-based credit relationship. Naszályi (2012) refers to “alternative finance” as the set of cooperative and mutualist movements by tracing their evolutionary lines. D’Andria (2012, p. 202) defines solidarity savings as those that “help people to increase the return on their savings while helping to fund certain very socially useful economic activities or initiatives that would otherwise struggle to find finance via the traditional channels”. The logic that drives social and solidarity economy banks’ actions is linked to the cooperative philosophy (Bachet 2012). In pursuing the idea of sustainable development, green banks express the new interest in environmental-related issues. In this sense, Mahfuzur and Barua (2016) explore the case of Bangladeshi banks and consider green banking as the shifting in their business model from “profit only” to “profit with responsibility” (Mahfuzur and Barua 2016). Becchetti (2011) considers SRIs and microfinance as major examples of social banking products and services. However, Weber (2011b) highlights the main differences between social finance and SRI. In particular, SRIs—in contrast to social finance—integrate social and/or environmental criteria into a set of investment indicators with the main aim to generate financial returns that outperform conventional investments that do not integrate the same investment criteria

(Weber 2012a). For this reason, the main distinction between conventional finance and social finance is that the latter uses financial services and products as the way to achieve a positive impact on society, environment or sustainable development (Weber 2012a; Weber and Duan 2012). Social finance can be generally classified into three main categories: (i) social banking, (ii) impact investing and (iii) microfinance (Weber and Duan 2012).

However, due to the importance of each of these topics, we decided to explore them separately.

Players in this field stem from all sectors such as public funds, (venture) philanthropists, special banks, social enterprises and firms in their CSR activities (Hangl 2014). Recent works published in the social finance landscape in the UK highlight a series of recurring issues that have been classified by Nicholls (2010b) under two main headings: the macrostructural level and the micro-market level. The macrostructural level is related to issues concerning what social finance is and how it can operate. Alternatively, the micro-market level refers to the specific allocative/exchange mechanism by type of finance (Nicholls 2010b). In the social finance landscape, emerging issues are (i) the limit of conventional finance markets that do not price social or environmental value creation (Nicholls 2010b) and (ii) the lack of comparable performance information and metrics able to support the creation of a social finance marketplace (Nicholls 2010b; Geobey et al. 2012). With regard to social investments—which are often referred to as social finance—Nicholls (2010a, p. 74) suggests: “the lack of academic work on social investment to date suggests that the topic has yet to be recognized by scholars as a distinct and legitimate field of research”. This is due to the absence of the epistemological and institutional structures that prevent building a wider legitimacy among scholars. The social finance field shows many contact points with other topics such as SRIs and RIs.

Finally, the term “social and solidarity finance” (SSF) is used by Artis (2017). This term refers to financial intermediation systems that aim to facilitate access to financing for borrowers who are often excluded from the standard banking channel. SSF is based on the creation of a complex system of financial dealings and socialization and is complementary to the standard financial system by fostering financial inclusion (Artis 2017).

Our analysis reveals that the phenomenon of social banking is not new in the finance landscape and that many terms have been used during the years. Social banks grew exceptionally during the years of the financial crisis (Benedikter 2011; Weber 2011b). The social banking idea has its origins

from religious and ethical movements and represents an alternative way of doing banking. With an economic culture plagued by anthropological reductionism, in which human beings are only driven by self-interest and corporate reductionism, in which all productive organizations are profit maximizing and social banks play a crucial role in allocating resources and represent a successful and sustainable model of the creation of economic, social and environmental values (Becchetti 2011). Benedikter (2011) identifies the “financial humanism” as the constituent philosophy of social banking and notes two major aspects to be considered to understand it. The first aspect is related to the importance of culture. In this sense, social banking and social finance include the concept of culture in the concept of the sustainability of finance. The second aspect is related to the concept of ethics and to the concept of money as not as a value itself but as the expression of a social relationship based on mutual trust and help. In particular, Benedikter (2011) states that:

Social banking is indeed decisively centered about changing the consciousness of consumers and the broad public regarding what money is and how it can be best used. Since it wants to provide and increase the societal insight into the connections between money, society, politics, culture, and education in order to reach out for a more just and balanced world, it follows the basic principles of enlightenment: rationalization and emancipation for the largest possible number of people. (p. 50)

Social and solidarity banks represent alternatives to the neoliberalism’s own funding modes (Bachet 2012), go beyond the finalities of capitalist banking and add a series of non-financial considerations such as ethics or religious beliefs. The success of this phenomenon is related to the desire for alternative forms of banking activities, products and services and much more related to the concept of social justice and social cohesion than to the capitalist criteria crashed in 2007. Our literature review shows that social finance and social banking are two of the main innovative approaches to grow in the wake of the financial turmoil. What is relevant to note is that they try to achieve a positive impact on society, environment or sustainable development providing a viable alternative to the capitalistic approach. Finally, also in this theme, particular attention to environmental issues emerges.

2.3.4 *Theme 4: Microfinance*

Although studies examining issues of impact on poverty alleviation, as they relate to microfinance as new financial tool for the poorest population, were common in the earlier microfinance literature (Haque 2000; Matin et al. 2002; Navajas et al. 2000; Buss 2005; Marino 2004; Oluyombo and Ogundimu 2006; Manos et al. 2013), only a few studies in the microfinance theme have clearly examined these issues under an “alternative” financial perspective. Such contributions (Oluyombo 2007; Chawla 2013; Mago 2014; Poudyal 2007) provide evidence of how the diffusion of such financial service creates an impact in poverty alleviation, considered as the “alternative” financial market. In this sense, such contributions characterize the debate about microfinance into the segment of *development finance*. In this sense, microfinance is seen as a revolutionary (and alternative) financial tools (Robinson 2001) for poverty alleviation. For this reason, Haque (2000) utilizes the expression the “new role of finance” in creating sustainable development. In this vein, Dash (2012), following Haque’s discourse, includes microfinance within the broader spectrum of *development finance*, even if distanced from the commercial banking sector. Based on the same perspective, Maksudova (2010) sees microfinance positioned as the lower end segment of the broader financial system, in particular as a “new pillar” of the mainstream financial system. In other words, such a research strand conceptualizes microfinance as an alternative finance for the poor in terms of new financial instrument as well as a new financial channel to produce an impact on poverty alleviation. For example, Schwittay (2014) conceptualizes the latter vision with the expression “financialization of poverty”, which provides legitimacy to microfinance “as a simple yet indispensable part of the contemporary development apparatus” (p. 517). In addition, consistent with the prior literature, Robinson (2001), Koveos and Randhawa (2004), Shetty (2008) and Arun and Hulme (2008), while highlighting the paradigm shift in microfinance from the microcredit to microfinance industry, examined the role of microfinance institutions (MFIs) under the conceptual lens of the sustainability. Such an evolution of MFIs is also described in the Wanchoo (2007), Hartungi (2007), Glaubitt et al. (2007) and Johnson (2009) contributions. Even if the introduction of institutional sustainability within MFIs is one of the main causes of the second phase of the microfinance industry called “mission drift” (given the change of focus from client to institutions), the “management of poverty”, obtained following sustainability criteria, creates a new phase for MFIs now directed toward

a form of “blended value organizations”. For these reasons, more recent contributions (Khan 2008; Mader 2014) provide a lecture of the microfinance discourse in the light of the *sustainable finance* conceptual lens that looks at the creation of the social impact in combination with sustainability themes. However, there are also instances of more clear positions of microfinance within the financial system. As stated by La Torre and Vento (2006), for many years, microfinance overlapped with microcredit intended as small loans, often without traditional guarantees and designed at improving the lives of people and their families or at promoting small-scale entrepreneurial activities. Attuel-Mendès (2012) found that microcredit logic and practices, clearly tagged as alternative finance, were engaged before Yunus’ theorization. For the author, even if microcredit is not a real innovation in finance, “the uniqueness of this phenomenon is due to its expansion and accessibility to the use of modern innovative techniques such as mobile banking and peer-to-peer lending platforms” (p. 237).

From the analysis of the literature included in this theme, microfinance responds to different needs and different audiences, but it cannot be reduced to being merely “finance for the poor”. Moreover, the paradigm shift toward sustainability issues characterizes microfinance not only as alternative financial practice or market segment but also as an alternative conceptual financial environment.

2.3.5 *Theme 5: Islamic Finance*

Much of the literature contained in our sample is centered on the theme of Islamic finance. The studies that focus on such an area of research analyze under different forms the points of contact between the Islamic financial system and the alternative finance experiences. Furqani, Khalil and Hamid (2015) capture the essence of Islamic banking and finance literature in terms of rethinking the foundation of finance from the Islamic perspective. Such a goal, according to the authors, still lacks attention to a clearer philosophical foundation providing conceptual and theoretical coherence. As a consequence, such an incomplete body of knowledge in Islamic finance theoretical foundations represents an obstacle to an emancipation of Islamic finance from a branch of Western finance to a genuine alternative to contemporary financial systems and practices. These patterns have contributed to Islamic finance’s persistent underrepresentation in term of rethinking tools for the foundation of finance according to the Islamic perspective.

Other authors (Rarick and Han 2010; Causse 2012) have attempted to address this perspective by providing an approach to Islamic finance as a system, not exclusively focused on one or more single dimension such as compliance with legal or moral requirements. In his study, Causse (2012) addresses, in addition to the peculiarities of the Islamic financial model, future directions for Islamic finance by exploring different prospects, ranging between a coexistence and an integration or even a substitution of the conventional financial system. According to the author, the moral compliance of Islamic finance constitutes the base to make economic activity more moral and able to be a benchmark on which an alternative financial model can be built. The same perspectives are addressed by Rarick and Han (2010), who depict the basics of Islamic finance in terms of a safer and more enduring approach than those conceived in mainstream financial practices. However, the authors give a precise characterization of Islamic finance as a necessary “niche in the financial industry” that appears “not likely to be a substitute for traditional finance” (p. 128). In contrast, Chaar (2016) gives to Islamic finance a proper dominant logic that does not reduce it to a subset of contemporary finance predominantly based on profit maximization. Following such discourse, Islamic finance could lead to an alternative view of finance that enlarges the socioeconomic reach of a financial system. In this vein, further contributions in this theme stem predominantly from the view of Islamic finance as an alternative finance able to serve a different segment of the market in different manners. In particular, Sairally (2007) and Hasan (2007) look at a replication, in the Islamic financial market, of forms of alternative finance developed in Western countries, such as a specific social banking model in the case of Sairally (2007) or the sustainable investing approach for Hassan (2009). The latter see in the creation of a Shari’ah compliant sustainable investing market a way to bridge the liquidity gap generated from the financial crisis in the global market. In the same way, Sairally (2007) looks at a diversification in the Islamic financial channels, thanks to a replication of the community development finance model within the Islamic financial industry.

Other contributions (Biancone 2014; Oseni et al. 2013), starting from a market perspective, depict Islamic finance as a credible alternative in terms of opportunity recognition. While Biancone (2014) privileges the consideration of Islamic finance under a market perspective that looks to underserved financial segments (such the Islamic community) in Western countries, Oseni et al. (2013) look at Islamic finance as a credible alternative

to traditional finance channels, in particular in the diversification of the financing of SMEs. Finally, some authors (Toumi et al. 2012; Paraque and Erragragui 2016) have also traced the financial complexity under both Islamic investors and investment perspectives. For example, Paraque and Erragragui (2016), moving from an emphasis on the compatibility between socially responsible and Islamic investment paradigms, indicate that an SRI screening does not affect the performance of a *shari'ah* compliant portfolio. However, Toumi et al. (2012) applied the classical theories of capital structure to explore the specific context of Islamic banks where different from traditional financial counterparties, information asymmetry and agency conflicts are less important than the trade-off capital implications.

Our analysis shows that the point of contact between Islamic and alternative finance varies from a macro to a micro level. In particular, Islamic finance for some authors has the potential to be an alternative to the traditional financial system. However, Islamic finance is seen as a niche within Western financial markets.

2.3.6 *Theme 6: Impact Investing*

In contrast to the relatively limited pursuit in the current literature about impact investing, a number of studies have been included in our sample focusing on such a theme in terms of alternative finance. These studies reveal a mixture of promising thoughts about the role of impact investing practices in terms of the possibility of creating a global financing sector that has both an environmental and a social impact. The term defines those investments that seek to have financial return and, at the same time, a social impact. In this sense, impact investing differentiates itself from investments that seek only a social impact as well as from those that seek solely financial returns. Impact investing remains a niche sector compared with traditional finance (Brandstetter and Lehner 2015). However, the contributions included in our sample look at impact investing as a form of alternative finance in different manners. According to Bugg-Levine and Emerson (2011, p. 17), impact investing “offers an integrated system of thinking and practice that is springing forth in a world where a different system currently dominates”. Moving from these considerations, impact investing is seen as a “revolutionary road” that introduces disruptive innovation in the mainstream financial system. In the same way, Brandstetter and Lehner

(2015) offer a primer attempt to include a “holistic” construction of a portfolio that takes into consideration risk and returns from a financial as well as a social impact perspective. The amalgamating of such components, for the authors, is a prerequisite for the inclusion of impact investments into the portfolios of traditional institutional investors. Höchstädter and Scheck (2015), in their contribution, provided a taxonomy of the impact investing universe of the definitions founded in their review of literature based on the analysis under definitional, terminological and strategic levels. It is interesting to note that Höchstädter and Scheck (2015, p. 460) clarify the use of a further term by stating that “recent efforts have been made to bring together the terms impact investing and social investment in the term social impact investing”. Social impact investing (SII) represents a growing as well as an independent (from other forms of social investments) financial phenomenon. However, for Michelucci (2016), the development of such an industry reflects the presence of some factors that helped such development. In particular, for the author, such factors, identified with the term paradigm, include the commitment of specialized financial actors, intermediaries and government agencies. Following such a point of view, the role of SII as financial alternative is seen as dependent on the construction of an SII network of actors. This study also reveals that “the real innovation in SII is not necessary in the instrument through which they are realized, but in the (re)activation of a network with purpose” (p. 9). Both in impact investing and in the social impact investing literature, one of the major issues is represented by the difficulty of developing a secondary market. However, as remarked by Mendell and Barbosa (2013, p. 119), the creation of secondary market is in line with the objective to achieve the larger goal of “designing “a new financial architecture that not only returns finance to its role as a ‘means’ and not an end in itself as has been the case” (p. 119). Along these lines, other researchers (Jakson 2013; Trotta et al. 2015) have shown that the logic behind impact investing can create financial innovation, such in the case of social impact bonds. Such innovative impact investing financial instruments provide a new form of financial public private partnerships among private (impact) investors, the public sector and social service providers in the broader field of welfare services or in preventing policy interventions.

As emerged from our analysis, impact investing and social impact investing can be clearly considered as an emerging as well as a promising field with real capacity to deliver meaningful and sustainable impacts.

2.3.7 *Theme 7: Access to Finance for SMEs, Microenterprises and Start-Ups*

Access to finance plays a central role in promoting economic development (Gandja et al. 2015; Wardrop et al. 2015). Many academic works highlight the role of SMEs in their economies as a strategic lever to promote jobs creation, innovation and growth. The impact of the financial crisis—particularly of the subsequent credit crunch—was profound and resulted in restrictions on the supply of capital from financial institutions and constraints on the demand for finance by SMEs (Harrison and Baldock 2015). Over recent decades, the entrepreneurial finance literature has emphasized the role of venture capital and business angel investors (Bellavitis et al. 2016). Château Terrisse (2011) defines “interdependent venture capital” as “a combination of solidarity and finance”—as a result of a combination of venture capital and private equity—that permits promoting workfare, regional development and social economy development reinforcing equities of non-publicly traded SMEs. Our analysis reveals that during recent years, there has been a proliferation in alternative sources of funding for SMEs, microenterprises and start-ups. The phenomenon is referred to in developed and developing economies (Bruton et al. 2015) and plays an important role in both cases as a source of external finance for firms (Allen et al. 2012). This is due to recent changes and evolution in both technology and regulation that permitted the diffusion and adaptation of many innovations such as Internet finance, equity- and debt-based crowdfunding, peer-to-peer lending, virtual currencies and other web-based funding schemes (Wales 2015). In particular, Wardrop et al. (2015) highlight that:

although various forms of alternative finance have long existed, a combination of financial institutions having been weakened by the financial crisis, the rise of disruptive disintermediation-enabling technology, and underlying socio-economic and cultural shifts, which is challenging the paradigm of how finance will be provided in the future. (p. 10)

A variety of new financing models are emerging outside of the traditional financial system and are able to connect fundraisers “directly” with funders often through online platforms or websites (Baeck et al. 2014). In this sense, La Torre and Mango (2013) consider social lending as an alternative market credit able to link borrowers and lenders through a website and to

create a virtual financial community. The role of an alternative financing mechanism is demonstrated in terms of social benefit, improved living conditions, women's rights and community development. The same or similar terms—such as alternative financing mechanism—are also used to indicate entrepreneurial finance. The latter refers to the set of both traditional debt and equity start-up finance tools (e.g., family and friends, angel investors and venture capitalist), microfinance, crowdfunding, peer-to-peer lending and other forms of financial innovations (Bruton et al. 2015). Microenterprise finance generally refers to the idea of attempting to reduce poverty and exclusion in developing countries through the provision of loans by specialized financial institutions (Mosley and Hulme 1998). Gandja et al. (2015) refer to the term “alternative finance” including microcredit and microfinance. Due to their importance, microfinance, microcredit and crowdfunding have been analyzed as separate and major themes.

Our analysis reveals that the alternative finance market is becoming an important part of the SMEs' funding landscape. Innovation, technology and the new regulatory approach have improved access to finance for SMEs and seem to have a positive impact in terms of growth and sustainable development.

2.3.8 *Theme 8: Crowdfunding as an Alternative Way of Funding*

Crowdfunding can be defined as a financing model and a “practice of funding a project or a venture by raising many small amounts of money from a large number of people, typically via the Internet” (Hollas 2013, p. 27). According to Belleflamme et al. (2014, p. 588) crowdfunding “involves an open call, mostly through the Internet, for the provision of financial resources either in form of donation or in exchange for the future product or some form of reward to support initiatives for specific purposes”. Some scholars underline that it is emerging as a novel, popular and alternative method to raise financial capital (Sharma and Lertnuwat 2016), particularly following the financial crisis, which began in 2008. However, a number of scholars suggest that it is the Internet equivalent of the old practice of collecting money (Pichler and Tezza 2016). The online platforms and the Web use are one of the main characteristics of crowdfunding (Brunetti 2016). Another important characteristic is related to investors' behavior and the attitude of investors toward values and ethics. Several academics and practitioners highlight the relevance of this form of

participatory finance (Lesur 2015), by emphasizing the role of the crowd, the emotions and the empathy. Indeed, on the crowdfunding platforms, the emotional engagement with the project often drives the investment of the people (Pichler and Tezza 2016). Nevertheless, perils and risks linked to this emerging form of participatory finance—which typically uses the Internet—should not be underestimated (Turan 2015). Baucus and Mitteness (2016) underline the “dark side” of the risk of the web because it can offer new opportunities for illegal entrepreneurs or fraud, to the detriment of investors. Several categories of crowdfunding and its financial business models are clearly identified in the literature (Langley 2016; Sharma and Lertnuwat 2016). More in detail, donation models differ with respect to return models, among which are prominent lending (Borello 2016; Hernando 2016) and equity crowdfunding. Taking into account all of these aspects, we can affirm that crowdfunding is indubitably a new phenomenon that is attracting considerable attention, particularly because of its potential to fund start-ups and small and medium enterprises (Brown et al. 2015; Culkin et al. 2016) in a different way with respect to traditional financial channels. About this, it was stated, “in many cases, crowdfunding offers an otherwise non-existent opportunity of obtaining funds” (Brunetti 2016, p. 56). In addition, in case of success, it represents the opportunity to obtain additional funding from traditional financial channels. The crowdfunding market first emerged in the USA and the UK and has subsequently developed throughout North America, Europe and Asia (Langley 2016), with impressive expansion in recent years. In this field, as stated by Langley (2016, p. 5), “the most influential research to date has been produced by the innovation charity, Nesta (...) annual benchmarking reports place crowdfunding at the core of what it terms the alternative finance sector, thereby juxtaposing this digital economy with mainstream banking and financial markets”. As evidenced, the relevance of this theme is significant. A large number of studies agree that entrepreneurial implications of crowdfunding as alternative funding source for start-ups, SMEs, innovative entrepreneurship and their business model (Lehner et al. 2015) are large and have not yet fully been thought of. The potential of crowdfunding for sustainable entrepreneurship (and in particular for environmental ventures) is delineated by Hörisch (2015), who defines sustainable entrepreneurship as “ventures that have a social or an environmental mission”, whereas environmental ventures are characterized by a strong focus on the environmental dimension. In this light, crowdfunding can be a new and alternative source of green financing (Lam and Law 2016).

Summarizing, the importance of crowdfunding—as an alternative source of capital for individuals and/or ventures—is emerging. However, this thematic area remains relatively unexplored, and several aspects need to be analyzed to understand the consequences of crowdfunding on community development and the financial system.

2.3.9 *Theme 9: Behavioral Finance*

Behavioral finance explores how decisions are made by investors (De Bondt et al. 2010) and represents a paradigm shift between a rationality-based approach and a behaviorally based approach (Dhankar and Maheshwari 2016). This field of studies combines theories from the areas of finance, classic economics and psychology by trying to propose a new direction of thinking for traditional finance theories (Huang et al. 2016, p. 92). The behavioral finance revolution is best described as a return to a more eclectic approach, more willing to learn from other social sciences, less concerned about elegance of models and more with the evidence that they describe actual human behavior (Shiller 2006). This new finance approach represents an incredibly fertile research area and is not considered part of mainstream finance (De Bondt et al. 2010). Through its new lens of analysis—far from the traditional postulates of the Chicago school of thought—behavioral finance tries to explain that investors' decisions are often influenced by psychological factors (Huang et al. 2016). This is particularly true if we consider systematic errors that can affect the market price of assets, but it can also be true if we consider investors' preferences during recent years. One of the main characteristics of behavioral finance is highlighted by De Bondt et al. (2010) and can be identified in its proximity to the real world. Despite the proximity with other themes, we decided to consider behavioral finance independently in light of its importance in finance research and, in particular, of its main implications in terms of how finance has been reconsidered during recent years. Moreover, it is important to underline that this sub-sample comprises only four articles published between 2006 and 2016. This does not mean that the field of behavioral finance comprises only our four articles, but with regard to our main purpose—to explore the domain of “alternative finance”—only these works have been retrieved through our search by keywords and assessed in our literature review.

2.4 MAIN FINDINGS: INTERCONNECTED THEMES

Over the last 20 years, major theoretical developments have occurred in the studies of finance. Many of these new concepts and approaches are now being employed successfully in practice. After reviewing our sample of analysis, we discovered that there is noticeable growth in the research work associated with alternative finance issues. However, there has not been much research done regarding the effective conceptualization of this new way of thinking of finance. In analyzing our themes, we identified many connection and contamination areas between the various streams of research. The social finance is interconnected with many investment approaches such as SRIs and RIs. Moreover, the field of impact investing is often referred to as social finance and social investments. In our view, this is particularly due to the common origins of these innovative ways to invest money, which can be generally identified as in ethical and moral principles. Social finance, impact investing and sustainable investments are grounded on the overcoming of the traditional investment decision-making process—based on the common parameters of risk and return—in favor of a more “human-based” (and less mathematical) approach. Ethical investments also have a contact point with the “Islamic finance” theme. Religious beliefs recall the origins of RIs, SRIs and social banks. Furthermore, recent developments in academic research highlight increasing attention to the issues related to the concept of access to finance. It is interesting to note that in the broad range of instruments dedicated to SMEs, microenterprises and start-ups enterprises, many represent an autonomous theme. In particular, we treated singularly themes such as crowdfunding and microcredit/microfinance due to their relevance. The increasing number of articles retrieved in those streams of research reveals particular attention to these types of firms and to their role in promoting social inclusion and social justice through economic development. Another important aspect is related to the fact that microcredit and microfinance, although originally originating in developing countries, represent an important financial opportunity for SMEs and microenterprises in developed countries. In more recent years, alternative forms of funding opportunities for firms have emerged. Phenomena such as peer-to-peer lending and other web-based funding opportunities are able to provide financial resources to a wide range of firms generally excluded from the traditional banking channel. A strong connection is also identifiable between the theme “crowdfunding” and “access to finance for SMEs, micro-enterprises and start-ups”.

Crowdfunding represents a form of participatory finance able to provide access to capital to start-ups and SMEs. Crowdfunding is generally based on phenomena such as empathy and emotional engagement, which represents a real innovation in the investment approach. Another stream of research that is particularly related to the concept of sustainability is that related to climate and environmental finance, both in terms of environmental risk assessment and pricing and in terms of financial products. A major common thread between our themes can be identified in the need for more ethics in finance and of a major attention to the sustainability issues. This does not coincide only with those that we named “ethical investments”. With the sentence “more ethics in finance”, we refer to a different approach to finance, much more based on human needs, social justice and social inclusion and less based on the exclusive desire for financial returns. From this literature survey, it can be seen that the contribution of research has been continuously increasing during the recent time period, in particular from 2007 to 2017. However, this does not mean that academics are paying attention to the new concept of alternative finance, but it means that a series of new “alternative” approaches are developing independently. Actually, the majority of research work is concentrated in a few journals, and this confirms that this new approach to finance is underestimated and less explored.

2.5 WHERE ARE WE GOING AND HOW DO WE GET THERE?

Our systematic review lets us underline many interesting points. In particular, from a theoretical point of view, the recent market crash demonstrated the inability of the traditional finance approach to ensure sustainable development, both from an environmental and a social point of view. Standard models are being put in doubt because they do not take into account the entire picture, in particular the behavioral aspects of the markets. During the last 50 years, quantitative finance research studies have dominated the finance literature and the journal publications, with the main result that researchers restrict their works to an epistemological approach derived from positivism. Nevertheless, alternative voices are opposed to traditional finance, and after the financial turmoil, a number of scholars have authoritatively suggested that mathematical models do not fit the reality of financial markets and institutions, which are inefficient and irrational (see, among others, Taleb (2007, 2012), Shiller (2013), Zingales (2015) and Jacobs and Mazzucato (2016)). Our analysis places emphasis on the intellectual shifts

that emerge from cross-disciplinary research and that are being manifested in approaches at odds with the traditional paradigm. The academic movement—born before the financial crisis but having grown after 2008—can be considered an alternative to the mainstream. For these reasons, alternative finance could be intended as a research field in a pre-paradigmatic state that lacks an established epistemology meaning that it has yet to achieve scientific maturity. This is particularly due to the absence of a clear vision about what alternative finance means, on what it entails, and of a clear and unanimous definition. This consideration is supported by the Kuhnian theory on the nature and character of scientific revolutions, which states how the failure of attempts to adapt the prevailing paradigm to anomalous phenomena allows new competing theories to arise, marking the next pre-paradigmatic stage (Kuhn 1970). In this sense, our analysis highlights areas of research that are still now much contaminated. Consequently, the landscape of alternative finance is in an ongoing stage of development.

2.6 CONCLUSION, LIMITATIONS AND FUTURE LINES OF RESEARCH

Emerging themes identified in the study clarify the spectrum of concepts, instruments and approaches around the area of “alternative finance”, focusing on different theoretical levels of analysis regarding the extent of substantive transformations that have occurred in the global finance system. The post-financial crisis discourse seems to be the dominant narrative in the contributions analyzed in this chapter, particularly in an empirical point of view. However, in conventional finance research, the lack of a paradigmatic innovation translates into a body of knowledge that is evolving around the concept of alternative finance. Drawing on such a theoretical lens, the habitus of finance academics appears ready for a change despite their historical resilience to new theories and knowledge. Our chapter reviews a large number of articles, and to the best of the authors’ knowledge, no detailed systematic literature review on this topic has previously been published. However, our findings are based only on the critical review of 192 studies and do not consider papers in progress or studies that are not in the databases. Further limitation of the study may be found in the right selection of terms that could exclude other articles covering this topic under different labels. Thus, future research needs to be designed to more clearly establish the relationships between investor behavior and the alternative

financial practices introduced by microfinance, social finance, impact investing and crowdfunding. Moreover, future studies need more works calling for new frameworks opened to interdisciplinary forms of research, with both theoretical and empirical perspectives. Furthermore, a future research agenda could aim to develop a better understanding of institutional logic and rationalities in the domain of alternative finance. Finally, to prove the financial viability of the alternative finance investing approaches, the mainstream financial research community should critically reflect on the effects produced by these practices in terms of transition versus a sustainable global financial system.

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Social and Environmental Responsibility in the Banking Industry: A Focus on Commercial Business

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Abbreviations

| | |
|--------|------------------------------------|
| A4: | ASSET4 ESG database |
| ANOVA: | Analysis of variance |
| CSR: | Corporate social responsibility |
| ESG: | Environment, social and governance |
| EU: | European Union |
| ROE: | Return on equity |
| SME: | Small and medium enterprises |
| UK: | United Kingdom |

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3.1 INTRODUCTION

The concept of social and environmental responsibility of companies has evolved greatly since Bowen (1953) presented institutional and normative reasons for business management to consider it. During the evolution and conceptualization of CSR, committed optimists, critics with this normative or moral vision of the economy, skeptics and pessimists have coexisted. Porter and Kramer (2006, 2011) were probably the most optimistic, affirming that companies can create economic value by creating social value, while critics have viewed CSR as a public relations policy or *greenwashing* for companies. Reich (2008) concluded that interest in CSR responds to companies' interest in preventing the government from intervening in social and environmental matters. He argued that most companies cannot achieve social goals without generating costs for their customers or shareholders due to strong market competition. Fleming and Jones (2012) viewed CSR as a type of complex manipulation conducted by companies to undermine the political rights of society. The social impact of the crisis on society has once again led to normative and ethical arguments in the debate on CSR aims.

This chapter presents a critical vision of CSR based on normative and ethical approaches (see Garriga and Mele 2004). This vision involves a model of a company aligned with society in a slightly different way of understanding capitalism. Companies are considered socioeconomic entities and direct their mission and business model to generating added value for all their stakeholders, not only for (or even prioritizing) shareholders. It assumes a stakeholder theory approach defended by authors like Bowen (1953) and Freeman (1984).

CSR rhetoric has been criticized, because it has often promoted 'ornamental elements' which are not part of the core business and unbalanced reporting focused on positive results instead of negative impacts. CSR is defined as the 'responsibility of enterprises for their impacts on society' and involves managing and taking responsibility for every negative externality of the company (European Commission 2011). CSR is meaningful when it is applied to core business and its related risks, which is much more complex than developing it in a 'perimeter scope' (social sponsorship, public relations, reputation, etc.).

Few analyses of companies are based exclusively on the core business of CSR, which is related to the demands of stakeholders affected by the way products and services are produced and delivered, and the social impact they have (Pedersen 2010; Visser 2010; Öberseder et al. 2011). They offer a

single ‘picture’ of CSR with a mixture of often incomparable elements like working conditions, environmental impact, advertising complaints or community sponsorship, some of which are not directly related to core business. For example, corporate governance is a fundamental part of CSR, but it cannot be considered external CSR, because it refers to an internal group of stakeholders (shareholders). Environmental impact can be observed from both an internal dimension (infrastructures, energy consumption, etc.) and an external dimension (e.g. in the banking sector, the impact of project finance related to low-carbon industries). External CSR is specific for every sector or even subsector—distinctive from the core business—while internal CSR can be defined by models applicable to different sectors (responsible human resources management, corporate governance, community involvement, etc.). Organizations which rate the social performance of enterprises have been criticized, as their metrics to quantify CSR are often invalid and misleading to stakeholders (Chatterji et al. 2016). Notwithstanding, we consider that rough data from sustainability rating agencies is the most suitable tool for constructing an external CSR index, as it allows us to select indicators only related to the commercial dimension. Rating agencies have also been widely used in academic research, particularly EIRIS¹ data (Wu and Shen 2013; Cuesta-González et al. 2006; Scholtens and Dam 2007a).

In their review of the literature, Griffin and Mahon (1997) stated that the industry that the company belongs to can influence the CSR measurement method chosen by the company and the configuration of the stakeholder impact. The banking industry has a significant impact on socioeconomic development and has experienced an intense development of CSR management and transparency. Notwithstanding, the main research topic regarding this sector has been sustainability reporting.

Much of the research focused on sustainability reporting identified ethics, product responsibility, human resources (Weber et al. 2014) and environmental information (Gallego 2006) as weak points of banks’ CSR reporting, whereas its strengths were community involvement (Weber et al. 2014) and regulated corporate governance (Douglas et al. 2004). Branco and Rodrigues (2008) also found a positive correlation between the commercial visibility of banks (measured as size) and the spread of CSR information.

Cuesta-González et al. (2006) affirmed that the most important functions of a financial intermediary should be analyzed to establish the framework of its environmental and social responsibilities. They distinguished

between the internal and external dimensions of CSR (the external dimension exclusively related to the core business) and argued that external CSR has been fundamentally developed by ethical banks. To boost external CSR, sustainability must be considered in the analysis of operative risks, but banks generally consider it a reputational risk. Schmid-Schönbein et al. (2002) identified three areas for development in terms of external CSR: sustainability criteria applied to project finance, sustainability applied to asset management, and retail banking activities and consumer relations.

In this study, we have focused on the external dimension of CSR, because we consider it to be the most relevant in terms of sustainability in the banking business. External CSR refers to the core business, the basic function of banking in the economy and the relational side of this sector, that is, their customers and the demands of society. The mixed assessment of external and internal CSR factors² distorts the accurate evaluation of CSR advances in the banking core business. The construction of a self-built index exclusively oriented to this external dimension of CSR is proposed to focus on performance indicators and avoid those simply related to policies or ‘greenwashing’ purposes. We measure the external CSR performance of European banks and define to what extent size and the banking model or business specialization influence this performance.

3.2 CSR IN THE COMMERCIAL BANKING BUSINESS

Commercial banks can be classified according to their mission and the diversification of their business. There are profit-oriented institutions (traditionally called ‘banks’ in Europe) and social-oriented institutions, which are often local or regional (‘cooperative’, ‘savings’ and ‘postal banks’ in Europe). We also differentiate between traditional commercial banks, focused on financial intermediation (savings and loans), and universal banks, which offer a wide spectrum of financial services beyond financial intermediation such as asset management, corporate banking, and so on. Universal banking is closely related to size rising, due to policies promoting the merging of entities and the centralization of decisions to minimize costs and maximize income.

Economic development relies on efficient institutions that reduce uncertainty related to markets and human transactions, which means reducing transactional and information costs. However, information is rarely perfect. Stiglitz and Weiss (1981) explained that financial markets are different due to serious principal agent problems, which include *adverse selection*—asymmetric

information—and *moral hazard*, assumption of risks when another agent is supporting the consequences of those risks. They showed that information problems can lead to credit rationing and exclusion from financial markets even in equilibrium.

In the case of banks, generating complete information is easier when they manage local investments, and monitoring costs become lower than for interregional operations. Thus, local or regional banks should identify, control and finance local projects more efficiently. As moneylenders, banks specialized in retail segments are fundamental for borrowers whose projects remain unfinanced by financial markets (domestic economies, SMEs, microenterprises, etc.), because they can generate information regarding profitability and risk at a reasonable cost (Strahan and Weston 1998). Therefore, good performance in consumer care should be characteristic of local and regional entities, as they make greater effort in this area due to a greater branch network and higher ratio of employees per assets volume. Commercial banks rely on information, proximity and trust and meet the needs of local and less profitable markets, prioritizing results in the long-term over short-term liquidity and profit.

This basic function of the banking industry may be jeopardized under a universal banking strategy by consolidation and merging processes, where local and regional banks can be ‘swallowed’ in an aggressive competitive market. Martin and Minns (1995) affirmed that financial markets prefer short-term assets due to their rising liquidity to more productive long-term investments, such as credit banks operations. There can be excessive investment in trading speed, because speed allows trading venues to differentiate and charge higher prices (Pagnotta and Philippon 2011). Internationalization of financial management and securitization of markets promote higher liquidity due to the commissions generated by increasing portfolio rotation, which reduces the incentives of shareholders to promote the responsible management of invested companies (Levine and Schmukler 2006). Credit to the retail market is less attractive because of the higher costs and greater uncertainty associated with domestic economies and particularly SMEs, which is aggravated during downward trends of the economy. Short-term targets oriented to maximizing shareholder value have been cited as the cause of several irresponsible practices in commercial banking business like, for example, the mis-selling of products, interest rates-rigging and financial exclusion of less profitable segments of the market (Bowman et al. 2014).

If we look at commercial banking lending to SME, technology is different from other types of loans (Berger and Udell 1995). The business of

SMEs requires greater control by a senior manager than the management of loans based on a simple ratio of a credit scoring model. Thus, there are diseconomies of scale that make doing business with SMEs more expensive. In countries where small and medium banks still have a relevant presence, the infrastructure to attend to the retail market is more expensive, but it is rewarded by customers and, consequently, financial margins and efficiency ratios are higher (Carbó and Rodríguez 2014).

After financial liberalization and globalization processes, banking institutions have increased their size through mergers and acquisitions, which have intensified during the financial crisis. On one hand, a large international bank should face higher risks in terms of sustainability and reputation (i.e. corruption, money laundering, impacts on human rights and environment in big projects in developing countries). However, size is also related to more sophisticated CSR policies and management (Wu and Shen 2013; Scholtens 2009). Some factors, such as company size or age, industry or risk exposure, could even explain the relationship between CSR and financial performance, becoming ‘mediator variables’ (Garcia-Castro et al. 2010; Hull and Rothenberg 2008), but they do not show a clear statistical dependence (Aupperle et al. 1985; McGuire et al. 1990; McWilliams and Siegel 2001).

Meyer (1998) anticipated that the consolidation of the banking industry would reduce the credit supply to retail business and that big banks would tend to allocate fewer assets to small businesses. They have moved toward a universal banking approach, combining retail and investment banking. This tendency was the result of economies of scale, the need for greater efficiency and increased competition. At the same time, it has produced a trade-off between less profitable, leveraged and risky business in a more competitive sphere (investment banking) and the profitable, simple business in a less competitive sphere (traditional retail banking). Thus, external CSR performance during the financing processes before the crisis is expected to be lower. Market pressure in a context of lower interest rates and financial margins incited the banking industry to obtain better financial performance ratios (ROE) by increasing their activity and placing financial products irresponsibly (Bowman et al. 2014). Higher ROE ratios are observed in countries with less institutional diversity and larger entities (UK, France, Sweden).

Thus, if recent internationalization processes have led to a more universal and *financialized* banking industry, we would expect *commercial banks still focused on traditional financial intermediation to have better external CSR performance than large investment and universal banks.*

3.3 ANALYSIS AND EMPIRICAL RESULTS

In this section, we propose a methodology to measure the social and environmental responsibility of banks, based on the construction of a self-built model exclusively oriented to the external dimension of CSR and core business. We applied this model, which can be fed by rough data from sustainability agencies, to a quite homogeneous, meaningful target group: European commercial banks. We have focused the analysis on the outbreak of the recent financial crisis and the more stable period before the crisis to determine if the crisis was also an inflection point in terms of external CSR for both retail and universal banks.

3.3.1 *Sample*

The sample was comprised of Western European financial institutions categorized as banks during the studied period. This means that their main or defining activity is financial intermediation, although some institutions may carry out other kinds of financial activities. We only considered companies listed on equity markets, due to the limitations of sustainability rating agencies regarding non-quoted entities (Scholtens 2009; Wu and Shen 2013). Thus, we obtained a nonhomogeneous sample from 14 countries (12 EU countries).

3.3.2 *Sources*

The historical database EIRIS,³ an international ESG rating agency, was selected as the main data provider. The total sample size of this portfolio is 49 commercial banks with longitudinal pool data from 2006 to 2009. EIRIS evaluates the quality of policies, management systems, reporting and performance in over 80 ESG areas. It was selected due to its broad coverage of external CSR issues, consistent research and compared assessment of peers.

We also carried out a complementary qualitative analysis with ASSET4 Database (A4),⁴ as statistical research remains insufficient to explain some of the results or potential conclusions. A4, a Thomson Reuters database, provides additional ESG information for 48 financial institutions (years 2006–2014), especially relevant in terms of consumer and product information. We have selected information regarding controversies to contrast the results on the external CSR performance of companies. This database also

allows a broader temporal analysis, including the post-crisis period. Finally, financial information was obtained from Bankscope⁵ database, ASSET4, or alternatively from financial statements.

3.3.3 Procedure

We constructed an index based on the external CSR information provided by EIRIS, that is, information on the scope of products and services. To minimize the potential ‘misleading effect’ of erroneous CSR ratings due to ‘greenwashing’ campaigns and similar factors (Wu and Shen 2013), we tried to select performance indicators instead of those simply related to policies. Thus, indicators were selected based on the following criteria: (i) Defined scope: the indicator was only related to external CSR aspects; (ii) Specific: it was only related to a particular environmental or social risk; (iii) Independent: it had no correlation with other indicators.

The index constructed with EIRIS information comprised 27 indicators, classified into eight different areas (‘Environmental management’, ‘Climate change’, ‘Project finance and sustainability’, ‘Corruption/bribery’, ‘Consumers’, ‘Human rights’, ‘Developing countries’ and ‘Armament’). Every area becomes an independent variable because a sub-score is assigned to the indicators that compose the area. Some examples of external CSR indicators are *project finance and sustainability risk* in the area of ‘Environmental management’, *product-related litigation/recalls* in the area of ‘Consumers’ or *third world mining/commodities corrections*, due to investment activities in ‘Developing countries’. Examples of unsuitable indicators are ‘General Environmental Policy’ or ‘Systems/practices for job creation and security’, as they belong to a mixed or internal CSR dimension.

3.3.4 Variables

The statistical analysis was based on the scores of banks and their ranking position. However, we also included distinctive variables. Considering some characteristics related to the diversity of institutions in the banking market (Bowman et al. 2014) and loyalty to financial intermediation and the retail market (Fernández-Olit and Cuesta-González 2014), we defined the distinctive variables as size and banking orientation (retail, investment, corporate, etc.), number of branches and employees (intensity of service to the retail market), and weight of loans and customer deposits in relation to total assets (Table 3.1).

Table 3.1 Variables and information sources included in the analyses

| <i>Variable</i> | <i>Type</i> | <i>Source and N. observations per year^a</i> |
|--|------------------|--|
| <i>CSR variables</i> | | |
| External CSR index | Dependent | EIRIS (49) |
| Environmental management of products | Independent | EIRIS (49) and ASSET4 (48) |
| Climate change | Independent | EIRIS (49) |
| Project finance and sustainability | Independent | EIRIS (49) |
| Corruption/bribery | Independent | EIRIS (49) |
| Consumers | Independent | EIRIS (49) and ASSET4 (48) |
| Human rights | Independent | EIRIS (49) |
| Development countries | Independent | EIRIS (49) |
| Armament | Independent | EIRIS (49) |
| <i>Banking distinctive variables</i> | | |
| Size = Total assets | Cluster analysis | Bankscope (49) |
| Banking orientation = Specialization, regarding main activities of banks (retail/corporate, commercial/investment/universal) | Cluster analysis | Bankscope (49) |
| Branches ratio = Number of total branches/Total assets | Cluster analysis | Bankscope (49) |
| Employees ratio = Number of total employees/Total assets | Cluster analysis | Bankscope (49) |
| Net loans ratio = Net loans/Total assets | Cluster analysis | Bankscope (49) |
| Customer deposits ratio = Total customer deposits/Total assets | Cluster analysis | Bankscope (49) |

Source: Own elaboration based on mentioned sources

^aEIRIS data are related to the period 2006–2009: 196 total observations per variable. ASSET4 data cover the period 2006–2014: 432 total observations per variable. Bankscope has provided static data (year 2009) used for clustering. 49 total observations per variable

3.3.5 *Analyses*

The data analysis included a cluster analysis, ANOVA and a discriminant analysis. We used cluster analysis to obtain two groups distinguished by different levels of financial characteristics related to banking business. ANOVA allowed us to contrast the profile of the dimensions measured by EIRIS and the obtained clusters. Finally, discriminant analyses were performed including the groups obtained in the cluster analysis as criterion variables and the dimensions of EIRIS as predictor variables.

3.3.6 Results

3.3.6.1 Cluster Analysis: Obtaining Groups of Banks

Table 3.2 shows the results of the cluster analysis. Considering the financial characteristics that outline the size and business model of banks (retail/corporate, commercial/investment/universal), we obtained the following clusters: Cluster 1 with high scores in size variables (mean total assets = 1,585,127; mean number of employees = 143,559; branches = 6078; etc.) and Cluster 2 with low scores in terms of absolute size. These results indicate a link between size and the business model of banking. Cluster 1 refers to entities whose mean total assets were 7.2 times larger than in the case of Cluster 2 entities. Thus, Cluster 1 contained entities belonging to universal banking, that is, banks that provide a wide variety of financial services, including both commercial and investment services. When we weighted the relative results of these variables against mean total assets, Cluster 2 had a higher ratio of relative employees and branches, suggesting a stronger orientation to the retail market. We also found a higher weight of net loans and customer deposits related to total assets, which is distinctive of banks more oriented to basic financial intermediation: savings and loans.⁶

Table 3.2 ANOVA of variables in the clustering process

| | <i>Quadratic mean</i> | <i>df</i> | <i>Quadratic mean</i> | <i>df</i> | <i>F</i> | <i>p</i> |
|-------------------|-----------------------|-----------|-----------------------|-----------|----------|----------|
| Total assets | 1.57E + 13 | 1 | 7.27E + 10 | 45 | 216.29 | .00 |
| Employees | 1.16E + 11 | 1 | 1.63E + 9 | 45 | 71.37 | .00 |
| Branches | 167,815,637 | 1 | 6,228,498.11 | 45 | 26.94 | .00 |
| Net loans | 1.51E + 12 | 1 | 1.33E + 10 | 45 | 113.25 | .00 |
| Customer deposits | 1.52E + 12 | 1 | 1.10E + 10 | 45 | 138.52 | .00 |
| | Cluster centers | | | | | |
| | Cluster 1 (n = 11) | | Cluster 2 (n = 36) | | | |
| Total assets | 1,585,127 | 218,651 | | | | |
| Employees | 143,559 | 26,236 | | | | |
| Branches | 6078 | 1615 | | | | |
| Net loans | 544,437 | 121,267 | | | | |
| Customer deposits | 507,128 | 82,225 | | | | |

Source: Own elaboration based on information from Bankscope database

Note: K-means cluster solutions. Below, the final cluster centers

3.3.6.2 External CSR Index by Year and Cluster (2006–2009)

We carried out a Spearman correlation between the CSR index position of the banks in each year from 2006 to 2009 (see Table 3.3). This correlation decreased when we considered more distant years, except for the correlation between 2008 and 2006, which was the lowest. This indicates that there have been changes in the CSR index, which are reflected in a consecutive reduction of the average score from 2006 to 2008. Thus, European banks have moved backwards in external CSR development. This could be due to the rising number of regulator penalties during this period. These results are also consistent with the data offered by A4 regarding consumer controversies (0 companies in 2006, 9 in 2009, and 23 in 2010). Other possible factors are the greater exposure of the sector to badly managed risks in terms of sustainable project finance and greater exposure to commodities in developing countries.

In fact, 2008 was a critical point: it was the year of the crash of global financial markets and a wake-up call for the whole banking sector to reconsider their way of providing financial services. This was also a year of a serious world food price crisis and increase in famine in many countries, which resulted in a higher level of commodities controversies for companies. On the other hand, this index distortion could be partly explained by a structural change, as a new data dimension (corruption) became available for inclusion in the model in 2008. Although the global influence of this indicator on the index mean has been neutral, it has ‘shaken’ the position of companies. This factor would also explain the out-of-trend results of the correlation between 2006 and 2008.

Figure 3.1 shows the tendency of the average scores of the external CSR index for the clustered banks. External CSR of the banks in Group 1 declined steadily with a very low average score in 2009 compared to 2006. Greater exposure to external markets and diversification of activities seem to have been penalized in the case of the largest banks: higher exposure to corruption

Table 3.3 Spearman correlation of CSR index position from 2006 to 2009

| | 2009 | 2008 | 2007 | 2006 |
|------|-------|-------|-------|------|
| 2009 | 1 | | | |
| 2008 | .813* | 1 | | |
| 2007 | .749* | .758* | 1 | |
| 2006 | .531* | .417* | .671* | 1 |

Source: Own elaboration based on information from EIRIS

Note: *The correlation is significant at level 0.01 (bilateral)

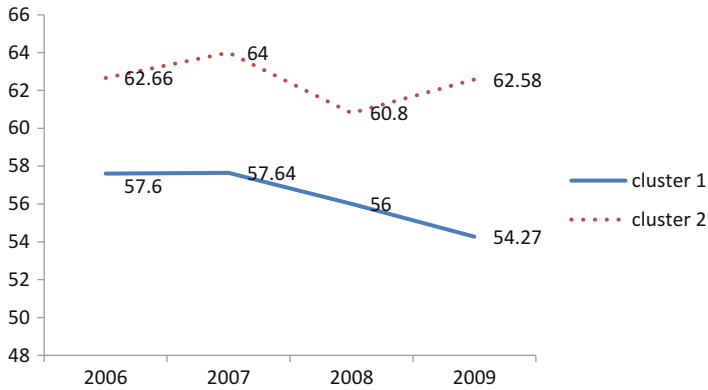


Fig. 3.1 Average CSR score of each bank cluster by year (2006–2009) (Source: Own elaboration based on information from EIRIS)

risks; greater involvement in bad banking practices like subprime mortgages and manipulation of interest rates; greater interest in developing countries, in unsustainable project finance and in speculative investment activities or financing armament; and so on. Smaller banks, less exposed, seem to have avoided or managed those risks and controversies better.

3.3.6.3 ANOVA and Differences Between Clusters

Statistical differences were found between groups for all dimensions included in our index except corruption, consumer care and human rights management (Table 3.4).

The most meaningful indicator was the dependent variable ‘total index’, followed by the independent variable ‘project finance and sustainability’. This endorses the consistency of our model and shows differences between clusters in the management of external CSR as a whole. Integrating sustainable principles, for example, Equator Principles,⁷ into project finance activities is considered one of the key points in the development of real CSR in the banking business (Scholtens and Dam 2007b; Cuesta-González et al. 2006). As international banks face higher risks in project finance, they need more sophisticated management systems, which are still being developed in many entities. In contrast, a local focus of banking activity could allow project finance to be carried out with a lower sustainability risk, as more information is available. We also obtained some less meaningful variables

Table 3.4 ANOVA for EIRIS dimensions

| | <i>Factor</i> | <i>Bank group</i> | <i>Mean</i> | <i>Sum of square</i> | <i>df</i> | <i>Mean square</i> | <i>F</i> | <i>P</i> | <i>Partial eta squared</i> |
|---------|--------------------|-------------------|-------------|----------------------|-----------|--------------------|----------|----------|----------------------------|
| Cluster | External CSR | 1 | -4.08 | 18.61 | 1 | 18.61 | 16.47 | .00** | .27 |
| | index total | 2 | -2.59 | | | | | | |
| | Project finance | 1 | -1.09 | 5.01 | 1 | 5.02 | 15.06 | .00** | .25 |
| | and sustainability | 2 | -.32 | | | | | | |
| | Corruption/ | 1 | -.52 | .00 | 1 | .00 | .00 | .98 | .00 |
| | bribery | 2 | -.53 | | | | | | |
| | Consumers | 1 | .38 | .25 | 1 | .25 | 1.99 | .16 | .04 |
| | | 2 | .21 | | | | | | |
| | HHRR | 1 | -.61 | .63 | 1 | .63 | 3.41 | .07 | .07 |
| | management | 2 | -.34 | | | | | | |
| | Developing | 1 | -.32 | .85 | 1 | .85 | 7.47 | .01* | .14 |
| | countries | 2 | .00 | | | | | | |
| | Armament | 1 | -.42 | .69 | 1 | .69 | 9.95 | .00** | .18 |
| | | 2 | -.14 | | | | | | |

Source: Own elaboration based on information from EIRIS

Notes: Significance *p 0.05; **p 0.01

(‘developing countries’ and ‘armament’) that are quite related to asset management activity. The profile of the two clusters is summarized in Fig. 3.2.

We found that entities with a higher score in the external CSR index had a higher probability of belonging to Cluster 2. On the one hand, this means that the constructed index provides a ‘balanced picture’ of CSR in terms of the business dimension. On the other hand, Cluster 2 entities (medium- and small-listed banks) showed better external CSR performance. This could be explained by the lower sustainability risk of this group regarding project finance (even though their related management systems are slightly worse). The entities in Cluster 2 have also received fewer penalties from regulators, and fewer controversies have been recorded regarding commodities in poor countries or armament. Although large and universal banks have more developed management systems, they do not compensate for their higher CSR risk. Thus, Cluster 1 generates more CSR controversies.

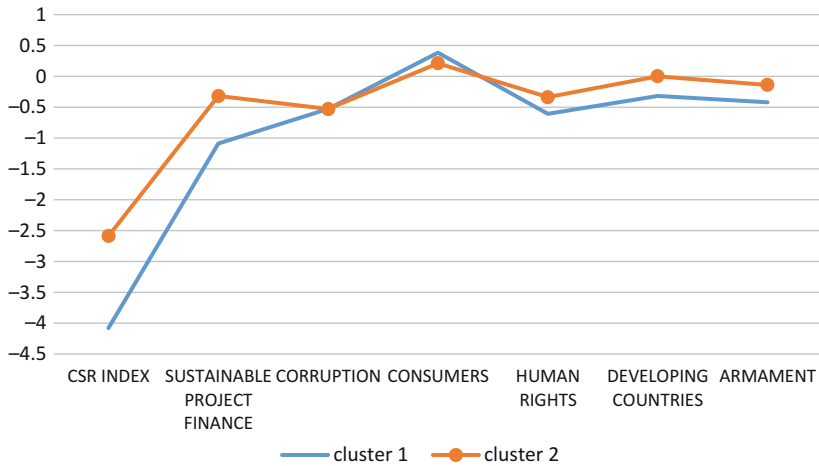


Fig. 3.2 Bank profiles in external CSR index dimensions (Source: Own elaboration based on information from EIRIS)

3.3.6.4 Analysis of the ‘Consumer and Product’ Dimension

After analyzing the main sustainability risks that differentiate retail banking from universal banking, we focused on the ‘Consumers’ area, where the CSR performance of the last group is comparatively better. This area also includes social and environmental responsibility related to products and services. The specificity of the analysis regarding one single area allows us to consider a broader time scope. Thus, we are studying a longer period—from pre-crisis to post-crisis years: 2006–2014⁸—to determine if there has been an inflection point in terms of consumer responsibility. As previously mentioned, the A4 database is especially relevant in terms of consumer and product information and offers a broad range of indicators in this area.

The ‘Consumers responsibility index’ constructed with A4 information comprised 21 indicators, classified into three different areas (‘Client Loyalty’, ‘Product Innovation’ and ‘Product Responsibility’). Each area is equally weighted in the total index and becomes an independent variable because each is assigned its own sub-score based on the indicators that compose the area. Some examples of indicators are *customer satisfaction transparency* in the area of ‘Client Loyalty’, *product innovation/improvements* in the area of ‘Product Innovation’ or *social exclusion controversies* in ‘Product Responsibility’. Table 3.5 summarizes the selected indicators.

Table 3.5 Indicators composing the consumer responsibility index

| |
|---|
| Client loyalty |
| <i>Client loyalty/implementation</i> |
| <i>Client loyalty/monitoring</i> |
| <i>Client loyalty/improvements</i> |
| <i>Client loyalty/customer satisfaction transparency</i> |
| <i>Client loyalty/consumer complaints</i> |
| <i>Client loyalty/anti-competition controversy</i> |
| Product innovation |
| <i>Product innovation/policy</i> |
| <i>Product innovation/implementation</i> |
| <i>Product innovation/monitoring</i> |
| <i>Product innovation/improvements</i> |
| <i>Product innovation/environmental project financing</i> |
| Product responsibility |
| <i>Product responsibility/implementation</i> |
| <i>Product responsibility/monitoring</i> |
| <i>Product responsibility/improvements</i> |
| <i>Product responsibility/quality management</i> |
| <i>Product responsibility/product access</i> |
| <i>Product responsibility/social exclusion controversies</i> |
| <i>Product responsibility/responsible marketing controversies</i> |
| <i>Product responsibility/responsible asset management</i> |
| <i>Product responsibility/ customer controversies</i> |
| <i>Product responsibility/ product compliance</i> |

Source: Own elaboration based on information from ASSET4

Figure 3.3 shows the mean score of the index by cluster. Larger banks demonstrated an advantaged position in ‘consumer responsibility’ down to 2009. From this year their mean score decreased, falling below the mean score of retail banks. As Wu and Shen (2013) and Scholtens (2009) stated, more sophisticated CSR policies and management could be related to company size. This may be particularly true in the case of consumers, one of the main stakeholders in the traditional management of companies. As seen in Fig. 3.4, ‘product innovation’ was strong in the case of Cluster 1—larger banks—during this pre-crisis period, for example, a wider development of sustainable project finance. Notwithstanding, retail banking shows leadership in client loyalty during this period, reflecting the reward of customers to a simpler model of business with a heavier infrastructure.

There is an inflection point in the year 2009 in both clusters, indicating a one-year delay from the outbreak of the crisis. This translated into costs in terms of consumer responsibility. For more traditional retail banking, it

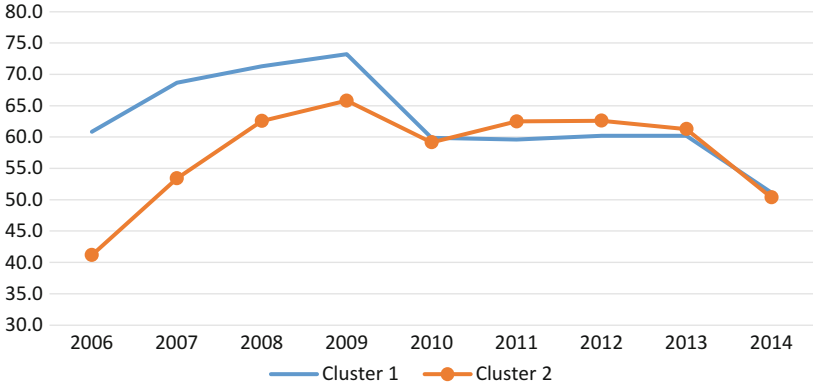


Fig. 3.3 External CSR index based on ASSET4*. Mean by cluster (*Index converted to 0–100 scale. Note: 2014 shows a lower index level due to database methodological changes. Source: Own elaboration based on information from ASSET4)

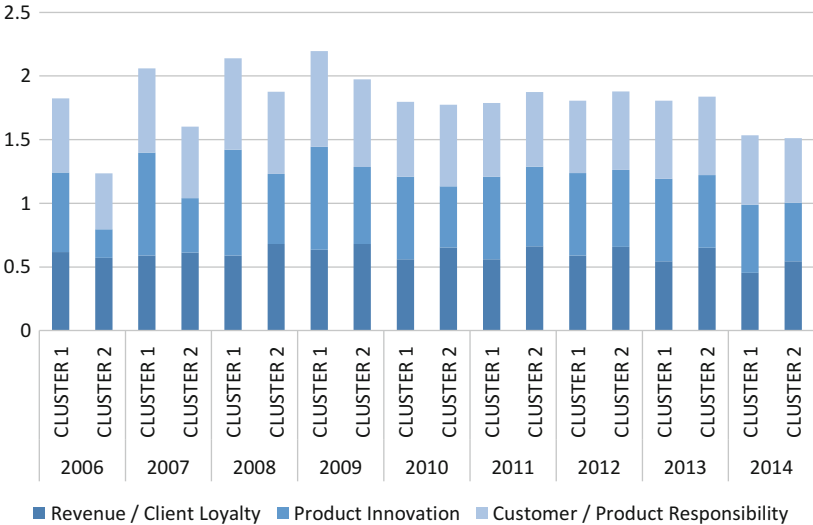


Fig. 3.4 Scores by areas of ASSET4 CSR index. Mean by cluster (Source: Own elaboration based on information from ASSET4)

implied a temporal slowdown, with the index reaching a steady performance similar to the pre-crisis level during the post-crisis years. This performance is the result of two complementary tendencies: an improvement in the area of ‘product innovation’—the crisis became a wake-up call for responsible innovation in medium and small entities—and a deterioration of ‘product responsibility’ due to the increase of customer and product compliance controversies during this period. For universal banking—Cluster 1—consequences were greater: the consumer responsibility index suffered a sharp fall and did not recover its previous level during the post-crisis period. The intensity of controversies related to customer and product compliance was much greater for this group, as were anti-competition controversies. The priority of allocating resources to these controversial issues may have also led to the decrease in product innovation.

We also find evidence of differences among countries. Most banks in Italy—a country with an important retail sector—were represented in Cluster 2. Bankscope data showed that they had a heavier cost structure than, for example, banks in the UK, which were mainly classified in Cluster 1. This is balanced by a higher ratio of return on interest and a larger ratio of profit before taxes in the case of the Italian entities. It could indicate that users are willing to pay higher prices for ‘proximity banking’, supporting our results regarding ‘client loyalty’, but further research should be carried out on this topic (Table 3.6).

3.4 DISCUSSION

Far from the instrumental vision of CSR mostly followed by large companies, this study has adopted an advanced approach to CSR, which is closer to the EU’s most recent definition: CSR is related to the impacts that business has on society. We have demonstrated that available data are not sufficient to determine if the banking industry is playing their economic role responsibly. Nevertheless, considering the CSR information contained in two important databases and the European banking industry analyzed in them, we can affirm that institutions which are closer to local or regional demands had better external CSR performance than large institutions with a universal and international strategy.

The objective of the present study was to identify any correlation between the external CSR performance of banks and their size and banking model. We have avoided giving excessive weight to ‘policies’ in the construction of our model, as we consider it does not reflect actual performance

Table 3.6 Scores by areas of ASSET4 CSR index

| <i>Year</i> | | <i>Client loyalty</i> | <i>Product innovation</i> | <i>Product responsibility</i> |
|-------------|-----------|-----------------------|---------------------------|-------------------------------|
| 2006 | Cluster 1 | 0.617 | 0.625 | 0.583 |
| | Cluster 2 | 0.572 | 0.223 | 0.440 |
| 2007 | Cluster 1 | 0.591 | 0.807 | 0.662 |
| | Cluster 2 | 0.613 | 0.429 | 0.560 |
| 2008 | Cluster 1 | 0.591 | 0.830 | 0.719 |
| | Cluster 2 | 0.680 | 0.551 | 0.646 |
| 2009 | Cluster 1 | 0.636 | 0.807 | 0.753 |
| | Cluster 2 | 0.680 | 0.605 | 0.689 |
| 2010 | Cluster 1 | 0.561 | 0.648 | 0.589 |
| | Cluster 2 | 0.653 | 0.480 | 0.642 |
| 2011 | Cluster 1 | 0.561 | 0.648 | 0.580 |
| | Cluster 2 | 0.662 | 0.625 | 0.588 |
| 2012 | Cluster 1 | 0.591 | 0.648 | 0.567 |
| | Cluster 2 | 0.657 | 0.607 | 0.615 |
| 2013 | Cluster 1 | 0.545 | 0.648 | 0.613 |
| | Cluster 2 | 0.652 | 0.570 | 0.616 |
| 2014 | Cluster 1 | 0.455 | 0.534 | 0.545 |
| | Cluster 2 | 0.544 | 0.460 | 0.508 |

Mean by cluster

Source: Own elaboration based on information from ASSET4

in the business scope. ‘External CSR index’ and ‘Project Finance and Sustainability’ are the variables that best discriminate between the bank clusters defined in terms of banking model. **Size, greater internationalization and business diversification seem to be risk factors for external CSR. We conclude that entities with the highest levels of external CSR are found in the group of medium-sized banks with diverse orientations and less diversified business.** These results are consistent with those obtained by Cuesta-González et al. (2006) regarding the lower external CSR performance of larger banks and the significant lack of information regarding the external dimension of CSR compared to the internal dimension of CSR provided by financial institutions.

Our findings partly refute research regarding the positive influence of bank size on CSR engagement among banking entities (Wu and Shen 2013; Scholtens 2009). At least in terms of CSR applied to commercial business, **we found evidence that larger entities had a lower performance, except in the consumer sphere.** Medium- and small-sized banks should be closer to customers, as they have higher ratios of employees and branches, but this

does not always result in better performance regarding consumers. This could be because consumer protection is highly regulated. As all banks have to comply with the normative, few differences can be expected when using indicators regarding consumer relations based on regulation, like *customer satisfaction transparency*.

The higher level of engagement of larger banks in sustainable project finance does not compensate for their higher impacts. This conclusion questions the effectiveness of incentives like signing Equator Principles and related policies and leads us to ask if they are reduced to a mere formalism to enter the market of large institutional projects.

Corruption is not a discriminant factor in our model. However, our index has coincided with the banks penalized by the European Commission in December 2013 for tampering with interest rates. All of these entities belong to the cluster defined by large banks, and their external CSR performance decreased during the studied period. The implications of these findings are related to size and transparency requirements in the banking sector.

3.5 CONCLUSIONS

CSR has often been considered a whole made up of very heterogeneous elements. Attempts have also been made to define CSR using the same standards for every industrial sector. However, when we focus on the external or commercial dimension of CSR, we find that common assumptions or tools cannot be applied to different industries. Structural elements like corporate governance can be addressed in the same way for banking and mining, for instance, but it is impossible to assess the sustainable performance of their products in the same way. Our findings demonstrate that the commercial banking sector has different models of entities with particularities that must be addressed from different perspectives, considering different regulation requirements (e.g. in reporting) and even different expectations from society.

This research shows that size and banking orientation are relevant variables for external CSR performance. The current trend of homogenization in the banking sector does not seem to search for greater social responsibility in business. We look to a horizon of large, quoted banks with highly diversified activities. However, the theory of operative inefficiencies in large mergers during the 1990s may have resulted in current inefficiencies in terms of CSR. Alternative governance models (cooperative, public, semi-public savings banks), small- and medium-sized banks, and entities focused

on financial intermediation and the retail market are being undervalued and induced to disappear in Europe.

The quality and availability of data are limiting factors. Sustainability rating agencies do not usually manage information on non-quoted banks or analyze all specific risks of this sector in depth. In fact, several impacts, whose relevance emerged during the crisis, are not included in the available information. As company reporting is the main source of information for rating agencies, the improvement of databases and analysis quality requires a greater engagement of banks. Soft or hard regulation (depending on the bank's risk level) would be desirable to guarantee the inclusion of core CSR information in management reporting. This information could be relevant for policy-makers and supervisor's authorities. External banking CSR performance could be used for public aids, facilities for solvency requirements or new incentives for access to wholesale funding or branch network expansion. This new information could be demanded once the new directive on extra-financial information is in force. Investors may also appreciate this transparency to better analyze the risks associated with the business and the good governance of institutions.

Moving forward in more sustainable financial systems requires a return to a business model closer to customers. The crisis has shown that banks have failed to design and market products that meet the customers' needs in transparent ways, given customers' lack of financial literacy, asymmetrical information and inertia. Some post-crisis measures (like the pressure on banks to lend to SMEs) were opportunistically aligned with part of these wider concerns, like access to finance, but do not address the broader issue of how banks deal with their business customers. There is a need for CSR that has an impact on the behavior of the retail banking sector, as this sector supports the (productive) economy. Further research is needed to propose changes in the transactional banking model to obtain a more relational banking model.

Technology can be helpful on the road back to relational banking, as banks have access to large amounts of data which allows them to offer their clients customized products. This personalized, client-centered banking can help democratize financial services by offering advice to low-income clients using data techniques (data management, statistics and algorithms, big data). However, we must be careful because online banking also favors the standardization of products and services and risk management procedures based on predesigned credit scoring, which are not suitable for a low-income vulnerable population. The replacement of offices with technology requires

the population to have adequate access, knowledge and confidence, as well as a medium or high level of financial knowledge. Therefore, the guidance of banking experts seems to be essential in the decision-making process of these consumers.

Although initiatives promoting social inclusion, such as the EU Directive on Payment Accounts guaranteeing access to banking services, are well received, they are insufficient. Other initiatives could also be promoted at the European level to encourage the breakdown of information on the banking business, areas and groups at risk of social exclusion. This reporting model has a long history since the approval of the Home Mortgage Disclosure Act of 1975 and the Community Reinvestment Act of 1977 in the United States. In this way, policy-makers would be able to evaluate if the banking industry is fulfilling its role of facilitating responsible and inclusive access to banking services.

In conclusion, a more relational and sustainable business model would help banking institutions to address the UN's Sustainable Development Goals, specifically the 12th goal (responsible consumption and production) and the 10th goal (reduce inequality avoiding over indebtedness and financial exclusion).

NOTES

1. This study is partially based on EIRIS data. A detailed description of this rating agency and the information provided can be found in Sect. 3.3.
2. Internal or structural CSR refers to aspects not exclusive to banking business such as corporate governance, human resources, internal environmental management, community involvement and sponsorship, and so on.
3. <http://www.vigeo-eiris.com>
4. <http://im.thomsonreuters.com/solutions/content/asset4-esg/>
5. www.bankscope.com/
6. Cluster 1 is composed by Banco Santander, Barclays PLC, BNP Paribas SA, Credit Suisse Group AG, Deutsche Bank AG, EFG International AG, HSBC Holdings PLC, Royal Bank of Scotland Group plc, Societe Generale SA, UBS AG, UniCredit SpA.

Cluster 2 is composed by Allied Irish Banks plc, Alpha Bank S.A., Banca Carige SpA, Banca Monte dei Paschi di Siena SpA, Banca Popolare di Milano, Banco Bilbao Vizcaya Argentaria S.A., Banco BPI S.A., Banco Comercial Portugues S.A., Banco de Valencia S.A., Banco Espanol de Credito S.A., Banco Espirito Santo S.A., Banco Popolare Societa Cooperativa, Banco Popular Espanol S.A., Bank of Ireland, Bankinter S.A., Commerzbank AG, Credit

- Agricole S.A., Danske Bank, Deutsche Postbank AG, Dexia S.A., DNB ASA, EFG Eurobank Ergasias S.A., Erste Group Bank AG, Intesa Sanpaolo SpA, KBC Groep NV, Lloyds Banking Group PLC, Mediobanca Group, National Bank of Greece, Natixis S.A., Nordea Bank AB, Provident Financial plc, Raiffeisen Bank International AG, Skandinaviska Enskilda Banken AB, Standard Chartered PLC, Svenska Handelsbanken AB, Swedbank AB, UBI Banca Scpa.
7. The Equator Principles, promoted by the International Finance Corporation, is ‘a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects. It is primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making’ (www.equator-principles.com).
 8. In the case of year 2014, there are fewer data available for several indicators and companies.

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Seeking Greener Pastures: Exploring the Impact for Investors of ESG Integration in the Infrastructure Asset Class

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4.1 INTRODUCTION

Achieving the UN Sustainable Development Goals (SDGs) by 2030 is estimated to cost \$4.5 trillion a year. When much needed additional infrastructure investment is added, this figure rises to \$7 trillion annually (Neto and Riva 2015). Governments alone do not have the capital required to make these investments. Private investment will be needed, particularly in infrastructure development. But what kind of investment and what type of infrastructure will private investors embrace?

In recent years the conditions for infrastructure investment, particularly sustainable infrastructure investments, have become especially favorable (Kaminker 2016). Investors are becoming increasingly interested in sustainable infrastructure projects which promote positive social and environmental impact together with long-term, stable financial returns. This growing movement of responsible investment in infrastructure was initially brought about by social and public interest concerns. In particular,

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researchers have identified a growing need for sustainable infrastructure which addresses current environmental concerns (Sims et al. 2015). Moreover, the potential for infrastructure to positively impact employment on a national and local level, as well as to improve quality of life in underserved communities, has served to highlight the major social impacts which infrastructure can have (Ibid.).

Responsible investment has, over the past few decades, proven to be a fast-growing movement in the field of investment decision-making. Growth rates in the field of responsible investment have been high, with the Global Sustainable Investment Alliance finding that assets under the management of sustainable investment funds enjoyed a growth rate of more than 33% between 2014 and 2016 (Global Sustainable Investment Alliance 2017). Responsible investments are long term in nature and seek to reduce risk and achieve positive financial return by taking environmental, social, and governance (ESG) factors into account. In the past, such considerations were applied primarily to public equity investments, but increasingly investors are applying this lens to other asset classes. One of the asset classes which is new to ESG scrutiny is infrastructure.

These long-term ‘responsible investors’ are most often pension funds (including many Canadian pension funds which pioneered investment in infrastructure assets, beginning in the 1990s) and sovereign wealth funds, who must match their long-term liabilities against the assets in their portfolio. Initially, these funds entered into investment in infrastructure through limited partnerships in private equity-like structures. They simply provided capital, took returns and left management decisions to the fund’s general partner. But this structure proved costly to investors and by the early 2000s, these funds began to find greater opportunities by investing directly in the asset itself and maintaining a long-term interest in its operation (Clark et al. 2011). Canadian pension fund managers are increasingly finding that investment in infrastructure projects meet their investment criteria and asset characteristics and are excellent assets for inclusion in their portfolios. In most cases these assets are held for a long term, particularly as these infrastructure investment opportunities are increasingly structured as design/build/finance/operate (DBFO) projects.

As a result, infrastructure assets have become long-term holdings for these funds. Canada’s trustee pension funds currently hold assets in excess of \$1.7 trillion (Statistics Canada 2016). The ten largest pension funds collectively managed approximately \$1.1 trillion (CPP Investment Board 2016). Given the long-term nature of these holdings, taking ESG into

account in this asset class raises project standards and reduces risks over time. These risks may include the social and environmental risks posed by pipelines, water systems, transportation corridors, and energy systems, among others (United Nations Environmental Programme 2015). The long-term holding period required in infrastructure investment means that investors who incorporate ESG requirements into this asset class benefit from reduced risk over the life cycle of the infrastructure asset and may also see their infrastructure assets outperform those selected through traditional investment decision-making processes. Risks that may be mitigated through the application of ESG analyses to infrastructure investment includes environmental accidents, community and social backlash, workplace accidents, and inefficient management. All too often project delays that could be reduced through higher ESG standards add to project costs and reduce cash flows. By mitigating these risks through the evaluation of projects on environmental, social, and governance metrics, investors can ensure a more reliable cash flow from the asset. As investors move from short-term positions in the infrastructure asset class to longer term development and ownership of the asset, these considerations have taken on greater weight than in the past.

This chapter draws on a series of interviews with individuals involved with ESG integration in the infrastructure asset class, for insight into how this key component of the financial system is taking sustainability into account in investment selection and what is needed to strengthen this process. The chapter also looks at the growing need to focus on ESG issues when making long-term infrastructure investment decisions in order to derive both financial and socio-ecological benefits. The chapter opens with a review of the existing literature, followed by a more detailed examination of the Canadian infrastructure marketplace and insights drawn from our interviews. Given the role private investment in infrastructure will play in achieving the UN Sustainability Development Goals, the chapter concludes with implications for sustainable financial systems going forward.

4.2 UNDERSTANDING THE INFRASTRUCTURE ASSET CLASS

The failure to take ESG sufficiently into account in the infrastructure asset class is an example of the inefficient market hypothesis (Lo 2008; Shleifer 2000; Shiller 2003). This occurs because the life-time costs associated with low ESG standards have not been fully factored into the initial price of an asset, thus creating an information asymmetry¹ between the buyer and the

seller of the product (Akerlof 1970; Stiglitz 2000). In many cases, the investor must look to the overall life-cycle costs and benefits of the infrastructure investment, in order to see the full benefit of the ESG consideration that may have an initial higher cost than the alternative but saves money over time. Therefore, in order for investors to fully understand the value of taking long-term ESG factors into consideration, more information needs to be available to the investor about the investment opportunity.

Inefficient market theory is designed as a counter to the efficient market hypothesis (EMH), which suggests that current stock prices fully reflect all available information about a company or an investment, and therefore there is no way to improve profits through the use of data on the company or its investment performance (Clarke et al. 2001). An efficient market assumes that there are large numbers of rational investors actively competing with one another, with each attempting to garner as much information as possible (Fama 1965). These rational investors compete in a market in which relevant information is freely available to all participants, thereby providing the tools to allow them to make rational choices (Ibid.). Although there may be some random price fluctuations as a result of reasonable investors disagreeing on the value of a security, the rational competition of these investors will ensure that prices will not stray far from their intrinsic values (Ibid.).

And yet, there is now significant evidence to show that the current prices of many investments do not adequately account for all information. In particular, data regarding ESG metrics and risks is often unavailable, or if available, it is not reflected in the price of the investment (Van Dijk et al. 2012; Naumer et al. 2011). Failure to incorporate ESG factors into an investment can expose investors to significant risks (Van Dijk et al. 2012). These risks are varied, and can include environmental accidents, corruption and governance scandals, as well as potential labor and community unrest (Ibid.).

An example of the type of ESG risks to which investors can be exposed to is seen in the 2010 British Petroleum (BP) oil spill (Clark et al. 2015). This spill cost BP approximately \$90 billion in cleanup costs and led to a 50 per cent drop in BP's share price between April 20, 2010, and June 29, 2010, as well as continued stock underperformance in the years following the spill (Ibid.). What is significant about this incident is that organizations which monitored ESG performance in companies had expressed concerns regarding BP's performance on environmental safety and community relations issues as early as five years before the spill occurred. This means that investors who factor in ESG data would have been better able to anticipate

and proactively respond to the risks identified in BP's organizational and environmental practices (Ibid.).

Exposure to ESG risks can often be more acute in emerging markets, where limited regulation and poor ESG disclosure can lead to severe problems in company and project performance on ESG metrics (Van Dijk et al. 2012). In these markets, an increased up-front investment in sustainability measures, which leads to lower emissions and better climate change resiliency, can often pay off in the long run in the form of efficiency improvements and wider economic benefits (Bhattacharya et al. 2012). These benefits can include improved energy security, better safety, cleaner operating methods, and stronger environmental performance and pollution control in these nations (Ibid.). Despite the fact that ESG factors can have major impacts on investment performance across all classes (Naumer et al. 2011), historically, this category of risk has not been adequately included in traditional investment analysis (Responsible Investment Association 2012).

A 2012 study by Deutsche Bank group found that companies which account for ESG factors experience superior risk-adjusted returns in securities and stocks (Fulton et al. 2012). A 2015 review of over 200 academic sources and studies corroborated this finding, noting that 90 percent of companies with strong sustainability standards had experienced lower costs when accessing capital (Clark et al. 2015). Furthermore, 88 percent of these companies with strong ESG standards had also experienced improved operational performance, as compared to companies with weak ESG performance standards. The review also found that 80 percent of the studies documented a positive correlation between strong ESG performance and improved financial market performance (Ibid.).

In many cases, improved operational performance has been traced back to specific elements of the ESG paradigm. A 2010 study found that firms with better ecological efficiency standards and governance procedures experienced improved returns on assets (Guenster et al. 2010). Social aspects, such as racial diversity in a firm's workforce, have also been found to have positive impacts on operational performance (Richard et al. 2007). Notably, a 2013 study found that a portfolio consisting of firms which scored high on an aggregate sustainability index, which measured adoption of social and environmental CSR policies, tended to outperform a portfolio consisting of firms which scored low on this index (Eccles et al. 2013). All these factors point to improved financial and market performance by companies which adopt strict ESG standards. These studies show that in a firm, high ESG standard and strong financial returns are not mutually exclusive, but rather

mutually supportive. This would also suggest the possibility that high ESG standards in infrastructure could lead to improved financial returns, if the same principles continue to hold in the area of infrastructure. Furthermore, these findings indicate that short-term market pricing does not always reflect the true, long-term value of an investment, thereby suggesting that markets may not be fully rational in their assignment of prices.

Even if markets did take into account all relevant information, the human mental capacity is limited and is subject to a concept known as “bounded rationality” (Simon 1990). This constraint often prevents human beings from attaining full rationality due to a limited capacity to learn and remember information about the market (Mullainathan and Thaler 2000). Any prediction or statement regarding human behavior must therefore recognize this biological constraint (Simon 1990). The concept of bounded rationality suggests that in order to account for the limited human processing capacity of investors, ESG information and metrics must be simple enough for investors to meaningfully engage with them.

There is also likely a need to counter some existing biases and preconceptions held by investors which prevent them from adopting more rigorous ESG standards in their decision-making. A study by the CFA Institute found that one of the main reasons some investors decline to incorporate ESG analyses into their decision-making is due to their belief that ESG factors do not add value to investments and are therefore not material to investment decision, even though the US SEC now requires that ESG factors be included in filings, as material (CFA Institute 2015). Another important reason why ESG factors were not included in decision-making was the perception that there was a lack of demand from clients and investors for this type of analysis, and a belief that it was not possible to incorporate ESG factors into quantitative models (Ibid.). These biases and preconceptions are largely unfounded, as the materiality and value added of ESG factors are demonstrated not only by the superior performance of companies that account for ESG factors, as measured by their improved risk-adjusted returns in securities and stocks (Fulton et al. 2012), but also, in the infrastructure context, by the reduced owner operating costs of sustainable infrastructure over multiyear periods (Bouton et al. 2015). With regards to the perception that there is a lack of demand among investors and clients for ESG analyses, this assumption is refuted both by the growth in assets managed under ESG criteria (Global Sustainable Investment Alliance 2017), and by our interviews with members of the ESG infrastructure community, in which they indicated that demand for ESG infrastructure

measurements was increasing among investors in both the public and private sectors. Concerns over incorporating ESG factors into quantitative models are gradually being addressed by new products and tools on the market, such as GRESB, Envision,² and Autocase,³ which attempt to provide a means to incorporate ESG factors into quantitative analyses of infrastructure. According to the model of Behavioral Economics, these biases and preconceptions will need to be addressed in order to ensure more widespread incorporation of ESG factors into investment decision-making.

Incorporating ESG factors into infrastructure investment decisions will require the adoption of a more long-term perspective than investors may be accustomed to. In most cases, initial costs for the creation of sustainable infrastructure, and sustainable neighborhoods, are higher than the costs incurred in the construction of traditional infrastructure (Bouton et al. 2015; Qureshi 2015). However, the financial benefits of these sustainable investments are generally spread out over a longer period of time and are accrued primarily as a result of monetary savings emanating from increased efficiency of operation, and decreased risk factors (Bouton et al. 2015). The increased efficiency of sustainable infrastructure can lead to savings in energy and water consumption (Ibid.). As a result of these efficiencies, the annual owner operating costs of sustainable infrastructure are often lower than that of traditional infrastructure, meaning that, within three to five years, the overall return on sustainable infrastructure will come to match or outperform the returns of traditional infrastructure (Ibid.).

Of course, the benefits of applying ESG metrics to infrastructure investment decisions go well beyond financial considerations alone. By accounting for ESG factors in their infrastructure investment decisions, investors can play a role in the crucial work of decoupling economic growth from environmental degradation, a process which the United Nations believes will be vital in ensuring sustainable economic growth in the future (Swilling et al. 2013). The reduced resource consumption of sustainable infrastructure projects provides not only financial benefits, but also ecological benefits, by helping to alleviate pressure on the finite resources of the earth (United Nations Environmental Programme 2015). Most infrastructure projects occur within the contexts of cities, which present their own challenges and opportunities. Poverty and social exclusion continue to be major urban problems, particularly in lesser developed nations, and urban areas which consume approximately 75 percent of the world's natural resources, and create 60–80 percent of global CO₂ emissions (United Nations

Environmental Programme 2012). With the rapid growth of cities, particularly in the developing world, there is a risk that these urban problems will continue to worsen without the mitigating effects of environmentally sustainable infrastructure design (Cities Climate Finance Leadership Alliance 2015).

In total, it is estimated that approximately \$93 trillion worth of low-emission, climate-resilient infrastructure will need to be built over the next 15 years (Ibid.). Any sustainable infrastructure strategy for cities will require a plan for urban densification (United Nations Habitat for Humanity 2012). In the past, cities have all too often selected infrastructure which contributes to urban sprawl and congestion, as opposed to a more sustainable path of integrated, densely populated communities (Ibid.). In order to ensure that reproductive and ecologically buffering non-urban land is not negatively impacted by urban population growth, cities will need to begin to choose strategies of “building up” rather than “building out” (Ibid.).

Choosing sustainable infrastructure over “business as usual” infrastructure need not be an expensive proposition for these cities and may, according to The New Climate Economy Commission, cost only an extra \$4 trillion over the next 15 years (2014). This up-front investment can be recouped over time in the form of risk dividends and efficiency savings (Bielenberg et al. 2016). By allowing cities to begin to transition to cleaner, more sustainable economies, sustainable infrastructure can have profound impacts on pressing global issues such as climate change (Swilling et al. 2013). One important consequence of infrastructure can be the influence it exerts on the consumption patterns and behaviors of a city’s population (United Nations Habitat for Humanity 2011). By controlling urban sprawl through densification strategies, and by investing in infrastructure for mass transit, cities can help to mitigate climate change by discouraging environmentally unfriendly modes of transportation, such as driving cars, in favor of more sustainable modes of transportation, such as buses and rail (Ibid.).

The ecological benefits of sustainable infrastructure are important when we consider the pressing need for action to combat global climate change. There is a general scientific consensus that, in order to prevent catastrophic climate change, average global temperatures must not be allowed to rise more than 2 C above pre-industrial levels (World Wildlife Foundation 2012). In order to have a reasonable chance of preventing such a rise in temperature, global carbon emissions must not exceed 870 gigatons of CO₂ between 2009 and 2100 (Ibid.). However, without significant changes to increase the sustainability and environmental performance of cities, urban

areas will generate 460 gigatons of CO₂ in the next three decades alone, pushing global environmental targets off track (Ibid.). A particular contributor to these emissions will be, under a business-as-usual scenario, the construction and usage of urban residential and transportation infrastructure (Ibid.). The requirement for cities, particularly in the developing world, to expand their infrastructure, combined with the need to find solutions to prevent catastrophic climate change, a key UN SDG, means that there is a necessity to begin to guide capital investments toward environmentally sustainable infrastructure (Ibid.).

If sustainable infrastructure is to be treated as its own asset class, there is a need for standardized procedures and for stronger regulations in the infrastructure market (United Nations Environmental Programme 2015). There is also an increased recognition of the need for transparent monitoring and reporting of both the risk levels of infrastructure investments, and the distinct financial features of infrastructure as an asset class (Ibid.). Many potential institutional investors indicated that the lack of information about the performance expectations in the infrastructure asset class is a barrier to their further investment in this area (Standard & Poor's 2014).

4.3 INFRASTRUCTURE NEEDS AND INVESTMENT IN CANADA

Over the past 50 years, there has been a general decline in Canadian federal government ownership of public infrastructure, as well as a transfer of ownership and funding responsibility between the various levels of government (federal, provincial, and municipal). In 1955, the Canadian federal government owned 44 percent of public infrastructure, the Canadian provinces owned 34 percent and municipalities 22 percent (Mackenzie 2013). Today, provincial, territorial, and municipal governments own and maintain approximately 95 percent of Canada's infrastructure (Flaherty 2013). The federal government provides infrastructure development funding to provincial/territorial governments and municipalities across Canada through federal departments such as Infrastructure Canada. A recent study on the roles and responsibilities of the three levels of government for Infrastructure in Canada suggests "when it comes to Canada's physical infrastructure, the federal government has the money; the provincial governments have the constitutional authority; and local governments (municipalities) have the responsibility for making the actual investments" (Mackenzie 2013).

In the past 20 years, both federal and provincial governments have handed over infrastructure responsibilities to municipal governments

without a matching increase in funding. Municipalities in Canada are responsible for over 60 percent of the country's infrastructure but collect just 8 cents of every tax dollar paid in Canada, with the other 92 cents of tax revenue going to federal and provincial/territorial governments (Federation of Canadian Municipalities 2014). This has resulted in an ever-increasing infrastructure "gap" (or deficit) of \$123 billion which is growing at a rate of \$2 billion every year (Ibid.). A study by the Canada West Foundation estimated that while the accumulated infrastructure deficit in Canada stands at \$123 billion for existing infrastructure, an additional \$110 billion is needed for new infrastructure (Ibid.).

Today, municipalities are faced with a problem of aging infrastructure and declining investment in infrastructure. Simply put, Canadian municipalities lack the means to sustain their current infrastructure. It is worth noting that almost all current infrastructure funding is restricted to road improvements, public transit, water, and wastewater projects. There is a chronic underfunding for all other infrastructure needs. A 2013 study by the Canadian Chamber of Commerce estimated that the magnitude of investment needed to address Canada's infrastructure deficit could be as high as \$570 billion (Friendship Bay Consulting 2013). This is in addition to a report by the Association of Consulting Engineers of Canada which estimated that 50 percent of public infrastructure in Canada will reach the end of its utility by 2027 (Broadhead et al. 2014). It is therefore evident that increased levels of private investments are needed to address this problem.

The federal government, in 2016, proposed a \$186 billion investment over the next 12 years in Canadian infrastructure, including a \$35 billion investment in an Infrastructure Bank that will try to leverage three to four times that amount from private investment. On the other side of the equation, Canadian pension fund managers are increasingly finding that investment in infrastructure projects meet their investment criteria and asset characteristics and are excellent assets for inclusion in their portfolios. In most cases these assets are held for the long term, particularly as these infrastructure investment opportunities are increasingly structured as design/build/finance/operate (DBFO) projects.

Canada's trusted pension funds currently hold assets in excess of \$1.7 trillion (Statistics Canada 2016). The ten largest pension funds collectively manage approximately \$1.1 trillion (CPP Investment Board 2016). In recent years, Canadian pension funds have invested in some of the largest infrastructure deals in the world such as the operator of seven UK airports including Heathrow, one of the largest electricity transmission and

distribution companies in the USA, and three Chilean water utilities (Broadhead et al. 2014). In 2016, Quebec's Caisse de dépôt et placement du Québec announced its intention to invest \$3 billion in a proposed \$5 billion light rail system for Montreal. In 2011, a Canadian pension fund, OPSEU Pension Trust, invested \$969 million in infrastructure (7.1 percent of the total fund value) and received a 29.6 percent return on investment (OPSEU Pension Trust 2012).

Sustainable infrastructure provides a good investment opportunity (see Appendix for list of international pension funds that invest in infrastructure). In addition to integrating ESG in this asset class, there are three other characteristics associated with sustainable infrastructure which makes it appealing to prospective investors. These are: (a) the strong reward-to-risk ratio,⁴ (b) low volatility (cash flow), and (c) duration. Infrastructure is a good asset class for liability matching.

Since pension funds tend to have long-term and relatively stable expected payments to beneficiaries, infrastructure investments can match inflation-linked stable returns with the liabilities they face in the future. Also, infrastructure has a low correlation with other markets and therefore adds diversification thereby reducing a portfolio's total risk. The expected return on investment for infrastructure investments, as with any investment, is directly correlated with the risk of the project. A recent study conducted by the Institute for Research on Public Policy found that the return on investment for infrastructure investments can be anywhere between 17 and 25 percent (Friendship Bay Consulting 2013). Given the infrastructure gap in Canada as detailed above, there are ample opportunities for infrastructure investments.

Similar to the Canadian federal government's attempts to encourage private investment in infrastructure, Australia too has adopted a novel approach to effectively leverage the domestic investment community and pension fund industry. In 2011 the Financial Services Council of Australia undertook a review of Australia's pension industry's appetite for investment in public infrastructure. The review suggested that the Australian government should adopt a formal policy of 'recycling' infrastructure assets. Under this policy the federal government would review operating assets held by the government, identify those that could be sold or recycled, and use the proceeds to build and finance infrastructure. The approach includes attracting pension funds to invest in core infrastructure projects, in particular brownfield projects with a strong operating history (Fenn 2014). In July 2014, the Australian government created the Asset Recycle Fund to

fund infrastructure projects (Infrastructure Growth Package—Asset Recycling Fund).

The United Kingdom introduced a National Infrastructure Plan in 2010. This plan sets out a broad vision for the United Kingdom's infrastructure needs. Under this plan, the government specifies the country's infrastructure needs, provides a comprehensive framework for evaluating and prioritizing infrastructure investments across the country, identifies barriers to investment, and mobilizes both public and private resources (Broadhead et al. 2014).

4.4 STAKEHOLDER PERSPECTIVES

In the summer of 2016, structured key informant interviews were conducted with individuals who have been involved with ESG integration in infrastructure investment. Interviewees were sent the interview questions in advance and were invited to participate in one to one telephone interviews. The interview questions generally focused on the specific performance of various ESG products, as well as on broader questions regarding the future direction of the sustainable investment field and the sustainability performances of various discrete economic sectors. Our goal was to learn from the experiences of these individuals in the field and gain a better understanding of investors' reactions to, and the financial results of, infrastructure investments that included high ESG standards.

The overall picture that emerged from the interviews was a sense of cautious optimism regarding the future of ESG infrastructure investment. Although growth in both the uptake of ESG measurement products and ESG infrastructure investments more broadly has not always been quick, it has been steady. Increasingly, investors are recognizing the need for a paradigm shift in infrastructure investment, one that will account for environmental and social risk factors over the long term, thereby ensuring stronger long-term returns. As investors gradually begin to move from a short-term to a long-term focus, ESG factors are increasingly being accounted for. This shift is aided by various products, software, and rating systems, such as Autocase (2017) and Envision (2017), which help investors to visualize and calculate ESG factors and long-term returns. Nonetheless, obstacles continue to exist which serve to delay the full adoption of ESG standards in infrastructure investment decisions. The obstacles identified by interviewees reflect those found in the recent literature on this topic (United Nations Environmental Programme 2015). These include the lack of

standardization of ESG measurements, lack of a clear definition of sustainable infrastructure as an asset class, and the need to further educate investors on the implications of solutions such as private–public partnerships (P3s). Furthermore, established incentive structures often continue to prioritize short-term over long-term paradigms, meaning that investors may be encouraged to take only a short-term view of infrastructure returns. Changes to investment practices, and incorporating ESG priorities earlier into infrastructure construction, may also help to overcome these obstacles. Overall, however, the interviewees remained optimistic regarding the long-term outlook for ESG investment in infrastructure, believing that interest is growing in both the public and private sectors.

One of the most striking findings from the interviews was that all of the interviewees indicated that they believed that interest in ESG infrastructure initiation and investment is growing. Particular optimism was expressed with regards to the public sector, with many interviewees noting that the public sector was increasingly accounting for the broader community objectives which can be served by infrastructure construction. A number of public sector infrastructure strategies were singled out as being positive for their emphasis on ESG factors, including the US-based Prince George County Stormwater Initiative, and the biking strategies pioneered in many cities such as Vancouver, British Columbia, and Oakland, California. A number of interviewees also stated that the demand in the public sector for infrastructure investments with an ESG focus is greatly influenced by cost factors, in the sense that the public sector tends to prefer sustainable projects selected using ESG criteria, but only if it can be shown that there are no excessive costs accrued in the project as a result of the inclusion of ESG measures. In general, however, the public sector has, in recent years, expressed an increased willingness to solicit and utilize ESG data when making infrastructure-related decisions.

One area where there has been more limited public sector uptake has been in the area of P3 partnerships. The challenges experienced in using this investment model, according to certain interviewees, underscore the need to further educate the public sector about investment vehicles that can promote ESG objectives. Some interviewees noted that many government bodies were concerned about entering into P3 partnerships due to the uncertainty of project risk allocation. In particular, the public sector had concerns on whether infrastructure project risk would be allocated to the private or to the public sector, in such partnerships. Also there may be a lack of trust between the public and private sector partners, where public sector

project managers have concerns about private sector partners not upholding their commitments to the project. Ultimately, interviewees identified solutions such as greater education and clearer contract writing as potential solutions to these issues.

Uptake of ESG measurements by the private sector has been less steady than in the public sector, but nonetheless it is increasing and has been significant. Many infrastructure design companies now incorporate sustainability analyses into their design models, and certain business sectors, such as mining and energy, have been quicker to incorporate sustainability and ESG analyses into their project design plans. What emerges from the interviews is a picture of sectoral divergence with regards to ESG adoption. Certain sectors, such as storm water, wastewater, transit, and energy have proven more able to rapidly incorporate ESG analyses into their design models, whereas other sectors, such as highways, airports, and pipelines, have been more reluctant to do the same. Many interviewees noted that structural issues in infrastructure classes such as highways and pipelines can hinder the adoption of ESG criteria. A major uncertainty is whether infrastructure which utilizes non-renewable resources, or that promotes behavior and usage patterns that are unsustainable (such as highways, which promote increased car usage and therefore may serve to increase pollution, or pipelines, which often ship non-renewable resources), can be designed and built with ESG principles in mind. Thus far, many interviewees felt that these classes lagged behind others in terms of ESG incorporation, due to this fundamental dichotomy.

With regards to the private sector investors, interviewees generally agreed that certain measures needed to be taken in order to encourage a more long-range-oriented investment culture that could prove more receptive to incorporate ESG criteria. Interviewees also indicated that other actions will need to be taken by the public sector to encourage investor interest and confidence in the infrastructure sector more broadly. These include the need for the public sector to clearly define its objectives, define the added value which private investors can bring to the project, and structure the investment appropriately and collaboratively. Ultimately, governments are said to be more successful when they work collaboratively with private sector partners on long-term projects, as opposed to merely focusing on short-term collaborations. By building relationships of trust, the added value of private investors can be maximized by allowing the public sector to fully leverage on the strengths and expertise of the private sector partner. By searching for long-term private sector partners, the public sector can also

seek out partners who are interested in long-term investments and returns, as opposed to short-term partners who are merely interested in short-term profit making.

With growing demand in both the public and private sectors for ESG measurements in infrastructure projects, the commercial sector has responded with a diversity of products and measurement tools designed to aid project managers and designers in measuring ESG factors in infrastructure projects. Measurement tools and ratings systems have emerged to measure infrastructure ESG factors at both the portfolio and individual asset levels. These new tools include GRESB Infrastructure Assessment system, launched in 2016 by ten major asset owners and asset managers including several major pension funds, as well as Envision and Autocase. Similarly, new platforms are emerging to provide guidance and much needed information. These platforms include infrastructure exchanges such as the US-based West Coast Infrastructure Exchange⁵ and the Canadian Impact Infrastructure Exchange.⁶ These exchanges assist project designers and investors with designing, selecting, and executing sustainable infrastructure projects with strong ESG returns over the long term. As the desire to incorporate ESG factors into infrastructure design and investment has increased, so too has the demand for these tools.

Some interviewees, however, identified the need for both greater versatility and standardization of these tools. At present, multiple measurement tools exist for the purpose of measuring ESG factors on various types of infrastructure projects. Such a plethora of measurement tools can present problems in standardization since different measurement tools tend to emphasize or measure different factors. A standardization of measurement tools, according to some interviewees, may lend greater predictability and uniformity to ESG measurements in infrastructure.

There is a growing interest in infrastructure investments selected using ESG criteria and for ways to measure the ESG performance of the various infrastructure projects. The key question then, for many investors and project managers, is whether infrastructure projects that incorporate ESG criteria can provide sufficient financial returns, and whether these returns are comparable to infrastructure projects selected using traditional methods. Almost all interviewees thought that infrastructure projects which performed well on ESG metrics could provide similar financial returns to traditional infrastructure projects. Moreover, interviewees also felt that infrastructure projects which performed well on ESG measurements better fulfilled broader social and community objectives in relation to sustainability

and social license. To date there is limited data on the financial performance of infrastructure assets with high ESG standards, as we would find, for example, with publicly traded equities (Clark et al. 2015). Moving forward we would hope to test this assumption using data sources such as the performance of green bonds or the newly launched GRESB Infrastructure rating standard.⁷

Infrastructure investments that performed well on ESG metrics were noted to have a number of advantages as compared to traditional infrastructure. One advantage mentioned by interviewees was a greater degree of social license which high-performing ESG infrastructure projects have in comparison to traditional infrastructure projects. As a result of greater social and community support for sustainable infrastructure projects, these projects prove better able to mitigate one of the most significant risks in infrastructure development, namely, project delays. As a result of greater community buy in and consultation, infrastructure projects which perform well on ESG metrics are less likely to be subject to unexpected delays emanating from social and community opposition to the project. Although data continues to be developed on the financial performance of infrastructure projects selected using ESG criteria, all interviewees indicated that the vast majority of infrastructure projects performing well on ESG criteria were also providing competitive financial returns and that investors and clients appeared satisfied with the results of these infrastructure projects.

Some interviewees also noted the need for ESG factors to be incorporated early into the infrastructure development process in order to ensure that the short-term costs of incorporating ESG criteria are mitigated and reduced. These interviewees noted that it was more expensive to bring projects into ESG compliance later on during the project execution phase, rather than at the beginning during the feasibility and design phases. According to these interviewees, the cost of ESG integration is best mitigated by an early and consistent commitment by project designers to ensure a strong ESG performance in infrastructure projects.

When taken together, all interviewees expressed a great deal of confidence in the future of sustainable infrastructure projects and in the future utility of ESG measurements to ensure better performing infrastructure projects. Many interviewees did, however, identify a continued need for a paradigm shift in the realm of infrastructure investment, a move away from an emphasis on short-term returns toward more long-term projects which prioritize stability and a broad range of community returns. They also stressed that educational and advocacy work in this area needs to be

ongoing and will continue to be crucial as the transition toward a new model of infrastructure investment continues.

4.5 IMPLICATIONS AND CONCLUSION

With the steady decline in public stock market returns and bond valuations, large institutional investors, particularly pension funds and sovereign wealth funds, are increasingly moving their investments into the infrastructure asset class. This shift is vitally important, as it is well recognized that governments alone do not have the necessary resources to meet our infrastructure needs either domestically or internationally and private investment will be required. As a result, the infrastructure asset class is becoming an important component of the global financial system. However, the question remains as to whether investors can embrace long-term social, environmental, and governance (ESG) considerations in their infrastructure investment decisions that will help to underpin a more sustainable financial system going forward.

Initially pension funds and sovereign wealth funds began their foray into infrastructure investment by outsourcing this asset class to fund managers with specialized knowledge. But many of the more sophisticated investors are now moving away from an outsourcing model for these investment decisions to an in-house infrastructure investment model (Clark et al. 2011). The result is that these investors now hold long-term investments in infrastructure that resemble project finance, with payouts over time based on the revenues generated by the asset itself. Given the long-term nature and risk exposure of infrastructure investments, investors need to take environmental, social, and governance (ESG) factors into consideration, not only at project inception but also over the full life cycle of the asset. In a way, the trajectory of embedded high ESG standards in infrastructure investments is following the path of real estate investment which began in the 1990s. As investors began to hold real estate assets over longer periods of time, high ESG standards, particularly in new construction, were demanded. This trend is particularly evident with the use of the Leadership in Energy and Environmental Design (LEED)⁸ building standards at the ‘gold’ or ‘platinum’ level. We can expect a similar pattern to emerge in the infrastructure asset class.

Taking ESG into account in investment decision-making is core to the investment beliefs of ‘responsible investors’. Currently asset owners and managers with over \$60 trillion of assets under management have signed

the UN-backed Principles of Responsible Investment (PRI) pledging to integrate ESG into their portfolios (United Nations Principles of Responsible Investment 2016). As per our interviews, supporters of the PRI felt that such an approach, one that no longer views environmental, social, or governance impacts as externalities results in reduced project risks and has the potential to financially outperform more traditional projects that do not take ESG criteria into account, to create a more sustainable overall financial system.

In the past these investors were primarily concerned with lowest initial costs in infrastructure developments, believing that this approach would yield the highest possible returns. While they rigorously analyzed their public equity holdings for ESG factors that may prove material in the financial performance of a company, they did not apply the same principles to their infrastructure holdings. However, this is beginning to change with the advent of new platforms such as GRESB Infrastructure, the West Infrastructure Exchange, and the Canadian Impact Infrastructure Exchange, and new ESG infrastructure measurement tools such as Envision and Autocase. These platforms and tools have resulted in an increased ability to take ESG factors into consideration in infrastructure investment decision-making.

But much work remains to be done. Our research and that of others in the field (Kaminker 2016) suggest that there are barriers to both infrastructure investments broadly and ESG integration in infrastructure projects, specifically. These barriers include the lack of standardization of ESG measurements, no clear definition of sustainable infrastructure as an asset class, and the need to further educate investors on the implications of new and innovative ways to structure infrastructure investment opportunities. A further barrier (and one that also hinders ESG integration in other asset classes) is incentive structures that all too often prioritize short-term over long-term paradigms. This results in fund managers and asset owners continuing to take short-term views on infrastructure returns.

Investors also want to know the financial implications of raising ESG standards in their infrastructure portfolios. More specifically, they want to know if taking ESG into account will pay off over time with higher financial returns. While we have considerable research on the impact of ESG integration on public equity financial performance, currently no such data exists for the infrastructure asset class. Several factors contribute to this lack of data. Firstly, the asset class itself is not homogeneous, and it covers a wide range of hard assets from roads and airports to wastewater and power grids.

Secondly, infrastructure assets include both equity and a debt component which makes financial valuation difficult. Finally, much of the current investment in infrastructure is in private markets that are not required to disclose their financial returns to the general public. The lack of transparency in this asset class is often identified as a further barrier to investment (Institute of International Finance 2014).

Global Infrastructure Basel, a Swiss foundation which promotes the development of sustainable and resilient infrastructure internationally through sustainable infrastructure design and financing, identified three key elements necessary to transform sustainable infrastructure into a viable asset class. Firstly, sustainable infrastructure must be distinguishable from conventional infrastructure. Secondly, securitized investments in sustainable infrastructure must be able to demonstrate a distinct financial performance when compared with other asset classes. Finally, this performance needs to be transparently monitored and reported to the market (Kaminker 2016).

In order to finance the sustainable infrastructure needs of cities in the twenty-first century, the value of sustainability must be demonstrable and accessible to capital markets and institutional investors (Wiener 2014). Strategic asset allocators, such as large pension funds, sovereign wealth funds, private capital managers, family offices, grant making foundations, and insurers, are particularly well placed to create financial flows in the direction of sustainable infrastructure (Ibid.). These investors will be important to the future of infrastructure investment, as public funds continue to be limited in light of new economic and political realities (World Economic Forum 2013).

However, before these asset allocators decide to invest significant amounts into sustainable infrastructure, they must first come to view sustainable infrastructure as an attractive and lucrative asset class (Ibid.). Strong 'enabling environments' will be crucial in helping to build private sector investor confidence in infrastructure investment (Bielenberg et al. 2016). These enabling environments should consist of sound government policies, strong institutions, transparency, reliable contract enforcement, and other sector-specific factors (Ibid.). Taken together, these factors can aid in creating a strong investment environment that will help to encourage investment activity in sustainable infrastructure.

Notwithstanding these challenges both in the asset class generally and in ESG integration within it, investment in infrastructure with high

environmental, social, and governance (ESG) standards holds great promise for sustainable finance going forward. This will be crucial if we hope to achieve the UN Sustainable Development Goals by 2030.

INTERNATIONAL PENSION FUNDS THAT INVEST IN INFRASTRUCTURE

| <i>Fund</i> | <i>Infrastructure investment (CAD)</i> | <i>% of total portfolio</i> |
|---|--|-----------------------------|
| Australian Future Fund | \$5.01 billion | 6.4 |
| BT Pension Scheme | \$610.9 million | 1 |
| Folksam | \$157.1 million | 0.33 |
| Pensioenfonds Zorg en Welzijn | \$24.36 billion | 14.5 |
| Construction & Building Unions Superannuation | \$744 million | 4 |
| National Pensions Reserve Fund | \$461.33 million | 2.25 |
| New Zealand Superannuation Fund | \$1.58 billion | 9 |
| VicSuper | \$225 million | 2.5 |

Source: Hakan Mustafa, Carleton Centre for Community Innovation, 2013

NOTES

1. Information asymmetry occurs when one party in a transaction has more information than the other party. Informational asymmetry leads to modified market behavior on the part of both the advantaged and disadvantaged parties, as the advantaged party will attempt to exploit its informational advantage, and the disadvantaged party will aim to either seek more information, or, if this is impossible, engage in certain forms of risk mitigation to control for having less information than the other party. George Akerlof, in his paper *The Market for Lemons*, famously discussed the issue of information asymmetry as it pertains to the automobile market. He claimed that defective used cars had the potential to damage the entire used car market, as buyers are unable to distinguish between good and bad used cars, and therefore attempt to control for the risk of defective used cars by spending less on all used cars (Akerlof 1970). This means that used cars in good condition cannot attain the price which they deserve, because of the entire market being harmed by defective cars (Ibid.). As a result, owners of used cars in good conditions are less motivated to sell these cars on the market (Ibid.). This paper will argue that, through analyzing infrastructure investments using an ESG lens, investors will be more able to rationally control for risk in infrastructure. Rather than engaging in generalized risk controls as a result of lack of information, as

seen in Akerlof's example, investors will instead be able to engage in targeted risk control through the analysis of ESG factors.

2. Envision is a sustainable infrastructure rating system which uses 60 sustainable criteria to measure the performance of infrastructure projects. The criteria are arranged in five categories: quality of life, leadership, resource allocation, natural world and climate, and risk.
3. Autocase is a software designed to model the cost, benefit, and risk of green infrastructure features and low-impact development systems using the Triple Bottom Line (environmental, social, and governance) Cost Analysis.
4. The risk of impact infrastructure is divided according to the type of investment. For example, greenfield infrastructure investments are riskier than brownfield investments which are considered the least risky.
5. The West Coast Infrastructure Exchange is an infrastructure platform which is designed to help connect potential investors with sustainable infrastructure investments. It also aims to develop best practices in the sustainable infrastructure field and improve transparency in the infrastructure asset class by providing more information to investors regarding infrastructure performance.
6. The Canadian Impact Infrastructure Exchange aims to help connect private investors with public-private partnerships in the field of impact infrastructure. It also aims to provide high-quality information regarding both the financial and extra-financial returns of impact infrastructure projects.
7. GRESB Infrastructure is a tool which provides systematic assessment, objective scoring, and peer benchmarking for environmental, social, and governance (ESG) performance of infrastructure companies and funds. These evaluations take place around a variety of metrics, including metrics that measure management and leadership, communication, engagement strategies, and financial performance indicators. GRESB Infrastructure seeks to measure both the performance of infrastructure assets individually and at the portfolio level. It is a tool that was developed in close consultation with institutional investors including pension funds.
8. The LEED is a building evaluation and certification system that measures building performance based on several metrics, including indoor environmental quality, energy and water efficiency, environmental friendliness of materials, location and transport access, as well as innovation and regional environmental impacts, among other factors. Four ratings are assigned to a building based on performance in relation to the metrics. From lowest to highest, these ratings are: Certified, Silver, Gold, and Platinum.

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Pricing Carbon: Integrating Promise, Practice and Lessons Learned from the Chicago Climate Exchange

Paula DiPerna

Wind rustled slightly in the trees behind Economist Richard Sandor as he swiveled his chair around in the bay window at a conference center in Glen Cove, Long Island, in 1995. We were both attending a gathering of the Secretary-General's High-Level Advisory Board (Hi-Lab), a group convened by then Secretary-General of the United Nations (UN) Boutros Boutros-Ghali to advise him on how to raise funds to implement all the high-minded official agreements that had come out of the landmark Earth Summit held in Rio de Janeiro in 1992. The Rio Summit, where the original legally binding Framework Convention on Climate Change had been signed by most of the leaders of the world, had left us all with an idealistic glow. After all, never in history had so many world leaders come together on any topic, let alone to declare that environmental issues were indivisible from economic issues and that climate change required urgent concerted attention, first by developed countries and, in good time, by developing countries too.

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Sandor, a well-known economist, had been named to Hi-Lab, and I was representing French underwater film pioneer and environmental hero, Jacques-Yves Cousteau, who had also been named and with whom I was working at the time as a writer and Vice-President for International Affairs. My job had been taking me on exotic expeditions all over the world with the legendary ship, *Calypso*, from remote Amazon villages to the farthest reaches of New Zealand, and always also to the highest pinnacles of world political power. At the time, Cousteau was one of the most recognized people in the world, thanks to our regular television documentaries, and it was a rare Head of State who did not want to shake his hand or sit down and speak with him. In fact, Cousteau and I had had a candid meeting with then President George H.W. Bush at the White House to try to convince him to attend the Rio conference and sign the Climate Change Convention, which would have meant his defying the anti-UN, anti-climate science advisors sprinkled throughout his coterie. To Bush's credit, he went and he signed.

But financial issues remained pressing. Most other Hi-Lab members at the Glen Cove meeting were economic development or banking experts, but the field we now call sustainable investment did not elicit even a whisper. The field barely existed then, still mainly a boutique pursuit by a handful of farsighted financial thinkers, and virtually no mainstream pressure existed on private capital to move from high-carbon to low-carbon investments. Screening of investment decisions for environmental, social and governance (ESG) factors was also nearly nonexistent, as compared to today when, according to the 2016 Sustainable Investment Forum (SIF) report, roughly one in five dollars invested in the USA is scrutinized for various ESG considerations.

At Glen Cove, the financial discussion, therefore, was mainly conventional. Yet, we were all there for a single reason—to try to come up with a recipe for how the world could locate \$125 billion extra per year, the back-of-the-envelope estimate then of what it would take to implement the ambitious plans and agreements signed and agreed at Rio, a pittance now compared to the \$13.5 trillion stated by the International Energy Agency in its 2015 World Energy Outlook as the sum that would have to be mobilized by the energy sector alone to meet projected low-carbon energy objectives of the Paris agreement, signed 25 years after Rio, at the 21st Conference of the Parties to the Framework Convention on Climate Change (COP-21).

Sandor, who was dubbed the “father of financial futures” for his invention of interest rate derivatives as Chief Economist at the Chicago Board of Trade, had been invited to the Rio conference by the UN. He had been

asked to speak about whether the cap-and-emissions trading system that the USA had implemented to reduce sulfur dioxide (SO₂) emissions and acid rain under the Clean Air Act could be adapted to address greenhouse gases. Sandor had advised the EPA on its SO₂ program, especially market and exchange aspects.

Cap-and-trade, though still much misunderstood today, is actually a venerable and pragmatic US invention, developed at the United States Environmental Protection Agency (EPA) in the 1980s. At the time, heavy smog and acid rain plagued the northeast states due to gritty caustic SO₂ emissions wafting eastward from coal-fired plants based in Midwestern states, and the EPA was preparing to require SO₂ reductions. But utilities claimed that compliance would be too costly and that cleaner technologies were not yet available.

The cap-and-trade concept was conceived to add flexibility and spread costs of reducing SO₂ emissions among all emitters. The basic cap-and-trade principle is simple: a group diet with a group calorie count. All participants in a cap-and-trade are subject to a collective “cap,” or maximum emissions allowed per year, established by public policy and regulation. Emissions below that cap are allowable; emissions above the cap are not. Collective emissions must remain below the cap, and participants are issued “allowances” concomitant with their portion of the allowable emissions pie. In order to generate environmental benefit, caps must be set in accordance with scientific limits, that is, how many tonnes of emissions need to be reduced by when in order to achieve notable environmental improvement. The key to environmental progress through a cap-and-trade is that the cap or limit is progressively tightened, progressively limiting allowable emissions and therefore available allowances. As supply shrinks, demand rises and allowance prices too. This supply-demand dynamic gradually makes it more costly to buy allowances than to make reductions and thus also helps accelerate demand for new technologies and incentivizes each emitting entity to transition to cleaner more efficient electricity generation.

Participants each have a baseline and are required to reduce their emissions below that baseline, keeping their emissions below the collective cap, however they can. Emitters generally have different starting points, and some emitters, for whatever reason, can stay under the cap more easily than others. For example, some emitters may have already installed state-of-the-art efficiency technologies, or may be better equipped to quickly switch to cleaner fuels. Such emitters may not use up all their allowances and could be considered “under-emitters” relative to the overall cap. These

participants can become sellers and are “long” in the market, and may sell the allowances they do not use to participants who are in the opposite situation—having used up their annual allowances but still exceeding their annual limit. These “over-emitters” are short in the market, and if for whatever reason they find they cannot make further reductions directly, they have to buy allowances from others who have surplus so that, collectively, all participants remain below the common emissions cap.

Brokers and commodities traders enter the market as well to buy, sell, hold and speculate on the price of a carbon allowance as on any other commodity, such as soybeans or wheat, and futures and forward markets also evolve the more robust and liquid the market becomes.

Ideally, because of the public environmental purpose of such a market, transactions occur on regulated bona fide public exchanges, like stocks, so that trading prices are transparent and provide a constant open public market signal. This market signal is critical to what we today call a “price on carbon,” since the market signal represents the “what the market will bear” price, that is, the minimum a buyer will pay for an allowance.

In theory, this price equates to the cost of actually making a reduction of a tonne of greenhouse gases (GHG). Each emitter, of course, is unique and faces a different cost per tonne because each emitter has a different starting point to make the low-carbon changes needed at a given facility. For example, a utility may face very high costs to retrofit a coal-fired plant to burn cleaner or even use an alternative fuel, as compared to a utility that may be starting from scratch with a new facility. Also, each emitter will have a unique financial profile, which can influence borrowing and other costs that can in turn influence the overall cost of making direct reductions. So at any given time, it may be less expensive for an over-emitter to purchase allowances on the market than undertake the operational or strategic business changes necessary to make the reduction directly. Critics of cap-and-trade say this option lets emitters off the hook, enabling them to buy their way out of taking action. But, on the other hand, cap-and-trade encourages the least cost emissions reductions to occur first, gradually herding in the rest.

Sooner or later, laggard emitters also have to make direct reductions, since the cost of allowances will tend to rise as the cap is tightened and, gradually, the cost of actually making the reduction becomes financially irresistible as compared to the going price for allowances. Cap-and-trade does allow emitters to buy time, yes, but not indefinitely. Regarding SO₂, as a result of the cap-and-trade system, new scrubbing technologies came to market quicker because of the need and demand of the over-emitters, costs

of reductions were much lower than projected, and eventually the US smog and acid rain problems disappeared, with considerable health and other benefits. (See www.epa.gov.)

While the US EPA was developing the SO₂ program, Richard Sandor had advised that market regulations should also require emitting entities to install continuous emissions monitors (CEMs) at all emissions sources, so emissions and reductions could be accurately measured. CEMs readings are regularly monitored and collect data in real time. Sandor knew that in order for commodities traders to enter a new market and place bids and offers, they would have to believe that the underlying commodity, in this case a tonne of SO₂ reduced, was valid, that is, had actually occurred and thus had compliance value for which a market participant would pay.

Just as a bushel traded should be a true volume bushel of wheat, so a tonne must actually be a tonne. CEMs provided that assurance and the symmetry of information that all participants in a public market require, that is, all participants have the same knowledge at the same time and this core information cannot be falsified other than at pain of criminal penalty.

The installation of CEMs proved vital to the success of the SO₂ program but, also, coincidentally, paved the way for reduction of carbon dioxide emissions as well. CEMs use a chemical process to measure emissions and, in one of those little-known twists of history, when the CEMs were installed to gather SO₂ information, an astute technical engineer at the EPA made sure that the reagent used was also sensitive to CO₂. This meant the SO₂ CEMs could also record CO₂ emissions.

Thus, as a corollary benefit to tracking SO₂ emissions, the USA has been able to track most of its utility Scope 1 CO₂ emissions accurately for many years and long before it was required by law, thanks to the farsightedness of a single diligent civil servant who understood that having CO₂ data would be useful one day (Paula DiPerna, Personal Communication 2005).

That CO₂ monitoring was already occurring in the USA gave the USA a head start on a CO₂ cap-and-trade, and in his remarks at the Rio Summit, Sandor told his audience that a cap-and-trade for climate change was entirely feasible.

The Glen Cove meeting had the usual flavor—many erudite persons sit at a table in a circle or horseshoe to offer a view on a question at hand. Attendees generally say what they come prepared to say, even if someone else has already made the same point, or makes a better one. The bouncing ball traveled around the table at Glen Cove as usual, but the attendees had the same single lament—the world surely lacked the money to implement

the Rio agreements. Until Sandor spoke. He simply said, “I’m no expert on climate change, which is complicated. But I do know something about commodities trading and I believe that global emissions trading could help. However, the thing about trading is that you can never know if it will work until you try it. So, I propose that we try it.”

It was just that pat—“let’s try it”—but those words hung in the room as if spoken in an alien language. The next speaker took no notice of Sandor’s intriguing nugget, as I recall.

No one asked, “How would we try it?” or “Could you try it?” or “What makes you think it would work?” The word baton passed to the next attendee, and Sandor’s idea melted away with all the others that day as the group broke up. But I asked Sandor for his card. He projected that same explorer’s curiosity and can-do zest that appealed to me in my Cousteau adventures.

Time marched on, but the world made no progress on finding the \$125 billion. Promises made by the developed countries to help fund the fight against climate change in developing countries fell flat. At least in 1997, the world did laboriously negotiate the Kyoto Protocol, which included a provision to create a cap-and-trade system due to insistence by the US delegation. But by then the urgency of the original Rio agenda had been eclipsed by other world concerns and the Kyoto Protocol had become political poison in the USA. Naysayers maligned it as detrimental to the US economy because it did not cover China and India, even though the Bush Administration had committed to the underlying Framework Convention which explicitly called for developed countries to act first.

It is true, of course, that the emissions of China and India were growing fast but, as we see even today, neither of these emerging economic powerhouses was willing or required to make major reductions before the Western economies did so, even if emission reductions had local benefits. This us/them gridlock doomed the Kyoto Protocol.

Still, at the time, the world hoped the USA, under the Clinton-Gore Administration, would eventually get on board with cap-and-trade, its homegrown idea. Meanwhile the European Union set to work complying with Kyoto and began the design phase for its own Emissions Trading Scheme (EU ETS), which still operates today.

Climate change policy was thus tenuously perking along in July 1999 when I accepted the position of President of the Joyce Foundation in Chicago, a well-established philanthropy known for its innovative grant

making and where environmental concerns were central. Sandor was also based in Chicago, and I had kept his card and his Glen Cove comments in mind for four years. So, now settled in Chicago too, as soon as the 4th of July weekend ended, I tracked Sandor down and made the call.

“I’d like to pick up on that idea you tossed out at Glen Cove in 1995,” I said to a startled Sandor. “What would it take to try it?”

And so began the spontaneous combustion that eventually led to the creation and success of the Chicago Climate Exchange (CCX), the world’s first and still only cap-and-trade system that covered all six major greenhouse gases, globally and across all economic sectors.

Sandor was eager to talk and so we had lunch on July 14, 1999, where Sandor sketched out his plan in the air, since we were at a private club where no papers were allowed at tables. We had a hunch in common: smart corporate executives had to exist across the country who knew that climate change was risky for business, and that dealing with it was inevitable, even if no US law yet said so. We also knew that corporate leaders viscerally disliked the kind of regulatory uncertainty swirling around the issue then, generally much preferring the proverbial level playing field. So, we reckoned a critical mass of corporations could be ready for some form of voluntary standardized vehicle, and that if a cap-and-trade system was up and running in the USA, it might attract innovative thinkers with an early adopter mind-set, if only to get ahead of regulatory trends, and competitors, and to learn the nuts and bolts of cap-and-trade, still considered the most likely policy tool.

We further reckoned that a voluntary system could serve as a useful placeholder while mandatory policy took shape, building up advocates for regulatory certainty as companies gained practical experience and shed their fears of emissions reduction commitments. In sum, our goal was to jump-start a national system by creating a surrogate, and see what happened.

Sandor submitted a formal Letter of Inquiry to the Foundation’s head Environmental Program Officer at the time, Margaret O’Dell, who was herself known for visionary grant making, and also gave a personal presentation to the Board of Trustees, which included the rising Chicago star and then Illinois State Senator, Barack Obama, who was greatly supportive. Ultimately, the Joyce Board approved two grants of \$1.1 million total that supported a feasibility study and the design phase of what it would take to “try” emissions trading.

Sandor, who served as CCX Chairman, coined the term “climate exchange” to encapsulate the goals of the exchange and named the enterprise for its home city. Chicago also eventually became the first CCX

member city, to echo its storied history as the nation's center of commodities trading and host to the great corn, soybean and wheat grain markets of the Midwest.

CCX was unprecedented, and all were excited by the high-stakes prospects, for if CCX could succeed, a transformation could be triggered, the essence of philanthropic purpose. (As for me, I left the Foundation to return home to New York after the 9/11 events occurred. I eventually joined CCX in 2005, as Vice-President for Recruitment and Public Policy and President of the International division. Later, Sandor and I were smeared by anti-climate change fringe media press, along with President Obama, as having set up CCX so we could personally make money, an absurd assertion. In fact, when CCX which launched officially in 2003 as a private business and its shares began being traded on the AIM exchange in London, Sandor paid the Joyce Foundation its original investment back in CCX stock, a rare gesture in philanthropy that was neither requested nor required.)

Though we did not call CCX a "club" at the time that term could have been applied since it has been used recently to describe entities that want to take action on climate change even though not compelled. But CCX was really more a "coalition of the willing" for CCX tapped indeed into what could be called "climate action readiness," not unlike the idea of "reading readiness" applied to young learners who cannot or will not read until they are ready and then, poof, there is no turning back.

To ignite this latent appetite, through the design phase, Sandor and his team tapped feverishly into their personal networks and referrals, contacting utilities, companies, traders and nongovernmental organizations, inviting them to enter the planning process. Numerous enterprises, committed or just curious, attended the first design meetings, and worked together to develop the CCX basic framework, known as the Chicago Accord. It stated the goals of CCX were to:

1. demonstrate unambiguously that a cross section of US industry can reach agreement on a voluntary commitment to reduce greenhouse gases and implement a market-based emissions reduction program;
2. establish proof of concept by demonstrating the viability of a multi-sector greenhouse gas emissions cap-and-trade program supplemented by project-based offsets;
3. establish a mechanism for achieving price discovery as well as developing and disseminating market information;

4. allow flexibility in the methods, location and timing of emission reductions so that greenhouse gas emissions can be reduced cost-effectively;
5. facilitate trading with low transaction costs;
6. build market institutions and infrastructure and develop human capital in greenhouse gas emissions trading;
7. encourage improved emissions management;
8. harmonize and integrate with other international or sovereign trading regimes;
9. develop a market architecture that rewards innovative technology and management and encourages sustainable farming and forestry practices.

More design meetings occurred. Some participants fell away, others came on board. By 2003, CCX had indeed attracted a critical mass of intersectoral members who had signed the CCX legally binding commitment letter and was ready to launch. CCX announced Phase I of the reduction schedule would run from 2003 to 2006. Members paid dues and audit fees up to about \$75 k/year, depending on their baseline size, for the purpose of taking actions they did not have to take under any current or imminent actual legislation.

CCX was at first a cash spot market only and established the Carbon Financial Instrument (CFI) as its tradeable financial currency—each CFI represented a tonne of CO₂ equivalent (CO₂e). CFI Futures also eventually came into the market system.

CCX Charter Members were a billboard of diverse and leading global corporate brands (Fig. 5.1):

The CCX contract required members to:

1. conduct an inventory of all GHG emissions in all North American operations, for years 1991–2001, for the purposes of establishing an average baseline year.
2. reduce absolute emissions by 1% per year below that baseline each year of Phase I, through direct emission reductions, or buy CFIs from other CCX members, the collective result of which would be for all CCX members to remain below the collective cap.

And, to trigger the maximum environmental benefit, CCX expanded beyond CO₂ to cover the other five major greenhouse gases: nitrous oxide

**CHICAGO CLIMATE EXCHANGE
FOUNDING AND CHARTER MEMBERS**

Automotive

Ford Motor Co.

Chemicals

DuPont

Commercial Real Estate

Equity Office Properties Trust

Environmental Services

Waste Management, Inc.

Electric Power Generation

American Electric Power

Manitoba Hydro

Electronics

Motorola, Inc.

Food Processing

Premium Standard Farms

Forest Products Companies

International Paper

MeadWestvaco Corp.

Stora Enso North America

Temple-Inland Inc.

Technology

Millennium Cell

Liquidity Provider

Carr Futures

Natsource LLC

Evolution Markets LLC

Municipalities

City of Chicago

Non-Governmental Organization

World Resources Institute

Semiconductors

STMicroelectronics

Steel

Roanoke Electric Steel Corp.

Transportation

Amtrak

Pharmaceuticals

Baxter International Inc.

Diversified Manufacturing

Bayer Corporation

Private University

Tufts University

Fig. 5.1 Founding Members in 2003

(N₂O), sulfur hexafluoride (SF₆), methane (CH₄), chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), all of which have more dangerous global warming potential than CO₂.

Audits of baselines, and all financial and environmental transactions, were conducted by the Financial Industry Regulatory Authority (FINRA), which provides oversight to the securities industry and was then known as the

National Association of Securities Dealers (NASD) and headed by Mary C. Schapiro, who went on to head the US Securities Exchange Commission and has remained deeply involved in climate issues and environmental discourse since her first forays into the topic through CCX.

CCX also pioneered offset project development and integration of offset credits to emissions reduction regimes worldwide, led vigorously by economist Dr. Michael L. Walsh, founding Executive Vice-President of CCX, who had worked with Richard Sandor at the Chicago Board of Trade. Offsets, of course, have always been controversial, in that, generally, rather than actually reduce a tonne of emissions, an offset either avoids or sequesters emissions. Classic offset projects include reforestation, so that trees capture CO₂, or no-till agriculture, where less CO₂ is released from the soil, or methane capture from landfills, and so on. Holders of bona fide and verified offset credits can sell them to buyers in a cap-and-trade system.

CCX developed a broad network of offset project providers and aggregators to develop its offset offerings. The offset field was already growing since, at the time, the EU ETS was linked with the UN system of Certified Emission Reductions (CERs). These were offset projects undertaken in developing countries, the credits for which could be sold into the EU ETS. The CER system suffered from oversupply and bureaucratic delays, but the core principle was sound: while developed countries made actual reductions in accordance with the Rio principles, developing countries could leapfrog high-emitting energy production through low-carbon projects that would also generate revenue through credit sales to EU buyers.

CCX worked directly with hundreds of farmers in the Midwest in states from Iowa to Michigan to develop and apply protocols to account for emissions benefits from no-till agriculture, cities to develop credits for methane capture and substitution of LED lighting, and numerous reforestation protocols, and it was even in the process of developing a protocol to help guide the capture of methane emissions in coal mines. Coal mine methane-capture offsets would not only have potentially generated income in coal-mining states through sales, methane capture would have also simultaneously made mining safer for coal miners, since methane buildup can cause mines to explode. Our protocol should have appealed to coal-mining companies and states such as West Virginia, but their opposition to any form of climate change action was absolute and remains so today.

One of the most inventive and promising offset projects was set up in Kerala, India, to help eliminate the long-festering problem of ashy and unhealthy air that can permeate village houses that used open mud cooking

pits fueled by firewood. A local community group, Andhyodaya, had introduced biogas cookers to substitute for the cooking pits, but the new devices were not maintained and the program faltered. A representative of Andhyodaya had heard about CCX and wondered if the sale of carbon credits could help generate revenue to repair the digesters and improve the program. Economist Murali Kanakasabai, who worked at CCX and had been born in India, set to work.

Biogas, of course, generates methane and, in CCX, methane capture could generate credits. So, Andhyodaya agreed to repair or replace faulty digesters and to calculate methane input/output, as well as train local people to do so. The organization also provided verification of results. But the true breakthrough was that the Federal Bank of Kerala took the unprecedented step of underwriting the program risk and was willing to pay villagers cash on demand when they presented proof of methane reduction or “carbon vouchers” without additional transaction costs. Villagers with bona fide vouchers received the cash equivalent of the tradeable value of their credits that day on the CCX platform, and the credits then entered the CCX buy-sell pool.

The meeting where the program was announced attracted scores of local villagers, including many women who, after all, spent the most time in the foul air of the kitchens and in the exhausting work of collecting firewood. Their gorgeous saffron and red saris brightened the room like sunlight (Figs. 5.2 and 5.3).

That villagers received cash in the pocket seamlessly and smoothly built up their confidence in the program and their willingness to keep the biogas cookers in good shape, not to mention getting the soot out of their kitchens. Word of mouth did the rest.

The Andhyodaya Biogas aggregation program started with a pool of 15,008 rural participants from 12 districts in Kerala and, by the end of Phase One, had transferred approximately \$1.2 million in gross revenue to participants. Phase Two extended the program to Karnataka, Andhra Pradesh and Punjab in North India, and was projected to reach approximately 113,000 rural households, displacing nearly 500,000 tonnes of CO_{2e} and transfer roughly \$2 million per year. The program also used funds from selling carbon credits to have all the biogas plants insured. No similar reductions-for-cash project was executed before or since.

To maximize the offsets program, and involve as many entities as possible in emissions reduction and management, CCX also offered Associate Membership, a “carbon neutral” program eligible only to entities that did not generate Scope 1 emissions directly but wished to offset their Scope



Fig. 5.2 Photos from Kerala



Fig. 5.3 Photos from Kerala

2 indirect emissions from purchased power. Through this program, Associate Members, mostly office-based enterprises, had to agree to do an inventory of their Scope 2 emissions each year, and to purchase offsets equivalent to that annual emissions output each year of Phase I, regardless of whether their electricity consumption went up or CFI prices rose. Associate Members could also opt in their total business travel or other indirect emissions, so long as these add-ons were entity wide. Associate Membership differed from other “carbon neutral” programs in that CCX Associate Members had to sign a contract committing them to achieve carbon neutrality each year. There was no opt-in opt-out or cherry picking once a Member had signed on.

At one point, even the US House of Representatives became an Associate Member of CCX and bought CCX offset credits from providers in many different states to meet its commitment to become carbon neutral, a goal established by then Speaker of the House, Nancy Pelosi, and demonstrate that climate change mitigation action was underway nationwide.

But, in keeping with the axiom that no good deed goes unpunished, CCX offset projects were criticized by some, who disapproved of offsets in general, or quibbled with some of the CCX experimental protocol methodology. It is true that, at times, we allowed credits for actions that might have been undertaken “anyway,” meaning those actions were not additional to business as usual, such as when we grandfathered in a year of carbon credits for a Midwestern farmer who may have been using no-till agriculture methods before the farm entered the CCX program. But that farmer, once in the program, had to commit to continue no-till in keeping with the CCX schedule and to a reserve acreage pool in case of fire or other mishaps. And, any giveaway credits were minuscule compared to the program overall.

Also, we felt that to allow credits for a limited amount of nonadditional action was a loss leader both we and the atmosphere could afford at the time, for the sake of expanding the constituencies for climate change action beyond the usual environmental advocacy cohort and expanding market knowledge and market growth overall. One inescapable fact about climate change and cap-and-trade is that small efforts are meaningless. Drinking weak tea generally serves no purpose.

Still, incredibly to us, some scathing and spurious critiques were written, even lambasting the US Congress for its use of CCX offsets but, though I confess I once sent flowers to one of our critics to dispel bad will, CCX continued its work regardless. Michael Walsh and I, for example, spent many a day in Sacramento, California, briefing the California Air Resources

Board (CARB) on our offset protocols and rationale as the state was designing its state-based cap-and-trade regime. And despite the skepticism expressed by some at the time, overall, the CCX protocols have stood the test of time and were similar or identical to many offset protocols now in application, including in California.

While CCX, as a prototype organization, surely had some flaws in design, the criticism leveled was shortsighted, unfair and, one can see clearly today, quite counterproductive, since it played into the hands of those who already looked askance at cap-and-trade as a useful tool, not to mention climate change deniers, who were skillful in exploiting any weakness in the environmental flanks.

But despite the ups and downs, CCX did offer Phase II to all members, to run from 2006 to 2010 and added an additional annual emissions reduction requirement.

By the time CCX ended Phase II in 2010, the program-wide baseline of 680 million metric tonnes CO₂ was one-third the size of Europe's EU ETS, and double the combined size of the RGGI and California programs at the time, which meant that during the days of CCX, the USA had more emissions under a managed cap than any other country in the world, including Germany, which then had the largest National Allocation Plan in the EU ETS.

CCX members represented 17% of the Dow Jones Industrials, 11% of the Fortune 100, and 20% of the largest emitting utilities in the USA (Fig. 5.4). Summarized by Michael Walsh, accomplishments of CCX included:

- Participation of 450 members including electric power generators, manufacturers, retailers, governments and universities.
- Audited emission reductions totaling nearly 700 million metric tonnes of CO₂ over the 2003–2009 period, approximately equal to taking 140 million cars off the road for a year.
- Industrial emission reductions accounted for 88% of aggregate GHG reductions over 2003–2009, the remaining 12% of mitigation produced by offset projects.
- Participation by more than 15,000 farmers, ranchers and foresters who conduct verified carbon best management practices on more than 25 million acres of land.
- Activities in all 50 US states, 8 Canadian provinces and 16 countries.
- Over 150 million metric tonnes CO₂ credits traded on the CCX market platform, with a weighted average price of \$3.26 per metric tonne CO₂.

- Over 83 million tonnes registered in the CCX offsets program since 2003 including over 27 million metric tonnes of agricultural soil and rangeland and over 26 million metric tonnes of methane reduction credits.
- Establishment of a robust and diverse set of offset protocols and verification bodies with input from hundreds of experts.
- Extensive knowledge development and transfer through self-governance system that conducted over 400 committee meetings addressing environmental compliance and audit, offsets, forestry, trading practices as well as multiple technical subcommittees.
- Hundreds of educational and lessons sharing sessions conducted at dozens of universities and other nonprofits, the US Senate, House and White House, cities, states, trade associations and numerous international events and UN meetings.

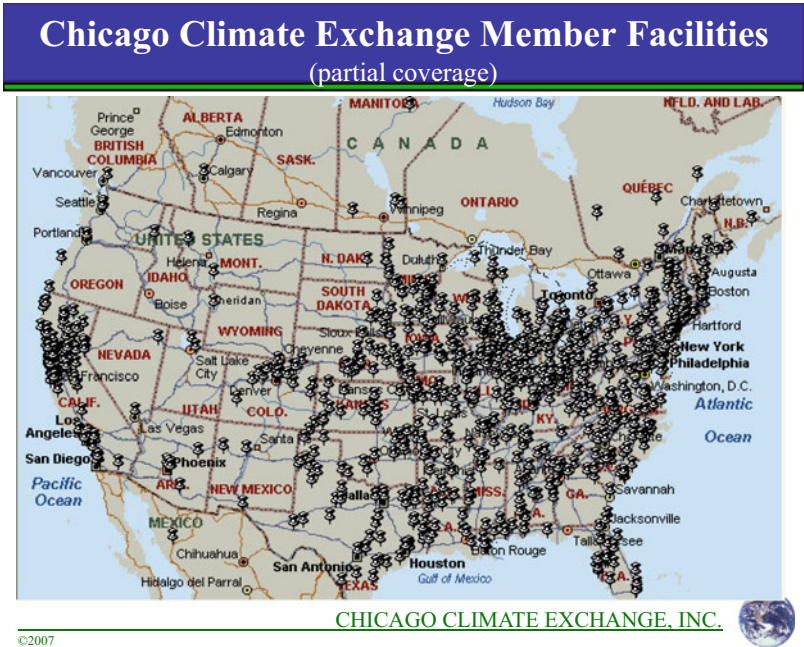


Fig. 5.4 CCX Installation Map and Members

Members of Chicago Climate Exchange®

July 13, 2010

| | | | |
|--|--|--|--|
| Aerospace & Equipment Rolls-Royce United Technologies Corporation | Avista Corporation Central Vermont Public Service CLECO Corporation DTE Energy Inc Duquesne Light Company* Dynegy Holdings Inc. Green Mountain Power Hoosier Energy Rural Electric Cooperative, Inc. Manitoba Hydro Mirant Corporation NRG Power Marketing Inc. Progress Energy PSEG Pueget Sound Energy, Inc.* RRI Energy TECO Energy, Inc. | Food Processing Premium Standard Farms* Smithfield Foods, Inc. | Petrochemicals LANXESS Elastomers do Brasil S.A. |
| Automotive Ford Motor Company | Electronics Motorola, Inc. Sony Electronics Inc. Square D/Schneider Electric N.A.* | Forest Products AbitibiBowater Aracruz Celulose S.A.* Aracruz Mital Florestas Ltda Boise Paper Holdings, LLC Cenibra Nipo Brasileira S.A.* Domtar Corporation International Paper Klabin S.A.* Masisa S.A. MeadWestvaco Corp. Neenah Paper Incorporated NewPage Corporation Plum Creek Timber Company, Inc Suzano Papel E Celulose SA Tembec Industries Inc. Temple-Inland Inc* | Pharmaceuticals Abbott Real Estate Investment JMB Realty Corporation Recreation Aspen Skiing Company Retail Safeway, Inc. States State of Illinois State of New Mexico* Steam Heat Concord Steam Corporation Steel Roanoke Electric Steel Corp.* |
| Chemicals Dow Corning* DuPont FMC Corporation Potash Corporation Rhodia Energy Brasil Ltda U.S. Salt, LLC | Environmental Services Atlantic County Utilities Authority Lancaster County Solid Waste Management Authority Veolia Environmental Services North America Corp. Wasatch Integrated Waste Management Authority Waste Management, Inc. Ethanol Production Corn Plus LLLP | Healthcare Baxter International, Inc. Hospira, Inc. Manufacturing Bayer Corporation Duratex S.A. Honeywell International Inc. Interface, Inc. Ozinga Bros., Inc.* Smurfit-Stone Municipalities City of Aspen City of Berkeley* City of Boulder City of Chicago City of Fargo City of Melbourne, Australia City of Oakland* City of Portland* | Technology Freescale Semiconductor IBM Intel Corporation STMicroelectronics Transportation Amtrak San Joaquin Regional Rail Commission* University Michigan State University University of California, San Diego University of Idaho University of Iowa University of Minnesota University of Oklahoma Tufts University* |
| Coal Mining Jim Walter Resources, Inc. PinnOak Resources LLC | Financial Institutions Bank of America Corporation | | |
| Commercial Interiors Knoll, Inc. Steelcase Inc. | Food & Agricultural Products & Services Agrium U.S., Inc.* Cargill, Incorporated Monsanto Company | | |
| Countries King County, Washington Miami-Dade County, Florida Sacramento County, California | | | |
| Diversified Manufacturing Eastman Kodak Company Robert Bosch LLC | | | |
| Electric Power Generation AGL Hydro Partnership Allegheny Energy Inc. Alliant Energy Corporate Services Inc. American Electric Power American Municipal Power Associated Electric Cooperative, Inc. | | | |
| Architecture/Planning Mithun, Inc. Perkins + Will, Inc. | Energy Broker Amerex Energy* | Financing Agency Ohio Air Quality Development Authority* | Houston Advanced Research Center* Midwest Energy Efficiency Alliance Rainforest Alliance World Resources Institute* |
| Consulting DCMANI LLC First Environment, Inc. Global Change Associates* Natural Capitalism Solutions RenewSource Partners LLC* Rocky Mountain Institute* | Energy Services Bell Independent Power Corp. Orion Energy Systems Ltd. Prenova, Inc. Sieben Energy Associates | Food Services Big Bowl Asian, LLC | Professional Associations Confederation of British Industry* The Professional Risk Managers' International Association* |
| Consumer Products Collective Wellbeing LLC | Energy Supplier BlueStar Energy Services Inc. MXenergy Holdings Inc. | Foundation Nathan Cummings Foundation | Real Estate ProLogis Logistics Services, Inc. |
| Documentary Production Cloverland Inc.* | Engineering Runsey Engineers* Vanasse Hangen Brustlin, Inc. | Green Power Marketer Green Mountain Energy Company* | Religious Organizations Jesuit Community of Santa Clara University |
| Educational Institutions Presidio School of Management Sidwell Friends School | Environmental Services Resource Recycling Systems | Information Technology Open Finance LLC Intercontinental Exchange* | Renewable Energy Airticity Inc.* American Renewable Energy* Economy International* Reknewco Ltd.* |
| Embassy Embassy of Denmark, Washington D.C. Embassy of Finland | Financial Services Access Industries, Inc.* G.C.-Anderson Partners LLC MB Investments LLC Wood Creek Capital Management LLC | Legal Services Foley & Lardner LLP* Levenfeld Pearlstein LLC Sullivan & Cromwell LLP Wei, Gotschal & Manges LLP | |
| | | Non-Governmental Organization ACORE* Delta Institute | |

*Member of Phase I (years 2003-2006) program only

Fig. 5.4 (continued)

| | | | |
|--|---|---|--|
| Retiring/Offsets Carbonfund.org Offset Collective, Inc. TerraPass Inc* | Social Investment Generation Investment Management LLP KLD Research & Analytics* Pax World* | Technology Millennium Cell* Polar Technology, LLC | Transportation Services Valera Global Inc. |
| Participant Members | | | |
| Offset Aggregators | | Offset Providers | |
| 33 Asset Management B.V. 3Degrees Group, Inc. Ag Business Solutions LLC (an Environmental Credit Corp subsidiary) AgraGate Climate Credits Corporation Agnrney Consultancy Pvt. Ltd. Andhyodaya Green Energy Technologies Pvt. Ltd. CantorCO2e, L.P. Carbon Green LLC Carbon Resource Management Ltd. Carbon-TF B.V. CARBONyatra Cargill - Green Hercules Trading Cargill, Inc C-Green Aggregator Ltd. CP Holdings LLC Delta P2/E2 Center LLC ecolutions GmbH & Co. KGaA Ecoreturn LLP EcoSecurities Capital Ltd. Element Markets LLC Emergent Ventures India PVT, LTD Environmental Carbon Credit Pool LLC Environmental Credit Corp. FO Stone, LLC First Capitol Risk Management LLC FORECON EcoMarket Solutions LLC Foretell Business Solutions Private Limited Geosyntec Consultants Inc GI Power Corporation Limited Grasim Industries, Ltd. Greenox Global Environmental Program Grey K Trading Limited GT Environmental Finance Guizhou Zhongshui Hengyuan Project Management & Consulting Co. Hudson Technologies Company | Indo Gulf Fertilizers (a unit of Aditya Birla Nuvo Ltd.) Indus Technical and Financial Consultants, Ltd. J. Aron & Company Kentucky Corn Growers Association Korea Energy Management Corporation LandGas Technology LLC MF Global Market Services LLC MGM International Mickelson & Company LLC Microg, Inc. Mission Climate Mountain Association for Community Economic Development National Carbon Offset Coalition Natural Capital North Dakota Farmers Union ProLogis Logistics Services Inc. Rajasthan Renewable Energy Corporation Ramakrishna Mission Ashrama Ranchlands Management LLC Reclamation Technologies Inc Reliance Energy Ltd. Reliance Industries Limited Rice Dairy LLC Rolling Plains Crop Insurance Agency, Inc R.S.J. Ozone Private Limited Santury Global Limited SunOne Climate Solutions LLC Tata Motors Limited Tata Steel Limited Tatajanka Resources LLC TerraPass Inc. The Verus Carbon Neutral Partnership U.S. Energy Services, Inc. Valley Wood Inc. Vayam Technologies Ltd Vision CO2, S.A. Xi'an Zhongyang Electric Corporation | Bajaj Finserv Limited Beijing Shenwu Thermal Energy Trading Co. Ltd. Burrell Ranches, LLC Cape May County Municipal Utilities Authority City of Gardner, Massachusetts CNX Gas Corporation CO2 Australia CommonWealth Resource Management Corp. CPI Carbon Asset Management Co., Ltd. Cumberland County Improvement Authority Dharwal Industries Ltd. Gazprom Marketing & Trading Ltd. Granger Holdings LLC Lugar Stock Farm Precious Woods Holding, Ltd Public Utility District No 1 of Chelan County, WA Rivanna Solid Waste Authority Sexton Energy LLC Tata Power Company Limited TerraCarbon LLC The Andhyodaya Trading Emissions PLC | Galtere International Master Fund LP GDF SUEZ Energy Marketing NA Grand Slam Trading Inc. Green Dragon Fund Green Fund Partners LLC Grey K Environmental Fund LP Grey K Environmental Offshore Fund Ltd. Grey K Trading Limited Haley Capital Management ICAP Energy LLC Infinium Capital Management LLC Ironworks Partners LP Integrys Energy Services Inc J. Aron & Company Jane Street Global Trading LLC JP Morgan Ventures Energy Corporation Kellybrooke LLC Koch Supply & Trading Kotlike Associates, LLC Lehman Brother Commodity Services Inc. Marquette Partners, LP Marsus Capital LLC Merrill Lynch Commodities, Inc. Newedge USA, LLC Octavian Special Master Fund LP ORBEO Penson GHCo Peregrine Financial Group, Inc. Rand Financial Services, Inc. Royal Bank of Canada SA Recovery, Inc. Serrino Trading Company Spectron Energy Services Limited Stark Investments TEP Trading & Ltd. The League Corporation TradeLink LLC Tradition Financial Services Ltd. TransMarket Group LLC Universal Carbon Fund LLC U.S. Energy Savings Corp. Vitol, Inc. |
| | | Liquidity Providers | |
| | | Akeida Environmental Master Fund Ltd. Ameresco, Inc Amerex Energy Apache CR Company Atrium Carbon Fund LP BNP Paribas Energy Trading GP Brane-Strom LLP C-Quest Capital, LLC Carbon Green Inc. Cargill Power Markets LLC Chapel Street Environmental Fund, LP Digilog Global Environmental Master Fund Ltd DRW Holdings LLC Evolution Markets LLC First Bank and Trust First New York Securities LLC | |

Fig. 5.4 (continued)

In addition to kicking off cap-and-trade to address climate change in the USA, CCX also launched the European Climate Exchange (ECX), which still operates and is the largest exchange operative in the European Union Emissions Trading Scheme (EU ETS), as well as the Montreal Climate Exchange (MCeX) to cover Canadian emissions with the Bourse de Montreal (MX) as partner, and was in negotiations worldwide to create additional climate exchanges.

By far, though, the breakthrough was in China, where in 2008 CCX we entered into a landmark joint venture with PetroChina, China's largest company, and the city of Tianjin to create the Tianjin Climate Exchange (TCX), the first of China's pilot cap-and-trade programs, an effort we had nursed along for several years. TCX, which involved a large and highly visible state-owned enterprise, PetroChina, thereby conveyed state sanction. Soon, six other pilot programs were launched in Beijing, Shanghai, Shenzhen, Guangdong and elsewhere. The experimentation of all of these programs has led to the announcement of an official nationwide cap-and-trade program to be launched late in 2017 in China, and by virtue of its size, the national China market is likely to set a de facto global benchmark price.

The opening of TCX meant CCX had operations in all major emitting regions and, in this sense, was well on the way to knitting together an international trading system as early as 2008. And even if ad hoc, through its scope and reach, CCX established beyond any doubt that capping emissions and reducing them on a clear trajectory was doable and desirable by a vastly diverse group of economic entities, including key utilities, manufacturers, cities and others across the globe.

How did CCX achieve these milestones?

By handpicking every plum.

No entity was beyond our attempts. We held countless conference calls and meetings throughout the world to uncover potential new members and add baseline and market liquidity. We gently but constantly cajoled our existing members to encourage and recruit their peers. We combed annual reports, affinity group newsletters and media of all kinds to see what companies were speaking out on the need to address climate change. Often, at breakfast, no sooner had I spotted an ad placed by a company about its environmental commitment than “riiiip!”—I tore out the ad then and there and the company landed on my call sheet that day. Sandor too kept up constant outreach and was fond of saying, “My knees may be bloodied but I keep going.”

No company was too small or too daunting to receive an introductory pitch from one of our market or recruitment teams. We reasoned that if a company was portraying itself as environmentally proactive, CCX membership was the logical next step. Indeed, at the time, CCX membership was the most demanding and coherent action an entity could take to put its climate change commitments into practice—voluntarily signing a binding contract to stipulated emission reductions no matter how high the costs became.

We spoke to sustainability officers, board members, investor relations officers, insurance companies and chief risk officers. At utilities, we directly involved the SO₂ traders, who after all had already gotten used to trading SO₂ allowances through the Clean Air Act. We briefed ratings agencies, such as Fitch, where forward-looking analysts such as Denise Furey were already alert to the economic risks and contingent liabilities that would face companies slow to understand climate change exigencies. When we couldn't get a serious hearing for CCX through one door, we tried another.

The CCX pitch, on one level, was outlandish. We were asking busy companies to become CCX members, which meant at minimum to undertake a complex inventory of their sources of all six greenhouse gas emissions throughout their entire North American operations, for the purposes of establishing a verifiable baseline, an unprecedented, costly and time-consuming exercise for companies at the time. Then we required them to sign on the dotted line to make annual emission reductions from that baseline in absolute tonnes, or buy emission allowances from other members if need be, no matter how the cost of allowances might rise, under pain of breach of contract law, and pay audit and membership fees to boot. In short, one could say the CCX pitch amounted to “eat spinach and pay for the privilege.”

But put the more productive way, CCX membership offered companies something entirely new to their operations—a de facto greenhouse gas emissions management system that could put them ahead of the curve and strengthen their competitive edge. Just the act of undertaking the inventory was valuable, since it functioned like a beacon in a dark cave. The inventory required companies to scour their business for every wasted bit of energy or stray emissions source, which in turn made visible a company's dormant emissions liability, and the costs a company could face if a mandatory regulatory regime were to come into being, still considered likely at the time. CCX membership also helped a company identify cost savings, and where reduction efforts could make a company a seller rather than a buyer in a carbon market.

For example, one utility member had implemented major reductions in SF₆, the potent greenhouse gas used to insulate transmission wires. SF₆ reduction was cost-effective for the company in itself, and environmentally beneficial, but CCX offered cream on the cake. Folded into their annual CCX inventory and reduction commitment for all emissions, those SF₆ cuts made the company a seller in CCX, and the cuts could be monetized as CFIs and sold to other CCX members. Without CCX membership, those cuts

had no premium financial value since no other market covering SF6 reductions existed.

CCX members got an instant primer in emissions pricing, and an advance understanding of looming financial and operational risk, a high value gain, especially given that audit and membership fees were nominal compared to other items in a business budget. If we could get enough air or meeting time to fully make our case, we usually won the member.

The only companies who outright rejected us were companies whose total emissions were, in fact, increasing, despite their outward environmental profile and their installing a wind farm or a solar powered facility here or there. These companies, including some of the brands considered very “green” at the time, did not want to risk being asked by customers about their CCX status, fearing that to admit they might be a buyer would tarnish their reputation for environmental leadership.

Also, some large major utilities, and oil and cement companies, rejected us regularly, because their buy side was very costly, or they had a standard posture of doing nothing about climate change until absolutely forced. Still, among other very high-emitting industries, we had recruited American Electric Power (AEP), the largest user of coal in the USA at the time and a charter CCX member; Allegheny Energy, DTE and others; and even two coal-mining companies, Jim Walters and Pinn Oak Resources.

CCX even executed a demonstration international pilot trade, linking CCX and the EU ETS, at the request of the UK Ministry of the Environment in 2005. We approached Ron Meissen, the chief environmental, health and safety officer of Baxter Pharmaceuticals, a CCX Charter Member that also had European operations that were covered by the EU ETS. Thanks to his dedication, Baxter in Europe retired a few of its EU allowances from its ETS account and transferred them to the Baxter CCX account for use in CCX compliance. We gave the tonnage a “haircut” to account for any double counting, and the transaction took a few electronic seconds, thereby linking the two trading platforms in a flash, proving it could be done.

CCX was in itself a mini-university dedicated to emissions management and environmental finance, and to build it up, Sandor had put together a first-rate academic team, led by Michael Walsh, who had worked with Sandor on the SO₂ program and proved ingenious in cap-and-trade design, and his ability to balance the early adopter imperative with impeccable environmental integrity; and Rafael Marques, Nathan Clark and Murali Kanakasabai, all young economists flush with idealism and skill that helped

expand the CCX community worldwide. Other key players were Gerard Pannekoek, the first CEO; Natalie Persky, Will Ferretti, Rohan Ma and Tom Cushing of the recruitment team; Ann Cresce, Fran Kenck and Mike Stern in operations; and Rob McAndrew, Mike MacGregor and Dan Scarbrough in market development.

By 2008, CCX had 54 employees in the USA and Europe. Sandor also attracted a strong and visionary partner in Neil Eckert of the UK, former CEO of Brit Insurance, who also threw himself into supporting the vision and raising capital to keep CCX alive. Helene Crook handled investor relations.

And CCX offered its service and expertise to any and all comers. For example, western states in the USA had convened the Western States Climate Initiative (WSCCI) to establish a regional cap-and-trade system. At a planning meeting held in Santa Fe, New Mexico—New Mexico was CCX member, thanks to the vision of its then Governor, Bill Richardson, and his dedicated environmental team—I personally offered that CCX would help design and implement the western system at no charge. “We can light up the board in a year,” said I. Our view was that the more programs across the country, so much the better for capacity building, market liquidity and ultimate carbon pricing. WSCCI demurred and does not exist to this day.

All in all, CCX exuded 24/7 start-up élan. Staff worked round the clock if need be, and we loved it because we knew we were building something entirely new that the world would eventually need. Or so we thought.

Adventures abounded, especially in China, while we were negotiating the joint venture that ultimately created the Tianjin Climate Exchange (TCX), which had been triggered by the help of our local colleague, Jeff Huang, a business and markets leader in China, and the vision and support of the head of the venture capital arm of PetroChina, Xiansheng Dai.

Richard Sandor and I were practically commuters to China, always inching along the negotiations in a caravan of meetings, ceremonial meals, toasts and conversations. We were both tireless, but our Chinese counterparts seemed to have even more stamina. I found I needed two mobile phones to keep up with the demands, and one day I was so punch drunk and tired, I caught myself calling myself from one of my own phones to the other. Sandor and I both died laughing when one of my pockets started ringing.

Yet, the day TCX opened officially, we almost missed our own party. The bullet train was not yet running, so we had to go by car. But, because there were so many new ribbons of roads heading into Tianjin, our driver couldn't

make sense of the traffic pattern. We were twirling in circles, but the local police, alerted to the VIP event and our delay, showed up just in time and escorted us straight to the huge ceremonial hall, sirens blaring and red lights spinning. And when the speeches ended and TCX was finally officially inaugurated, a cannon shot out red and gold confetti all over the stage.

From those beginnings, a national China carbon market has taken shape. Who could have thought it then—only dreamers. But then again, why not dream of the best that can be done, and feel the energy and rewards of trying. That is what we did.

In retrospect, CCX does indeed seem like what Australian aboriginals call the “dreamtime,” a moment when creation bubbles up and people act on visions, hope and inspiration. Looking back, I feel almost heady, remembering the thrill of each success, each new member’s signature on the contract, so many new friends and collaborators, all working feverishly together to strengthen CCX and push the climate change issue ahead.

But today, what can we learn from the CCX experience that can help take us forward, now that the dreamtime has surely ended and political tension grips the world. Momentum on climate change varies greatly from country to country and, overall, the scientific clock is ticking, with sea levels rising, glaciers melting and oceans warming (Intergovernmental Panel on Climate Change 2014).

And as of this writing, the Trump Administration in the USA appears intent on dismantling US involvement in international climate activities, including declaring an end to the Clean Power Plan (CPP) established by the Obama Administration that sought to reduce direct emissions from the utility sector. Minus the CPP, the USA would lack any national framework to guide and require ongoing emission reductions, and, surely, there would be no chance of a federally administered cap-and-trade program. The only cap-and-trade systems operational in the USA are likely to remain regional: in the northeast states, through the Regional Greenhouse Gas Initiative (RGGI), and in California. However, both of these are still relatively small in scope, with somewhat lean baselines and liquidity relative to the global atmospheric challenges and the need for massive GHG reductions. And these state-based programs are not at all immune to national political turmoil and legal uncertainty, as the Trump Administration, for example, seeks to legally challenge the State of California’s authority to set environmental standards that differ from the national rules.

And while, of course, the COP-21 Paris agreement injected new and universal political will to meeting the climate change challenge, albeit a

quarter of a century after the ink dried on the Framework Convention at Rio, sticking to the Paris agreement will require stamina and consistency that so far has been elusive. The COP-21 agreement seeks to hold global warming to below 2 degrees Celsius by the end of the century, with a global peaking of emissions by 2050. These timelines are so far beyond today's decision-making that real action and accountability could easily be shunted off. To bring the deadlines closer, the Paris agreement declares doable bites, and achieved a legally binding basic commitment from all nations to develop a national plan to reduce greenhouse gases and to strengthen that plan annually, with a five-year report card due in 2020. But even in this nominally mandatory world of global commitments sketched out by COP-21, actual action at the scale required might still have to be pulled along by the vanguard.

This is especially true when we speak about what is now commonly referred to as a “price on carbon.” For example, in the quest to develop sustainable financial systems, especially in addressing climate change, it is commonly accepted that a “price on carbon” needs to be built into the financial architecture, namely, a reference cost per tonne that corresponds to the direct and indirect costs to society of one tonne of greenhouse gas emissions. Carbon pricing in effect hangs a price tag on every invisible tonne as it rises into the air. The hidden costs of emitting greenhouse gases are illuminated, and low-carbon alternatives can benefit from a clear financial contrast.

Currently, most calls for pricing carbon refer either to establishment of carbon taxes or “carbon markets,” notably cap-and-trade systems. In fact, of the roughly 190 Intended Nationally Determined Contributions (INDCs), the national climate change mitigation plans filed with the UN during the COP-21 process, roughly 90 include references to establishing carbon markets. And, according to “Embedding a carbon price into business strategy,” the 2016 annual report on carbon pricing from CDP, formerly known as the Carbon Disclosure Project, which annually tracks the use of internal or “shadow” carbon prices by public companies, “517 companies are already using internal carbon pricing as an accounting and risk management tool (19% increase from 2015), and an additional 732 disclose plans to implement one by 2018 (26% increase from 2015)” (CDP 2016, p. 8).

Most internal carbon prices cited by companies are based on existing carbon price signals from existing legal regimes, such as California or the EU ETS, or pegged to what price a company considers affordable in internal terms: what a company is willing to assess itself. But none of the stated

internal carbon prices are high enough to truly tip innovation at the necessary scale, that is, higher than the cost of mitigation, other than perhaps the internal price cited by Shell—US\$80/tonne—which is a price in theory as, to date, no company would voluntarily charge itself that amount per tonne as an internal cost-of-doing business.

Legal frameworks and more stick are needed in a world that has come to prefer carrots. Also, even the most high-minded COP-21 commitments and initiatives are in danger of becoming a grab bag of mismatched ineffective efforts, without clear policy signals, market coherence and mainstream participation of mature financial markets and market practitioners.

Despite much analysis of the benefits of pricing carbon, discussion tends to remain theoretical, unrooted in actual practice, and is likely therefore to be unnecessarily slow to reach scale. Moreover, at times, seeking the environmentally perfect can become the enemy of the good, slowing down progress, causing reinvention of the wheel. For example, there seems to be constant revisiting of protocols for measuring and reporting emissions, when accepted common custom and rubrics exist.

And perhaps most to the point, there is no concrete global carbon pricing policy, despite the COP-21 agreement. To declare a desirable minimum carbon price does not make it so, obviously. Pricing must rest on some credible financial market signals and financial systems infrastructure. Otherwise, carbon pricing remains merely wishful thinking. Also excess emphasis on the role of “non-state actors” in solving the climate change challenge has also somewhat denigrated the importance of clear strategic national mandatory policies.

As to price itself, many scenarios project a base carbon tax of about USD15 if such legislation were to pass in the USA. But, in the heyday of CCX, CFI Futures were already trading at nearly US\$13 per tonne. This is roughly equal to the highest price reached currently in any live carbon market, indicating that a market appetite at least equivalent to today’s existed nearly a decade ago.

CCX CO₂ futures were beginning to get trading traction around the time the climate change issue was reaching a policy pinnacle in the USA in 2008–2009, when a national plan to establish a congressionally sanctioned official US cap-and-trade system, the American Clean Energy and Security Act, was moving through the US House of Representatives. Known colloquially as Waxman-Markey after its two leading champions, Congressmen Henry Waxman of California and Ed Markey of Massachusetts, the bill finally passed the House in July 2009 to much fanfare. It was the first

time any national climate legislation had gotten this far, and hope skyrocketed that the USA would, at last, establish a binding national emissions reduction plan coupled with a meaningful energy efficiency program.

CCX had lobbied intensively for the bill's passage, and we met with elected officials or key staff from nearly every state in the Union in a constant cavalcade. Up and down the winding corridors we walked, in and out of congressional offices each flanked ceremonially with the state flag. We created a 50 State Book, which showed CCX members or affiliates entities in each State, so that legislators could see vividly how many constituents existed back home who had already embraced the idea of taking action on climate change and cap-and-trade (Fig. 5.5).

We thought this show of force would shore up proponents, and it did to a point. But it was often shocking how uphill was the climb. Talking about cap-and-trade in the Congress at the time met so much ignorance and skepticism, at times I felt I must have sprouted the horns of Lucifer, so resistant were some legislators to the idea of a national system for greenhouse gas reduction. Ideology had taken a rigid hold.

And some legislators who should have known better took the low road, maligning cap-and-trade as "cap-and-tax," in an attempt to shove forward their own variation on the theme. Then too, lack of background knowledge and inexperience also created headwinds. I once gave a briefing to the full staff of a key House Energy Committee, and none of them had ever heard of the EPA's SO₂ trading program. This vividly showed how much background knowledge had been lost even then, and so our lobbying meetings had to include much more basic training than we had anticipated.

CCX members themselves also pushed for the bill, and Honeywell, an active CCX member, hosted numerous meetings at its Washington, D.-C. headquarters to discuss tactics. CCX members sent a collective letter urging the bill's passage in the Senate, with some modifications (Fig. 5.6).

But, despite these and other marathon efforts by environmental groups, and corporate coalitions, and the hard-won passage of the bill in the House, ultimately national climate change legislation in the USA was stillborn. No climate change legislation was introduced in the US Senate, a catastrophic failure of political leadership, exacerbated by insufficient groundwork to win the votes. Our 50 State Book was a measly feather in the swirl of opposition and inertia. Waxman-Markey died.

The demise of national cap-and-trade legislation spelled the end for CCX, because its business model assumed that the voluntary principle would solidify into mandatory regulation and the CCX platform would



CCX IN MICHIGAN

Members with Operations in Michigan

Abbott Laboratories
 American Electric Power
 Bayer Corporation
 Cargill
 Domtar
 Dow Corning
 DTE Energy
 DuPont
 Dynegey
 Ford
 Knoll
 Michigan State University
 Neenah Paper
 NewPage
 Robert Bosch
 Smurfit Stone
 Steelcase
 United Technologies Corporation
 Veolia

Associate Members in Michigan

Resource Recycling Systems
 4Offsets, LLC

Offset Aggregators and Providers Active in Michigan

Enrolled Offset Projects include Agricultural Methane and Soil Carbon, Forestry, Landfill Methane and Renewable Energy

Agragate Soil
 TerraPass
 North Dakota Farmers Union
 Iowa Farm Bureau Soil
 Ag Business Solutions
 Granger Holdings
 Delta P2/E2 Center
 Phase 3 Renewables

Fig. 5.5 CCX 50 State Book sample

have de facto market share. But with no legislation in the foreseeable future, even the most ardent early adopters had little incentive to stay active. They had learned what they needed. And with no prospect of increasingly robust trading, CCX could not foresee sufficient revenue in transaction fees.



January 28, 2010

| | | |
|------------------------------------|------------------------------------|---------------------------------|
| Senator John Kerry | Senator Lindsey Graham | Senator Joe Lieberman |
| 218 Russell Senate Office Building | 290 Russell Senate Office Building | 706 Hart Senate Office Building |
| Washington, DC 20510 | Washington, DC 20510 | Washington, DC 20510 |

Re: The Importance of Early Action Recognition for U.S. Greenhouse Gas Reduction Legislation

Dear Senator Kerry, Senator Graham and Senator Lieberman:

We at American Electric Power, Bayer, DTE Energy, Intel, Safeway, TECO Energy and all the undersigned enterprises, have undertaken greenhouse gas emissions reductions through a voluntary but legally-binding commitment in the Chicago Climate Exchange (CCX). Through our participation in CCX, we have developed relevant experience with cap-and-trade, including the establishment of third-party verification and emissions tracking systems with strong fiduciary and transparency requirements.

We are concerned that neither The Clean Energy Jobs and American Power Act (S.1733) nor The American Clean Energy and Security Act (HR.2454) included adequate Early Action Recognition for emission reductions from industrial sources, a provision that would be consistent with former U.S. Senate draft legislation. As the Senate addresses climate change, we urge that any new discussion outline or draft bill include adequate Early Action Recognition for industrial emission reductions.

Cost containment is critical to the viability of national legislation that mandates greenhouse gas reductions. Adequate Early Action Recognition for industrial companies that have made verifiable, entity-wide reductions prior to a mandatory requirement is widely recognized as a cost containment tool in the early years of compliance. In addition, there is significant legislative precedent for the concept of Early Action Recognition. In the 110th Congress, a total of 24 Senators co-sponsored three greenhouse gas reduction bills that provided adequate Early Action Recognition. Furthermore, adequate Early Action Recognition will promote the orderly transition from existing carbon markets to a mandated market structure.

We believe that cost containment assurance will be vital to the success of any legislation. Adequate Early Action Recognition should be included as a central component of climate change legislation being drafted now or in the future.

Sincerely,

Members of Chicago Climate Exchange (CCX)

[enclosure]

Fig. 5.6 Letter from CCX members

January 28, 2010

SIGNATORY MEMBERS OF CHICAGO CLIMATE EXCHANGE

| | |
|-------------------------------------|---|
| ABITIBI-BOWATER | HONEYWELL INTERNATIONAL |
| ALLEGHENY ENERGY | IBM |
| ALLIANT ENERGY CORPORATE SERVICES | INTEL |
| AMERICAN ELECTRIC POWER | INTERNATIONAL PAPER |
| AMERICAN MUNICIPAL POWER | JMB REALTY CORPORATION |
| AMTRAK | KNOLL |
| ASSOCIATED ELECTRIC COOPERATIVE | MICHIGAN STATE UNIVERSITY |
| ATLANTIC COUNTY UTILITIES AUTHORITY | MIRANT CORPORATION |
| BAYER HEALTHCARE CORPORATION | MOTOROLA |
| BOISE PAPER | NEENAH PAPER INCORPORATED |
| CARGILL | NEWPAGE CORPORATION |
| CITY OF ASPEN | PLUM CREEK TIMBER |
| CITY OF OAKLAND | POTASH CORPORATION |
| CLECO CORPORATION | PROGRESS ENERGY |
| CONCORD STEAM CORPORATION | ROBERT BOSCH |
| COUNTY OF SACRAMENTO, CALIFORNIA | ROLLS-ROYCE |
| COUNTY OF MIAMI-DADE, FLORIDA | SAFEWAY |
| DOMTAR CORPORATION | RRI ENERGY |
| DTE ENERGY | STEELCASE |
| DUPONT | TECO ENERGY |
| EASTMAN KODAK COMPANY | UNIVERSITY OF IOWA |
| FMC CORPORATION | UNIVERSITY OF MINNESOTA |
| FREESCALE SEMICONDUCTOR | VEOLIA ENVIRONMENTAL SERVICES NORTH AMERICA |

Fig. 5.6 (continued)

With heartbreaking regret, CCX decided to end its operations after Phase II.

In 2010, CCX and its affiliates were acquired by the International Continental Exchange (ICE), the largest commodities exchange in the world. ICE eventually sold its interests in all CCX affiliates, other than ECX, which it continues to own and operate. Meanwhile, the EU ETS is revamping its structure, tightening up allowance supply, preparing to integrate the aviation industry, and hoping allowance prices will rise to a level that does trigger and incentivize rapid emission reductions.

But there is no doubt that the demise of Waxman-Markey in the USA set the USA and the world back grotesquely relative to the climate change challenge, and the world lost at least a decade of market participation, experience and political and corporate willingness to cap emissions through pricing carbon. That lost decade needs to be recovered if the world is to succeed in holding down emissions below the 2-degree scenario.

So, what now? We are at a crossroads that demands we re-marshal the expertise, passion, grit and practical financial invention that came so exceedingly close to transforming the global economic systems to fully integrate environmental costs. The time is now to be wholly forward looking, and move carbon pricing from theory to practice on a rapid timeline consistent with the exigencies of COP-21, largely believed to be the world's last great blueprint with a chance to confront climate change impacts before they run away beyond control.

How? A few humble suggestions:

1. Resurrect the CCX concept of “coalition of the willing” and try again to find and motivate a handful of visionary global companies to act together according to common rules, as if linked and covered by a standardized global pilot cap-and-trade system, quickly. All it would take is a few global companies opting in to existing national systems voluntarily, and being allowed to do so. The early adopter concept is still alive, especially post COP-21 and COP-22, but lost in a mixed bag of objectives, all the more mixed since the Trump election and the confusion it has sown.
2. Speed up global market linkage efforts: Market linkage is a popular topic, with many discussions underway, but the process remains cumbersome. Building on the existing EU system, and snippets of markets here and there, plus the emerging market in China, a few large early adopters could change the course of history on climate change by linking in practice, if not yet in policy. For example, as I suggested in “Let’s Make A Climate Deal,” an op-ed published in the *Los Angeles Times* (DiPerna 2014), if California were to open its cap-and-trade system to any willing US company that wished to opt in its national emissions, California’s system would become overnight a de facto national cap-and-trade system in the USA regardless of how US national policy emerges. Then, China and California could rapidly negotiate a mutual recognition agreement, standardizing some guidelines and allowing companies that opt in to experiment with

international trading using existing trading desks and exchanges, as with the CCX-EU ETS demo trade. All we need is one transaction to get the ball rolling.

3. Ask Google or another IT giant to donate to the world an IT system that could link stipulated greenhouse gas reduction targets with carbon trading screens and schemes worldwide. In other words, a fully digitalized linked global carbon pricing and trading IT infrastructure, ready to go, thereby eliminating presumed technical hurdles.
4. Undertake a massive educational program for civil servants in finance ministries worldwide on the revenue benefits of carbon pricing and cap-and-trade, linked to implementation of environmental commitments. Carbon pricing remains the esoteric domain of a small group of cognoscenti, and to actually move forward, the circle of believers needs exponential expansion. Civil servants are natural allies, because carbon pricing aligns with their needs to generate public budget revenue, while also advancing public policy and maintaining other public programs. Carbon taxes and cap-and-trade systems can be designed to generate revenue for public budgets, but a massive capacity building effort needs to occur, not just on the theoretical benefits of carbon pricing, but the nuts and bolts of cap-and-trade as well. The more public-spirited the idea of carbon pricing, the less likely gaming or domination by purely commodity trading interests.
5. Put jobs creation at the center of carbon pricing rationale. People everywhere need work, and work is increasingly difficult to find. Unemployment makes people insecure, and insecure people have little emotional or financial cushion to think ahead to what might benefit future generations. Climate change policy will remain tepid, marginal and vulnerable to demagoguery for lack of broad public support until climate change action is expressed and recognized for what it is—the most powerful jobs creation force since the Industrial Revolution. The entire future of work could be refreshed as the world redesigns, rebuilds, refits and reinstalls almost every bit of infrastructure we use to add resilience in the face of likely weather extremes and the inexorable need for more efficiencies in energy and other resource use.

As hard as we tried at CCX, we never could break through sufficiently to policy makers on the employment upside of carbon pricing and emissions management, for example, the fact that CCX members

were generating \$750 billion in revenues in 2008 and employing more than one million people, all while systematically and significantly reducing greenhouse gas emissions and investing in efficiencies of all types. Or that CCX domestic offsets had generated 41.4 million tonnes of offset credits since inception, creating more than \$100 million of new value in the USA alone. Such good news stories did not stick, even in the all-important agricultural states which were also coal-dependent, in part because so few legislators understood the linkages and so many outright did not believe us, even though we had many testimonials from the beneficiaries concerned. The statements were either too good to be true, or took too much time and attention to be understood, or fell prey to the chronic split in priorities between advocates for labor and advocates for environmental improvement, a long-standing either/or policy quagmire.

Advocates of carbon pricing need a nonstop almost exclusive focus on reconciling this counterproductive and false dichotomy.

6. Avoid the perfect becoming the enemy of the good. While, of course, accurate carbon accounting is vital, it is also an imperfect science, and some trial-by-error and learning by doing should be allowed, even if errors are made. The atmosphere can forgive some small mistakes in carbon accounting in the short term, for example, if a stated reduction did not occur precisely as reported. But, the atmosphere cannot forgive the larger mistake—inaction in the long term where the millions of tonnes of reductions needed never occur.
7. Do not create false either/or choices. The atmosphere needs both carbon taxes and carbon trading, and they can be made to work together. Taxes have the virtue of simplicity, but the drawback of being nearly impossible to ever raise, due to chronic difficulty political figures face in raising any tax at all in any nation. So proponents of a tax need to be careful not to lock in a too-low price signal. Also, proponents of a carbon tax tend to be mostly focused on environmental issues and may not be prepared for the political horse trading that would go with establishing a carbon tax, especially in the USA. What programs or taxes are proponents prepared to give up to win the votes of skeptical legislators on a carbon tax? It is doubtful that in the US Congress in the next four years, a carbon tax can be secured that is high enough without trade-offs, such as the jettisoning of other taxes, or the outright cancelation of specific public budget

line items. Down the path of horse trading, danger for key US social programs may lurk.

8. Expand the circle: To develop a global cap-and-trade or other carbon pricing system, there must be significant intersectoral education and dialogue so that environmental policy makers become knowledgeable about trading rules and vice versa, and the financial services sector also must come to take carbon markets seriously as any other commodities market.
9. Talk is cheap, let us remember. It is roughly a quarter of a century since the original Rio agreements, and it has become too easy to overpraise meager progress. Focus now has to be on actions that are coherent, measurable and meaningful.

As regrettable as it is true, the fact remains that the world has lost at least ten years of institutional memory and early adopter momentum on carbon pricing, and the post-COP-21 euphoria is also in danger of withering. To keep hope alive, a productive but ruthless focus is required.

By definition, it is lonely in the vanguard. However, few human activities offer as much satisfaction as bringing new ideas to fruition, and looking back on that success. CCX was such an idea, even if it may have come perhaps too early. The willing came together to break new trail and it was thrilling.

Today, with the flourishing of the field of sustainable finance and so much more familiarity with the role that financial innovation can play in environmental progress, the path ahead should be easier. Only time will tell if the world can act quickly enough on all the information and experience at its disposal. But, as the CCX story makes clear from Glen Cove and beyond, trying with passion is surely the only way to advance.

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PART II

Innovations in Best Practices, Tools,
and Financial Products

Designing Carbon-Neutral Investment Portfolios

Gianfranco Gianfrate

6.1 INTRODUCTION

The materiality of climate-related risks on the valuation of many assets and companies could be severe. Dietz et al. (2016) show how an integrated assessment model can be used to quantify expected impact of climate change on the present market value of global financial assets. They find that the expected “climate value at risk” of global financial assets today is 1.8% along a business-as-usual emissions path, that amounts to US\$2.5 trillion; however, for the 99th percentile the value estimate is US\$24.2 trillion. Importantly, Battiston et al. (2017) estimate that while direct exposures to the fossil fuel sector are small (3–12%), the combined exposures to climate-policy relevant sectors are large (40–54%), heterogeneous, and amplified by large indirect exposures via financial counterparties.

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This evidence suggests that climate-policy timing matters: while an early and stable policy framework would allow for smooth asset value adjustments, a late and abrupt policy framework could have adverse systemic consequences given the pervasive interconnections in the global financial system.

Building on such quantifications of climate change materiality for financial institutions, this chapter conceptualizes the possible strategies to structure “carbon-neutral” investment portfolios. I will specifically discuss to what extent financial hedging of institutional investment portfolios is feasible and how policy-making could shape markets and instruments to make the financial global system more resilient to possible climate-related regulatory shocks.

The chapter is structured as follows. Section 6.2 discusses the nature and definition of climate and carbon risk, highlighting its relevance for the whole economy and society. Section 6.3 sketches the major forces which are pushing toward a progressive decarbonization of the financial system. The political role of “carbon finance” in the COP21 negotiations will be examined along the broader societal and cultural changes in favor of a more eco-sustainable capitalism. Section 6.4 presents the state of the art of sustainable investing as far as environmental issues are concerned. The main approaches to embed environmental aspects in the investment process will be critically discussed: “exclusion lists”, ESG ratings, active engagement approach, and climate risk-adjusted valuation metrics. The advantages and limits of each approach are briefly discussed. Section 6.5 introduces the concept of “carbon-neutral” portfolio. The micro-foundation of how investors can hedge climate-related risks will be presented. Such risk management strategies can be categorized into one of three functionally distinct types: hedging, insurance, and risk avoidance (Merton and Bodie 1999). The extent to which each of those strategies can be currently applied will be discussed. This section will highlight that financial markets mostly lack securities and instruments to hedge off climate risks. Section 6.6 will conclude by drawing conclusions for policy-makers, industry bodies, and regulators.

6.2 THE NATURE OF CLIMATE RISKS

Climate change is a cross-country coordination problem, the resolution of which would involve the establishment of sufficiently high costs of emitting CO₂ throughout most of the world through taxes or quotas. Without sufficiently high carbon prices, the pattern to lower emissions will be both

more difficult and less effective. In fact, existing carbon markets are incomplete and subject to market failure, which reflects mostly political shortcomings. In particular, there exists a lack of relevant long-term price signals for companies and investors, and where markets do exist, the current prices in most cases are far below the levels needed for a path toward sustainable climate targets. Nevertheless, especially after the COP21 agreement more decisive actions seem likely to be taken by governments around the world.

In this framework, as the debate about how to address climate change quickly moves from theory to action, the phrase “put a price on carbon” has become increasingly popular.

From a practical point of view, there are several possible ways to price carbon, and they all tend to lead to the same result. These approaches try to quantify and capture the external costs of carbon emissions—costs that society pays in other forms, such as droughts, heat waves, damage to cultivations, health care—and tie them to their sources just through a price on carbon.

The objective of carbon pricing is to shift the social costs of damage back to those who are deemed responsible for them (also known as “polluter pays principle”), and who can actually curb them. In this way, polluters are ultimately left with the decision on whether to discontinue their polluting operations, to reduce emissions (e.g. by adopting cleaner technologies), or to continue to pollute and pay for it. Therefore, the price of carbon provides an economic signal to polluters who can decide for themselves how to respond. With carbon pricing the global and local environmental goals are expected to be achieved in a flexible and efficient way. In addition, the pricing of carbon also has the advantage of stimulating technology and operational innovation, fostering the economy transition toward a low-carbon configuration.

There are two main approaches for pricing carbon: carbon taxes (Nordhaus 2007) and emission trading systems (Stavins 2007). The former consists of defining a tax rate on greenhouse gas emissions or—more frequently—on the carbon content of fossil fuels. Following this approach, the overall emission reduction associated with the carbon tax is not predefined (but it can be estimated), while the carbon price is.

With the latter approach (also known as “cap-and-trade” system), the objective is to cap the total level of greenhouse gas emissions. The firms who perform better than expected in reducing the emissions can sell their surplus allowances to the larger than expected emitters. In this way, the firms that are more effective in reducing the emissions get rewarded, while the

least-effective ones get penalized. This is a market mechanism where the interplay between supply and demand for emissions allowances is reflected in a market price for greenhouse gas emissions. The caps ensure that the required emissions reductions will progressively take place by keeping all the emitters within the boundaries of the pre-allocated carbon budget.

The choice between carbon taxes and emission trading systems (or the coexistence of the two) depends on national policy-makers and economic circumstances. According to the World Bank,¹ as of 2016, 40 countries have a carbon pricing system in place, and that number is expected to increase significantly over next few years following the climate change agreement reached in Paris in 2015.

In this framework, “carbon price risk” emerges as a new form of political risk for both companies and investors. Such risk depends on the probability that in future new international agreements and national policies impacting the prices of carbon will be implemented. The timing and extent of carbon-related policies will dramatically determine when and which real and financial assets will be affected. The risk is not merely political but technological as well as there is uncertainty about possible future technologies which might affect the speed and scope of the transition toward a low-carbon economy.² This aspect further influences investors’ ability to form long-term expectations about assets to be invested in.

Comprehensive climate legislation and technological progress toward cheaper renewables and clean technologies are already materializing across the globe. These developments affect the relative prices of fossil and non-fossil fuel sources, thus creating “stranded assets”. In all, the growing evidence of the increasing physical impacts of climate change is making the current lack of adequate response more and more unsustainable and therefore forces governments to take decisive actions.

As a consequence, investors and financial regulators are debating on whether the implementation of climate policies to meet the 1.5 C COP21 agreement target will generate systemic risks or, instead, opportunities for low-carbon investments. Therefore, assessing the impact of climate risks and climate policies on the financial system is easily ranked among the most urgent and prominent societal issues (Carney 2015; ESRB Advisory Scientific Committee 2016; Battiston et al. 2017).

From a purely financial point of view, the question becomes whether climate risks are diversifiable or not. In other words, using portfolio theory jargon, climate risk can be broken down into two components that together make up a portfolio’s total climate risk exposure, systematic risk, and unsystematic (idiosyncratic) risk.

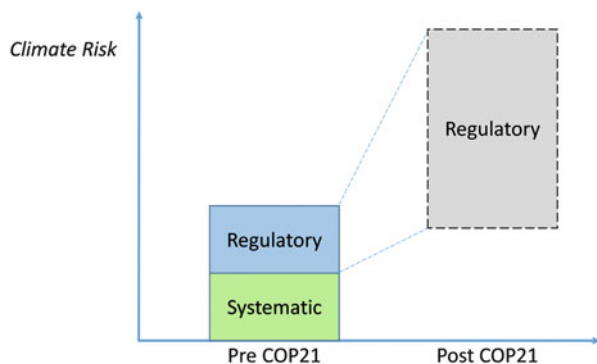


Fig. 6.1 The components of climate risk

Systematic risk is associated with macroeconomic concerns as climate change (and the policies to combat its impacts) will create systematic risk across the entire economy, affecting energy prices, national income, and all the industries regardless of their direct exposure to carbon policies. On the other hand, unsystematic climate risk is the component of investment risk specifically attached to an individual security. This component of climate risk is assumed to be potentially diversifiable away.

Therefore, there is a systematic risk related to natural disastrous event and erosion of the living standards on the planet which in turn can provoke instability in societies and economies. The unsystematic risks mostly refer to the regulatory risks associated with the implementation of policies (i.e. carbon tax, cap-and-trade systems, new regulations against carbon emissions) that could affect especially the companies which have a relevant carbon footprint. This latter component of risk is assumed to be increasing after the COP21 agreement (see Fig. 6.1).

6.3 MOUNTING “GREEN” PRESSURE ON THE FINANCIAL SYSTEM

For over two decades, many investors around the world have factored, in various ways, environmental considerations in picking and managing financial assets. Those investors are typically labeled as socially responsible investment (SRI) players as they explicitly acknowledge the relevance of environmental, social, and governance (ESG) criteria in carrying out investment activities. How and to what extent specific environmental concerns are

factored in the investment process vary greatly depending on the size, technical capabilities, customer base, and policy framework those investors operate in.

Nevertheless, the common denominator of this kind of investors is that they recognize that the possibility to generate long-term sustainable returns is dependent on stable, well-functioning, and well-governed social, environmental, and economic systems (Laermann 2016). The focus of these investors is on long-term returns because their investment horizon is to a large extent long term: they are public and private pension schemes, insurance companies, sovereign wealth funds, mutual funds, banks, and other institutional asset managers. For these investors the reduction of medium- and long-term risks such as the climate change ones is of paramount concern, especially because some of them have relevant direct and indirect exposure to the infrastructure and energy sectors (which are particularly exposed to climate change risks). Besides long-term focused institutional investors, the pressures on financial companies to become more environmentally sustainable are of different nature.

First, more and more anecdotal and scientific evidence is being gathered supporting the positive relationship between environmental performance and corporate financial and operating performances. For example, Friede et al. (2015) examined more than 2000 empirical analyses of ESG and financial performance over three decades and found that about 63% of the studies showed a positive correlation between the inclusion of ESG factors in investment decision-making and financial performance.

Second, from an asset owner's perspective, failing to consider sustainability factors in long-term investment practice is "considered being a failure of fiduciary duty" (UNGC 2015), and as a consequence, the integration of ESG information into investment decisions is becoming common practice. Especially, the investors which have long-term liabilities and a fiduciary duty to their ultimate owners/clients (pension funds, insurance companies, and sovereign wealth funds) are mandating asset managers to integrate ESG criteria across their portfolios.

Third, in some jurisdictions public pension funds and sovereign wealth funds are required to comply with statutory provisions that require the integration of ESG issues into their investment decision policies. In other jurisdictions, there are industry-sponsored initiatives that, although are not legally binding, strongly encourage asset owners to mandate their trustees to adopt a more active stewardship approach (see next paragraph) through direct engagement, proxy voting, or impact investing. For example, in

2010³ the Financial Reporting Council issued *The UK Stewardship Code* which set standards for voluntary-based transparency on how institutional investors enhance the sustainability profile of the companies they are invested in. Another example is the *Portfolio Decarbonization Coalition* which is a multi-stakeholder initiative that seeks to support and catalyze the transition to a low-carbon economy by encouraging and mobilizing institutional investors to decarbonize their investment portfolios. The leading initiative in the field is however the United Nation-sponsored *Principles for Responsible Investment* which is a nonprofit organization aiming at studying the investment implications of environmental, social, and governance factors and at supporting its broad network of international investor signatories in incorporating these factors into their investment and ownership decisions.

Fourth, there is a progressive cultural shift of consumers—especially in Western countries—in favor of eco-sustainability. The customer base is rapidly changing as more millennials become consumers of financial services. When making decisions about the financial products they buy, younger generations tend to factor the sustainability profile of the provider. Therefore, financial institutions and asset managers are aligning their investments criteria to meet the demand of their clients. For funds and other financial players, the inclusion in their offer of SRI products is becoming compelling from a business perspective.

6.4 FINANCIAL INSTITUTIONS' CURRENT APPROACHES TO ECO-SUSTAINABILITY

With mounting pressure on the financial system to become more sustainable, many investors have been exploring and implementing strategy to “decarbonize” their investment portfolios. Decarbonization is the process through which investors align their investment portfolios with the expected needs of a low-carbon economy. In practice, the strategy chosen to decarbonize investors' financial assets is critically dependent on how they define decarbonization, how they structure their decarbonization targets and objectives, and how they choose to measure their performance in greening their portfolios. The chosen approaches also depend on their position in the investment chain, namely, on whether they are asset owners or asset managers. The nature of the assets they invest in, their capabilities and expertise

in managing complex risk exposures, the human capital, and resources in place are all elements that determine the actual approaches to sustainability.

The metrics used to quantify emissions' footprint play a key role in designing the decarbonization strategy. Investors committed to reduce the carbon exposure of their portfolios usually refer to the so-called Scope 1 or Scope 2 emissions. The former are greenhouse gas emissions from sources that are owned or controlled by the issuer, including emissions from fossil fuels burned on-site, emissions from company-owned or leased vehicles, and other direct sources. The latter, on the other hand, encompasses electricity generation, heating and cooling, or steam generated off-site but purchased by the company. Scope 1 and 2 emissions are the metrics preferred by investors because they are easy to measure and monitor. In practice, they are easy to understand and communicate, they are typically covered by financial and extra-financial information providers, they minimize the risk of double counting, and they are generated by operations on which companies have the most control on.

However, those emission metrics may provide an incomplete picture of a company's total carbon exposure. This is why it has been argued that "Scope 3" emissions—which cover all indirect emissions occurring in a company's value chain both upstream and downstream—should be factored in the assessment of the total carbon exposure along the Scope 1 and 2 ones. Examples of Scope 3 emissions are the ones generated by employee travel and commuting, and from outsourced activities. These emissions are clearly more difficult to measure and report in a systematic way. Moreover, companies may have relatively limited influence over these emissions, and it would be difficult for investors to make them accountable for emissions outside companies' direct control. Finally and more importantly, there are economic and ethical considerations (see also next paragraph) about whether Scope 1 and 2 emissions really provide a full picture of the wider contribution that companies, through their products and services, make to the transition to a low-carbon economy. For example, while there are greenhouse gas emissions associated with the production and installation of solar panels, these solar panels could reduce demand for other more polluting forms of energy.

In general, the main approaches adopted in the asset management industry to factor environmental risks in the investment process are exclusion/divestment, active ownership/engagement, sustainability ratings, and explicit modelling of the environmental risks.

6.4.1 *Exclusion/Negative Screening and Divestment*

Typically, exclusion mechanisms are applied to avoid investments in companies involved in the production of either certain products (e.g. weapons, tobacco, alcohol), or when there is a risk that a company might be responsible for or contribute to unethical conduct (e.g. exploitation of child labor). When the exclusion criteria are defined and implemented, investors are expected to divest from the assets in their portfolios which fall under the scope of the exclusion. This mechanism is often adopted on purely ethical considerations basis and can vary depending upon the cultural and religious beliefs of the asset manager and/or of the ultimate owners.

Exclusion criteria can be either “product-based” when an asset is excluded solely on the basis of what its operations produce or “conduct-based” when a financial asset is associated to an issuer whose conduct is not consistent with the stated ethical principles. As for the possibility of excluding carbon-related investments, the issue is whether the products themselves may warrant exclusion or whether there are aspects of the productive process that could lead to exclusion. This issue leads to several conceptual considerations.

To start with, it should be noted that energy is an input in basically all human economic activities. This necessary energy is to a large extent derived from fossil fuel sources—coal being the less eco-sustainable of them. However, even recognizing the consequence of a too slow transition to a low-carbon (or no-carbon) economy, an abrupt transition could potentially generate unacceptably high social costs. In this framework, investments in carbon-intensive assets are not necessarily purely “unethical” as, for instance, carbon-intensive cheap coal used in electricity production may have positive social and economic benefits in disadvantaged areas of the world. For instance, the recommendations by the Council of Ethics appointed to set the investment policy of the Norwegian Government Pension Fund state that “fossil fuel companies’ energy production, energy use or CO₂ emissions cannot per se be said to be contrary to generally accepted ethical norms, as these products and activities constitute an important basis for our society”.⁴ A similar view has been pointed out by the Interfaith Center on Corporate Responsibility (ICCR): “the energy industry should not be seen as sole creators of the problem as long as global markets remain inextricably linked to fossil fuels to propel growth”.⁵

Nevertheless, organized campaigns for divesting fossil fuel assets are gaining momentum around the world. According to Gofossilfree,⁶ as of

December 2016 the value of assets represented by institutions and individuals committing to some sort of divestment from fossil fuel companies has reached \$5 trillion; to date, 688 institutions and 58,399 individuals across 76 countries have committed to divest from fossil fuel.

Conceptually, it would be difficult to ban all the fossil fuel producers without doing the same with all their consumers—namely, the whole global economy itself. While the exclusion criteria could be easily implemented, for example, for coal or petroleum producers, it would be inconsistent not to exclude the businesses that are using such energy products as well. Moreover, while consumption of the tobacco product, for example, leads to harmful consequences almost exclusively, the use of coal-related products can generate vast economic and social benefits.

6.4.2 *Active Ownership and Engagement*

Active ownership by institutional investors encompasses both engaging with investee companies and proxy voting on issues that regards the governance and performance (including those related to the environmental strategy). From a theoretical perspective, active ownership is a way to address principal-agent problems. Those refer to situations in which there is not a complete alignment of interests between the owner of an asset (the principal) and the person charged with managing the asset (the agent). Practically, active ownership is based on the full exercise of the rights attached to the status of “owner” of the securities issued by companies or other entities.

Some active ownership initiatives try to affect the environmental performance of companies by mobilizing public opinion and the media—this is particularly the case of proxy voting when environmental-related issues are voted at shareholders’ meetings. Other active ownership initiatives are carried out “behind the scene” and consist of discreet dialogues and interactions between investors and management and/or board directors. The effectiveness of active ownership is receiving increasing attention in literature, and, for example, Dimson et al. (2015) report enhanced performance (about 2% yearly abnormal returns) of investee companies after structured engagement activities by asset managers.

Successful engagements on specific environmental issues typically aim at punctual objectives. They are not limited to requesting corporate boards to consider certain sustainability issues, but they explicitly call for defined environmental targets to be delivered on. However, just as important as overcoming agency issues between an owner and manager is avoiding

micromanagement of companies while expecting full accountability from board and senior executives. As for carbon risks, the lack of a robustly defined long-term price for CO₂ emissions can definitely create incentives for non-optimal investment behavior by corporate leaders. Examples of engagement objectives in this area include ensuring compensation policies are consistent with environmental targets or requiring improved disclosure from companies on their carbon price assumptions.

Active ownership builds on the assumption that it is the responsibility of a long-term shareholder to question the robustness of financial analyses behind significant new investments made by investee entities. Since fossil fuel companies face the prospect of business decline and must adapt to new circumstances to survive, active ownership by investors may push them to leverage their present strengths toward a low-carbon energy productive system. Since this transition will take time, those entities exposed to carbon risks will need the engagement and support of large long-term investors. By engaging on climate resilience and transition strategies for fossil fuel companies, the investors adopting active ownership can manage the exposure to climate change risks exposure of their portfolio and protect the long-term value of their investments.

Active ownership engagements are conducted either independently or through collaborative platforms such as Carbon Disclosure Project (CDP) and major investor climate change networks (the European Institutional Investors Group on Climate Change (IIGCC), the Asia Investor Group on Climate Change (AIGCC), the Australia/New Zealand Investor Group on Climate Change (IGCC), and the Investor Network on Climate Risk (INCR)). Typically these collaborative engagements aim at encouraging companies to disclose their climate change strategies (e.g. the CDP information requests), to set emission reduction targets, and to take action on sector-specific issues such as gas flaring in the oil and gas sector.

6.4.3 *Sustainability Ratings*

Rising demand from investors to assess ESG-related risk and opportunities has fueled the strong growth of the ESG information market over the last two decades. A range of asset managers use sustainability analyses and ratings in managing their portfolios by comparing quantitative metrics and consolidated scoring for their investment universes.

In general sustainability research and analysis assesses the environmental, social, and governance performance of corporations and other issuers of

securities such as local governments and sovereign states. ESG ratings, rankings, and indices aim at measuring the performance and risk of the issuers against ESG criteria. They provide therefore a proxy for the external costs and benefits beyond conventional financial accounting and reporting parameters (Laermann 2016).

In practice, by establishing an overall score that positions the company on a particular scale, ratings indicate a company's sustainability performance. Investors, depending on their specific selection approach, can use such rating when mapping and managing investment portfolios.

Despite the growing availability of data on companies' sustainability profile, the quality of the disclosed information still depends both on the issuer and the analysis carried out by the rater. ESG disclosure does not necessarily feature materiality aspects or predictive data and thus bears the risk of being incomplete, inconsistent, and difficult to compare between different industries, markets, and rating schemes. To compensate for this deficit, it would require an active investigation approach, which ESG research providers, analysts, and asset managers due to constraints of resources can only perform to a limited extent (Laermann 2016).

Given that there are significant gaps and uncertainties in the emissions data available, environmental ratings do not appear to be yet reliable enough to enable investors to set decarbonization targets or to measure their performance against rating-based targets. A further practical consideration is that it takes time for investors to set up their data gathering processes and to educate their analysts and fund managers about how these ratings may be interpreted and adopted in the investment process. Moreover, there is often a time lag between data being available, ratings being issued, and that ratings being integrated into investment research and decision-making processes.

6.4.4 Modelling Carbon Risk in the Valuation of Investments

There are ways to treat the relevant risks incorporated in corporate assets (such as carbon risks) that are more informative than the standard application of valuation techniques. For example, the investor can quantify the value of companies in a certain number of scenarios, rather than synthesizing the different outcomes in a single expected value.

Focusing on one of the leading valuation techniques for corporate investments, namely, the discounted cash flow⁷ (DCF) model, it is possible to enhance such technique to reflect the magnitude and timing of expected

environmental risks. In practice, depending on the level of uncertainty, on the information available, and the time and effort investable in the valuation, more flexible configurations of the DCF model can be adopted (Damodaran 2012; McKinsey et al. 2015):

1. Standard DCF, to be preferred when uncertainty is limited and there is a clear dominant likely scenario.
2. Scenario-based DCF to be used when there is significant amount of uncertainty. Usually, there is a “base” or “most likely” scenario along one or more alternative one(s). The alternative scenarios model and quantify the consequences for company’s value of extreme (less likely) states of the world; typically two extreme scenarios are worked out, one optimistic and one pessimistic, but sometimes more than two alternative scenarios are considered.
3. Stochastic simulation DCF to be used when detailed data are available (or assumed) regarding the probability distributions of key variables affecting future cash flows. This approach is mathematically complex, but it can be handled by common software packages.

The increasing relevance of carbon risks for companies will increasingly require nonstandard valuation processes. Given the great uncertainty of future carbon prices, a scenario-based DCF and a stochastic simulation are the two approaches to be preferred especially for companies whose operations are particularly exposed to carbon risks.

An alternative strategy to embed carbon risks in the DCF valuation of companies consists in adjusting the cost of capital. In practice, moving from a single-factor model to a multifactor approach, environmental risks can be estimated as exposure of companies to that specific class of risks. The estimation of environmental beta is derived by the identification of market price/return related to this class of risks (Bianchini and Gianfrate 2018). Companies involved in industries under “cap-and-trade” schemes (e.g. electricity generation and energy-intensive industries such as steel, glass) are exposed to carbon price volatility, and the stringent obligations set by regulation on carbon quota can increase the dependence of company results with respect to carbon market. For these companies the beta might not truly reflect the exposure of the company to the amount of risk that cannot be diversified away. Underestimating carbon risks can be even more costly for non-(or not-enough-)diversified investors. In those situations, it

can be advisable to compute the cost of capital with the inclusion of an ad hoc estimation of carbon risks.

Therefore, a multifactor model, which explicitly estimates a carbon risk premium and the company's sensitivity to that premium, should deliver a more precise estimate of the stock's return, thus allowing for a more accurate measure of the cost of capital. The cost of equity capital for any company exposed to carbon risk can be derived as follows (Koch and Bassen 2013):

$$\mu_i = r_f + \beta_{iM}(\mu_M - r_f) + \beta_{iCO_2}(\mu_{CO_2} - r_f) \quad (6.1)$$

According to (6.1), the expected return on stock i μ_i is equal to the risk-free interest rate r_f plus the risk premiums for market risk and carbon risk. The latter is based on a stock's sensitivities to carbon factor as expressed by β_{iCO_2} , which show expected returns μ_{CO_2} .

A multifactor asset-pricing model that includes a carbon beta can be an effective tool to assess carbon risk materiality in terms of corporate value. This approach could be potentially extended to other environmental-related sources of risk, such as other pollutants or water.

The carbon beta approach relies on the existence of a liquid market for carbon allowances as well as on the assumption that stock markets are not pricing correctly the information about carbon and, more generally, climate change risks. Both elements are highly debatable in theory and practice. Still, the idea of adjusting the cost of capital directly using the price of carbon expressed by trading platforms has its merits. The more markets are established to trade carbon permits, the more room there will be for techniques to disentangle the sources or risks for companies and for stockholders.

As for the popularity of the approaches presented in this section, a study by the Global Sustainable Investment Alliance (GSIA 2014), from 2014, identifies negative screening/exclusions (€12.7 trillion) as the most common SRI approach globally, followed by ESG integration (€11.4 trillion) and corporate engagement/shareholder action (€6.2 trillion). A more recent survey (2015) conducted among members of the Chartered Financial Analyst Institute reports that, with 57%, ESG integration appears to have become the most popular approach.

6.5 TOWARD CARBON-NEUTRAL PORTFOLIOS?

Carbon risks do appear more pervasive and material than previously thought. The natural question for investors is how to neutralize or reduce such risks. If investors do not want to retain carbon risk—and therefore cover the potential losses it could cause out of the capital invested—what are the alternative strategies?

In a context of carbon priced dynamically, carbon exposure would affect an investment portfolio's volatility as well as its long-term returns (Wellington and Sauer 2005). A portfolio management strategy that seeks to maximize portfolio returns as its primary goal may be quite different from the one that seeks to reduce overall portfolio risk. But whatever the goal, as for other sources of risk, the strategy should be consistently designed, implemented, and evaluated against the primary objective: return impact or risk reduction (Statman 2005). Setting one objective and then evaluate the results against another could be inconsistent and counterproductive. In this chapter we assume the point of view of an institutional investor with a long-term horizon perspective and a risk-reducing objective.

In Fig. 6.2 we represent the relationship between portfolio value and cost of carbon. We consider that for a portfolio comprising asset (in total or in part) exposed to carbon risk the relationship between value and carbon price is negative and we assume that such relationship is linear (Fig. 6.2a).⁸

In their classical framework, Merton and Bodie (1999) identify several theoretical possible approaches to reduce or eliminate risks. The most intuitive one is risk avoidance that consists in deliberately excluding from the portfolios the securities and financial instruments carrying certain risks. Using the language and the framework introduced in the previous paragraphs, such an approach would consist in negative screening and exclusion lists of companies which are high carbon emitters.

Eliminating carbon polluters would result in a process of “decarbonization” of the portfolio, so that (as shown in Fig. 6.2b) the portfolio value would become insensitive to any variation of the carbon price. As mentioned, some initiatives are underway to promote such approach—notably, *Gofossilfree* and *Portfolio Decarbonization Coalition* (PDC). In practice, to implement a decarbonization strategy, investments are made directly or through fund of funds or other investment vehicles—in environmental technologies and renewable energies. Investors committed to decarbonize their portfolios invest in renewable energy (solar, wind, geothermal, hydro, and tidal power), enabling technologies (e.g. electric vehicles, smart grids), energy

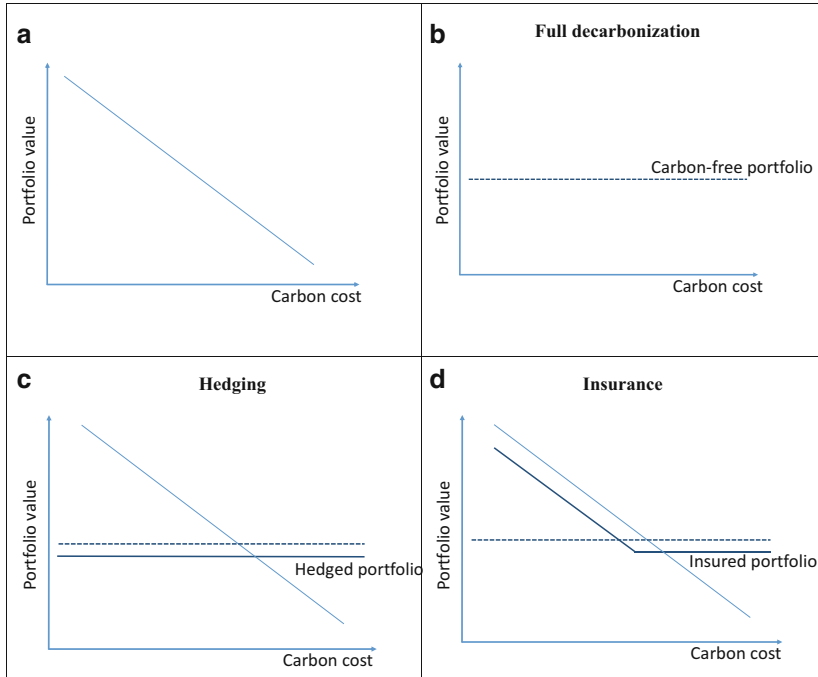


Fig. 6.2 How to immunize a portfolio from carbon risk (a) Relationship between carbon cost and portfolio value, (b) full decarbonization, (c) hedging, (d) insurance

efficiency (e.g. LED lighting, more efficient motors, smart energy management technologies), and products and activities that reduce energy usage (e.g. recycling, insulation, battery storage). However, as highlighted by a PDC report (2016, p. 9), according to some asset owners “there has been relatively little innovation in terms of the opportunities being presented to them, in particular beyond equities and clean energy”, and “there are relatively few investment managers with a strong track record on decarbonization, and they find that there is an insufficient choice of low-carbon opportunities across asset classes”.⁹ Apart from the paucity (relative to the institutional portfolios’ size) of carbon-free assets, the decarbonization strategy presents several implementation shortcomings and casts notable ethical and economic rationality doubts as already discussed in the previous paragraphs.

The second possible approach is the hedging of the portfolio from the carbon risk. Formally, a risk is hedged when the action taken to reduce portfolio's exposure to a loss also causes the investor to give up of the possibility of a gain from a favorable configuration of the risk source (Merton and Bodie 1999). Hedging therefore usually involves "linear" instruments whose contractual payoffs move one-for-one with the value of the underlying asset and so can be graphed with a straight line (Fig. 6.2c). Those linear contracts tend to be obligations or commitments usually in the form of forward, futures, and swaps (Servaes et al. 2009), but the construction of synthetic positions that deliver the same payoff of a hedging strategy is also possible. An interesting example regarding the hedging of climate risk is provided by Andersson et al. (2016): they present an investment strategy that optimizes the composition of a low-carbon portfolio index so as to minimize the tracking error with the reference benchmark index. They show that tracking error can be almost eliminated even for a low-carbon index that has 50% less carbon footprint. By investing in such an index investors are holding, in effect, a "free option on carbon": as long as the introduction of significant limits on carbon emissions is postponed, they are essentially able to obtain the same returns as on a benchmark index, but the day when carbon emissions are priced the low-carbon index will outperform the benchmark (Andersson et al. 2016).

The third relevant risk management strategy is insuring. Insurance eliminates only the adverse outcome, while maintaining potential upside, but an upfront premium is required or ongoing costs. Insurance contracts tend to involve "nonlinear" contracts (Servaes et al. 2009) whose payoffs are not graphed as a single straight line, but rather a combination of lines. In the language of the derivatives finance, the insurance scheme represented in Fig. 6.2d would be the payoff of a put option which gives the investor the right, but not the obligation, to purchase carbon at a fixed price.

As of now, the financial system is lacking the instruments to efficiently perform the hedging and insurance of carbon risks. Carbon-negative assets do exist: carbon permits in cap-and-trade systems or the financial contracts related to the REDD and REDD+ schemes¹⁰ are among the most notable examples. However, private investors currently have no access to such assets. If the financial system moves—autonomously or because of regulation—toward the implementation of effective risk management policies for such risks, financial innovations would be necessary. For instance, a market of climate and carbon-related derivative securities could be created.

However, it is difficult to determine *ex ante* what products, intermediaries, and financial instruments will best serve the need for the management of climate risks. Assuming a functionalist view of the financial system (Merton and Bodie 2005), the focus should be more on functions rather than on individual products. The functional perspective views financial innovation as driving the financial system toward the goal of greater economic efficiency, including eco-sustainability. The innovation will result in either new specialized intermediaries or new markets serving the need for climate risk protection. Intermediaries will emerge as the solution if climate-related products remain low volume and highly customized. On the contrary, if the products become standardized, they will move from intermediaries to markets. In this case, as the volume of traded securities expands, the increased volumes will lower the transaction costs and so make possible further design and launch of new products. Success of these markets and custom products will stimulate further investments in creating additional products and trading markets (Merton and Bodie 2005), progressively spiraling toward a low transaction costs, dynamically complete eco-sustainable markets.

6.6 CONCLUSIONS

Aligning the financial system with meeting the sustainable development goals will require profound innovation in the way investment portfolios are designed and managed. Sovereign wealth funds, pension funds, insurance companies, and other long-term institutional investors have been the pioneers in exploring ways to hedge climate risks (e.g. via timber investments). While those approaches have contributed to make investment activities greener and more sustainable, the latest evidences about the magnitude of the climate change risks demand more decisive actions to reduce and mitigate the risks borne by institutional investors.

A structured comprehensive risk management approach is required to make investment portfolios insensitive to carbon risks. In this perspective, renewables, timber/forests assets, sustainable agriculture, and clean-tech ventures can provide only limited hedge for long-term institutional investors, and there is a clear need to unleash financial engineering to structure more effective ways to manage climate risks. Importantly, climate risks are an issue not only for equities but for fixed income securities and most other financial assets. The more we know about the pervasiveness of this type of risks, the more we realize the extent to which the financial system is exposed

to it. Financial innovations are likely to emerge soon in this area. Climate- and carbon-related derivative securities will play an essential role in neutralizing the risk exposure of institutional investors. Moreover, carbon-neutral vehicles and indexes are to be designed to make climate risks hedging more effective and accessible to institutional and individual investors.

Policy-makers should explore and promote disclosure about climate risks embedded in financial instruments across asset classes. On the other hand, financial institutions should identify, model, and manage those risks in the same structured way traditional financial risks (e.g. interest, forex, and counterpart) are. The next financial revolution has just started, and it will be green.

NOTES

1. World Bank, Carbon Pricing Watch 2016, <https://openknowledge.worldbank.org/handle/10986/13334>
2. IPCC (2007) has defined several types of carbon risk: physical risk, regulation risk, litigation risk, competition risk, production risk, and reputation risk. In addition to the regulation risk, the other types of risks also indirectly make GHG emitters more vulnerable to the future development of labor, financial, and product and service markets.
3. A subsequent revision of the Code was released in September 2012.
4. From website: <http://etikkradet.no/en/recommendations/>
5. Downloadable from http://www.iccr.org/sites/default/files/page_attachments/ICCRInsightsOnClimateChange2013.pdf, p. 5
6. <https://gofossilfree.org/#>
7. DCF analysis is a method of valuing a project, company, or asset using the concepts of the time value of money. All future cash flows are estimated and discounted by using cost of capital to give their present values (PVs); then the sum of all future cash flows is the net present value (NPV), which is taken as the value or price of the valued entity.
8. An analysis that defines the negative relation between (a randomly selected) equity portfolio value and carbon cost is provided by Credit Suisse's report "Investing in carbon efficient equities: how the race to slow climate change may affect stock performance", 2015.
9. <http://www.unepfi.org/wordpress/wp-content/uploads/2016/11/PDCreport2016.pdf>
10. *Reducing Emissions from Deforestation and forest Degradation* (REDD) is a mechanism promoted by the United Nations Framework Convention on Climate Change (UNFCCC) since 2005, with the objective of mitigating climate change through reducing net emissions of greenhouse gases through enhanced forest management in developing countries.

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Sustainability Stress Testing the Financial System: Challenges and Approaches

Dieter Gramlich

7.1 AN EXTENDED DIMENSION OF SYSTEMIC FINANCIAL RISK AND RETURN

Stress testing has been widely used in economics and other disciplines as a technique to simulate the impact from worsening operating conditions on a target variable (Demekas 2015, p. 4). Its main objective is to explore the consequences from adverse developments (stress factors) on a system or a system's element, thereby assessing its sensitivity and resiliency ("what if" analysis). Stress testing in finance assumes negative variations of parameters in the financial and real markets—for example, an increase in risk spreads or a decrease in gross domestic product (GDP)—and searches for the effects from these variations on the stability of the system as a whole (macro approach) or the financial system's single institutions (micro approach) (Batten et al. 2016, p. 19). Whereas stress testing approaches (stress models) usually first assign negative variations and then model the resulting effects, inverse stress tests first fix an outcome considered as critical and then ask for the adverse conditions which may induce this outcome.

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Even while adverse scenarios for financial stress testing should be constructed to be both challenging and plausible (Anand et al. 2014, p. 62), they mostly remain within the financial or the real economic system's boundaries. The assumptions thereby are that shocks emanate from inside the financial or real markets (economic markets) and that the effects from stress factors can be sufficiently measured within the scope of the economic system. In this regard, the stress tests conducted more recently by major central banks and supervisory authorities (Anand et al. 2014; Board of Governors 2016; ESRB 2016a) are based solely on sets of economic conditions that differ in the number and severity of assumptions and in the way they are interpreted.

In light of evolving ecological and societal changes and their effects on financial markets, the limitation of financial stress testing models to the economic system has recently been criticized. Central banks have been asked by governments to comment on the possible effects from climate change on the stability of financial markets (ESRB 2016b). Regulatory authorities have been blamed for not sufficiently incorporating risk factors into the supervisory frameworks that emerge from outside the economic system (CISL and UNEP FI 2014; King et al. 2015, p. 146). Several external factors are missing in existing stress models: The scarcity of resources threatens economic and financial stability as well as health-related risks from pollution and extreme weather events. As societies expand on a global scale, issues of social unrest and political dissent become more frequent and manifest in violations and the destruction of economic value (Bowman et al. 2014, pp. 10–12).

Mostly, the critical values for scenarios are obtained from looking at extreme values in the economic markets from the past. Even while this strengthens the empirical evidence of the stress tests, the underlying assumption is that future challenges may be replicated as a function of past experiences (assumption of stationarity). In the case of increasing dynamics in the financial markets as well as almost unprecedented changes in ecology and society, this assumption is more than critical. Stress models usually assess the direct or first-round effects on financial assets and markets. However, as the most recent crises show, the effects from financial parameters may unfold in multiple dimensions and feed back in multi-step processes: When the bubble in the housing market burst, it manifested in worldwide cascades of decreasing asset prices and higher default risks, along with the over-indebtedness and social problems of the borrowers.

In the past, stress testing in finance was mainly focusing on individual institutions. In order to get an indication for systemic risk, the results from

these micro stress tests have mostly been summed up (Demekas 2015, p. 17) showing thereby how many institutions have been hit and how much equity or liquidity was missing in the system. Yet, simply adding together the results from individual institutions may not provide an authentic picture of the system's overall resiliency. As has been evidenced from financial crises, the interaction of institutions and their joint behavior differ largely from the sum of individual actions (Helbing 2010, p. 12; Gramlich and Oet 2017). More appropriate macro approaches specifically account for the connectivity and interactions of institutions. This applies both to their joint sensitivity to individual stress factors (correlation, common exposure) and to dependencies in their responses where the failure of one institution may induce a series of follow-up problems (risk cascades, risk contagion). Further, due to behavioral characteristics of the market such as amplification, exaggerating and herding (Krishnamurthy 2010), the effects from single events propagate exponentially to much higher levels in a systemic dimension (non-linearity). Similarly, in the context of extended stress factors, the impact from financial investors' collective behavior on the overall economic, environmental and social system has to be taken into account (Lydenberg 2016, pp. 57–58).

In the light of these considerations, this contribution addresses in more detail the challenges and approaches related to the integration of adverse conditions from the natural and social environment into models of financial stress testing. The extension of current stress testing in finance both by accounting for ecological and societal stress factors, the structural and behavioral complexity of the financial system and also with respect to possible feedback between the financial system and the socio-ecological system is referred to as *sustainability stress testing the financial system*. Existing and potential sustainability stress test (SST) approaches as a more comprehensive modeling framework is investigated. This allows for recognizing challenges to financial stability and profitability and also for the responsibility of the financial system in regard to the socio-ecological environment, thereby providing incentives for a better risk and return management.¹ The objective is to emphasize directions for the design of SST models in financial markets.

In the next step, the nature of SST models is related in more detail to the context of current financial stress testing models (Sect. 7.2). Within the SST modeling particularly, the challenges from the connectivity within and between economic and noneconomic systems (structural complexity) and their dynamic behavior (behavioral complexity) are addressed (Sect. 7.3).

The findings from this section further lead to directions in future SST modeling (Sect. 7.4).

7.2 APPROACHES TO STRESS TESTING SYSTEMIC FINANCIAL RISK

7.2.1 *Financial Stress Testing*

As the background of stress tests in finance is mainly linked to financial crises and as the stress tests conducted by regulatory authorities and central banks are mainly aiming to discover potentially distressed institutions (ESRB 2016a, p. 1), their connotation is mostly negative. Yet, stress tests also provide a range of helpful insights into the risk and return profile of institutions and the system and may be looked at from a much more positive perspective. Knowing the causes of their vulnerability, financial institutions are incentivized to strengthen their risk mitigation capacities and work proactively with their clients in order to avoid potential failures (IFC 2010, p. XII; Mercer 2011, p. 98; UNEP FI 2016, p. 26). Recognizing the impact from different stress factors, regulatory authorities and central banks may concentrate their efforts in order to ex ante mitigate the most critical factors for the system (Onischka et al. 2012, p. 2; Schoenmaker and van Tilburg 2016a, p. 6).

Though stress tests of the financial system may be conducted in various ways (an overview is given from Demekas 2015, pp. 7–20; Haben and Friedrich 2015, pp. 264–266), they are based on three common elements:

- A set of assumptions about the critical changes in the relevant environment of the investigated system or element (scenarios, shocks, stress factors).
- A functional approach to model the propagation of stress factors with respect to the structure and behavior of the system or the element (stress functions).
- A concept on how to measure the outcome from the combination of critical changes and propagation process (stress effects).

Existing stress tests in finance design scenarios based on critical conditions in the real and financial markets. For example, the *European Banking Authority* assumed in the adverse scenario 2016–2018 for the European Union stress test that real GDP decreases by 2–5%, unemployment rises by

2.5–11.5%, equity prices fall by 25% and housing prices by 10% (ESRB 2016a). The *Board of Governors* assumed in the severely adverse scenario for stress testing the United States financial system 2016–2017 that real GDP decreases by around 6%, unemployment rises by 5–10%, equity prices fall by 50% and housing prices by 25% (Board of Governors 2016, pp. 5–7).

At the core of stress testing is the functional model reflecting the processes within the financial system that relate stress factors to the system and the system's reaction. As the financial system is considered to be highly connected and at the same time highly sensitive (Helbing 2010, pp. 11–13; Krishnamurthy 2010, p. 1), the functional part of the stress testing framework is highly demanding and various approaches for modeling exist. Effects within the system can be modeled when looking at the behavior of individual institutions and then aggregating the processes to a systemic dimension (bottom-up approach). Alternatively, the overall response of the financial system can be assessed first and then attributed to single institutions (top-down approach). Bottom-up approaches are mainly linked to balance sheet information for individual banks. The stress effects are obtained with respect to the value of assets and liabilities and the results in the income statement. Top-down approaches refer to the aggregated value of assets, capital or liquidity in the system and investigate its sensitivity to changing stress factors mostly based on statistical analysis. It is then determined how much the overall risk is affected from the inclusion or exclusion of single institutions (incremental or marginal risk).

Finally, the outcome from stress factors and consecutive adjustments in the financial system may be measured in different ways.² Very often the effects on bank equity is referenced, other approaches target the liquidity of banks and the system and, more recently, combined approaches to measure solvency and liquidity effects have been presented (Haben and Friedrich 2015, p. 274). Though these advances are already highly demanding and comprehensive, the framework of stress modeling is basically restricted to the boundaries of the markets for capital and goods. However, this ignores the dependency of economic markets on the surrounding environmental and social system. Achieving optimal stress results within the financial system does not mean that this is also optimal with respect to the stability of the entire system. The connectivity between the different dimensions of human life together with their highly dynamic pattern of interactions may produce quite different effects in the overall system than just in the financial system alone.

7.2.2 *Financial Versus Sustainability Stress Testing*

Sustainability stress testing the financial system thus first implies the integration of stress factors from the broader ecological and social context (socio-ecological system, external system) into the modeling of financial effects.³ Stress factors can emerge with respect to damage from disasters (physical risks) and also from policy responses to disasters (transition risk) (Batten et al. 2016, pp. 12–17; ESRB 2016b, p. 2). Secondly, the modeling framework has to account for the various interactions between the markets for capital and goods (economic system, internal system) and the external system. Due to the different nature of socio-ecological stress factors as well as the mostly unknown interaction patterns (Lydenberg 2016, p. 58), SST modeling is not just to be conceived as a simple extension of stress factors into the existing framework but rather as a new conceptual approach for stress modeling.

This is also evidenced by the way the effects from sustainability stress factors can be measured (an overview is given from Stiglitz et al. 2009, pp. 61–82; Lydenberg 2016, pp. 58–60). There is a consensus that sustainability is difficult to assess in a single monetary number, given its complex and global nature. Instead, it has to be measured as a set of indicators referring to quantities and qualities of natural, human, social and physical capital (Stiglitz et al. 2009, p. 17). From an economic perspective, adverse conditions from society and ecology impact on conventional financial parameters such as equity and liquidity. In a broader perspective, the effects should be measured in terms of variations of a sustainability value including also social and ecological value components besides simply the financial ones.⁴ For example, the United Nations (2015) have adopted 17 sustainable development goals for the economic, social and environmental dimension with 169 targets where specific indicators are still to be developed. The different patterns of conventional financial stress testing and SST modeling are illustrated in Table 7.1.

As in financial stress testing, the SST framework is also based on the three basic model elements: stress factors, stress functions and stress effects. In addition, its profile as a separate class of modeling is evidenced by the fact that socio-ecological stress factors exhibit a higher degree of complexity, new transmission structures and dynamics and that SST models may also include specific target variables. Modeling based on observed patterns in financial markets in the past may be misleading as the emerging sustainability risks create patterns of vulnerability and connectivity of their own. Instead,

Table 7.1 Financial and sustainability stress testing—a synopsis

| | <i>Financial stress testing</i> | <i>Sustainability stress testing</i> |
|-------------------|--|--|
| Objective | Monetary effects of adverse economic conditions Strengthen institutions' resilience | Monetary and non-monetary effects of overall adverse conditions Counterbalancing unsustainability |
| Nature of problem | Economic Complex, national/international Medium frequency, high impact Mostly reversible (mean reversion) | Ecological, social and economic Highly complex, global Low frequency, high impact Probably irreversible |
| Context | Risks in finance and real economy and their impact on financial markets Mostly unidirectional: forward effects finance—production Financial system: mostly banks Regulation and central banks as actors | Risks in ecology, society and finance and their impact on financial markets Mostly multi-directional: Forward and backward effects ecology—society—economy (finance) Financial system: banks, near-banks, funds, insurers Regulation, central banks, corporates and governments as actors |
| Technique | Mostly linear relationships Short- and mid-term modeling Modeled by economists Based on past experiences | Mostly non-linear relationships Long-term modeling Modeled by economists, natural scientists, sociologists Forward-looking scenarios |

the modeling framework has to invent new and forward-looking scenarios (IFC 2010, p. 7). This may include new types of exposures, correlations and amplifications, and the modeling of sustainability stress factors has to be adjusted accordingly.

7.3 A FRAMEWORK FOR SUSTAINABILITY STRESS TESTING THE FINANCIAL SYSTEM

7.3.1 *Models of Sustainability Stress Testing the Financial System*

SST models for financial systems account for the connectivity and interaction between the financial system and the social and ecological context. Though few modeling concepts for SST exist (EIU 2015, p. 33; Battiston et al. 2016, p. 2), these models have in common that they align the modeling components stress factors, stress transmission and stress effects

alongside the objectives of a sustainability-related risk assessment framework. Existing approaches mainly concentrate on climate risk factors as a threat for loan and investment portfolios thereby assessing potential damages for financial assets and exploring ways how to mitigate them (CISL 2015; EIU 2015; Mercer 2015; UNEP FI 2016).

Given the complexity resulting from the extension of already very demanding financial stress testing models by climate factors, the connectivity between climate and finance is basically modeled in a unidirectional way: The pattern investigated is how climate-related factors propagate into the financial markets and impact the value of assets. Feedback from the financial system to the external system is rarely included.⁵ Further extensions of SST models may focus more on those responses as well as further social and environmental stress factors and also include target variables other than purely financial effects on equity and liquidity. Figure 7.1 illustrates the components of the SST framework.

First approaches to link developments from society and ecology to economics can be attributed to the work of *The Club of Rome* and the underlying modeling from *System Dynamics* in the 1970s (Meadows et al. 1972) and the follow-up reports (Meadows et al. 2004; Lietaer et al. 2012). Though not explicitly labeled as a stress test, the publication of *The limits to growth* and the follow-up reports express critical outcomes for economy and society from a negative environmental scenario. They are based on the simulation model *World3* incorporating feedback loops and non-linearities and also provide evidence on how economic growth and structures themselves feed back on environmental and social frictions.

More recent SST frameworks have been developed as a consequence of extreme weather events at the beginning of the twenty-first century focusing primarily on the damage to corporates and insurers. One of the most well-known approaches is the investigation of climate change-related economic effects, the *Stern review* (Stern 2006, 2009). Similar to *The limits to growth*, the *Stern review* concludes that a transition into a sustainable system is possible. However, the cost of transition gets exponentially higher the more time is needed for actions. As in the approach from the *Stern review*, the modeling of Nordhaus (2010, 2014) and approaches from the *Economist Intelligence Unit* (EIU) and *Mercer* are designed as integrated assessment models (EIU 2015, p. 33; Mercer 2015, p. 9), thereby representing top-down approaches that integrate macroeconomic models with effects from climate change.

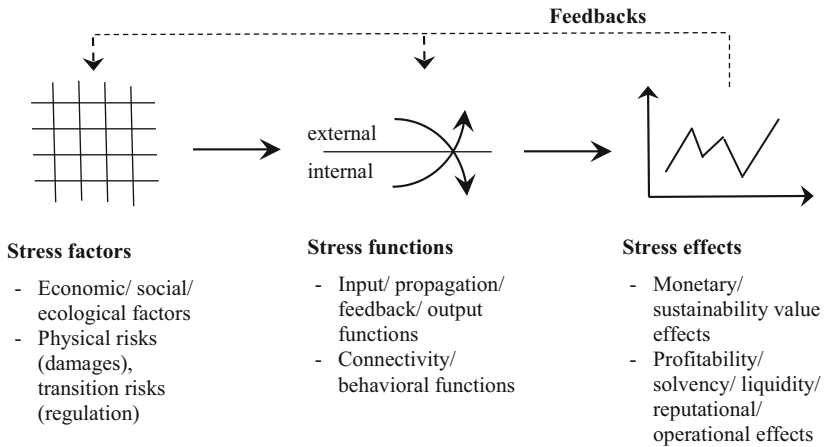


Fig. 7.1 Components of the sustainability stress test framework

Existing models are still at the beginning of developing SST frameworks. Though they already provide valuable insight into the vulnerability of financial markets caused from external factors, the structural and dynamical complexity of the problem needs much more consideration. A major challenge is to model the multiple, direct and indirect and mostly non-linear transmission processes from sustainability stress factors into the financial markets. Particularly, assumptions about levels of future economic productivity, the associated climate sensitivity and the destruction potential (EIU 2015, p. 51) are considered to be critical.⁶ Further challenges come from the interaction effects back and forth between the socio-ecological system and financial institutions (UNEP FI 2016, p. 26) and from the representation of the inherent complexity in a simple numeric way. As general obstacles for the development of SST models, it may be considered that the purely financial modeling of stress is difficult and not yet complete (Demekas 2015, p. 20). In addition, the awareness of socio-ecological risks currently is too weak to put sufficient pressure on rapidly expanding the SST framework (Onischka et al. 2012, pp. 12–13; Gramlich 2014, p. 233).

As a consequence, basic challenges in the modeling of SST frameworks are associated with the adequate representation of the underlying systems' structural, dynamical and algorithmic complexity (Helbing 2010, p. 3; Haldane and May 2011, p. 351). Where structural and dynamic aspects

are related to the systems' elements, their connectivity and behavior, algorithmic complexity addresses more technical challenges in the functional implementation of the framework. The following sections are arranged along these modeling challenges.

7.3.2 *Sustainability Stress Testing from a Structural Perspective*

Structural aspects of SST models include the components of the stress testing framework and how these components are connected. Further to economic stress conditions related to the markets for capital and goods in the financial stress testing models, SST approaches consider how adverse conditions in society and ecology and policy responses to them affect the financial markets' efficiency and resiliency. Several new dimensions of connectivity have to be considered. Within the socio-ecological stress context, single factors such as climate change and migration can be modeled in isolation or in combination with eventually amplifying effects. The transmission of these factors into the financial markets can directly impact financial institutions, for example, pollution affecting the institutions' staff, or indirectly via the institutions' claims on exposed companies (UNEP FI 2016, pp. 24, 26). Effects from sustainability-related risk factors might have impacts on financial values and also on social values such as health and reputation.

Up to date, mostly climate-related issues are taken into account. Climate factors already unfold to a broad spectrum of subsequent effects and are particularly addressed in the report of the *Intergovernmental Panel on Climate Change* (IPCC) including (IPCC 2014, pp. 58–64):

- Rising air temperature with more frequent hot and fewer cold temperature extremes.
- Water cycle and extreme precipitation events (floods, droughts, storms, blizzards).
- Sea level rise and reduction of Arctic sea ice.
- Carbon cycle changes and ocean uptake of anthropogenic carbon dioxide.

Potential dimensions of climate change may affect the markets in various ways (IPCC 2014, pp. 64–74; CISL 2015, pp. 36–40). Institutions are immediately hit as their staff and their infrastructure are directly exposed to the consequences of climate change: Heat waves cause productivity and

health problems among employees (King et al. 2015, pp. 57–64), and rising sea water levels and flooding jeopardize the institutions' infrastructure in coastal areas. At the same time, private and corporate customers are hit by the same effects, which then may induce multiple consequences for the value of financial assets and collateral, default rates and cash flows (Gramlich and Finster 2013, pp. 636–639). Batten et al. (2016) and ESRB (2016b) also address potential threats that emerge from climate change policies where new legislation requirements impact the markets.

Where in financial stress testing concepts mainly banks are assessed, SST frameworks must comprise a larger range of institutions. Sustainability stress factors threaten the system as a whole, and the assets held by all types of financial institutions are exposed (Klomp 2014, p. 180): Losses from environmental damage hit at the same time banks, near-banks (specific types of funds), investment funds and also insurers. Institutions are hit directly through assets in exposed sectors or indirectly via stakes in other financial institutions that are threatened themselves (Battiston et al. 2016, p. 4). In particular, insurance companies have to be included as they are exposed both by their asset holdings and from insuring natural damage.⁷ Given the broader range of affected institutions and their exposure, the impact from sustainability stress factors is to be estimated as being higher than from simply financial stress factors.

Though climate-related issues already expand to a broad range of effects, changes in the natural environment involve further consequences. The scarcity of resources, particularly when considering fossil fuel resources such as oil and gas, will impose restrictions on particular industries and also affect the mobility of people. Water will become an even more scarce resource due to increasing demand from a rising population, changing meteorological conditions and contamination of ground water in industrialized areas (King et al. 2015, pp. 74–83). Last but not least, increasing pollution is a threat for the health of people and ecological systems and further affects the productivity of companies, the creditworthiness of borrowers and the stability of social security systems. As a consequence, the approaches for stress testing must be adjusted:

- Environmental factors are a global phenomenon (CISL 2015, p. 36) and materialize through multiple channels.⁸ Thereby, they affect companies and households from various sides and create new patterns of common exposures and risk concentrations. As a consequence, the traditional pattern of correlation and diversification with respect to

customers has to be rethought (Batten et al. 2016, p. 8): Currently, the loan portfolio of a bank seems to be well diversified if it includes loans to different industries, for example, to the agriculture and to the energy sector. However, in future both types of customers may suffer simultaneously from rising temperatures—reduced harvest for the farmer and problems from cooling down the power stations—and the bank may thus be exposed to a temperature concentration risk.

- Similarly, an SST of the financial system can show the common exposure of multiple institutions from sustainability stress factors and incentivize regulatory limits (Schoenmaker and van Tilburg 2016a, p. 6).
- Climate change as a systemic risk factor is not limited to political boundaries and affects various regions, countries and even continents simultaneously. As a consequence, the concept of geographical diversification has to be rethought. Particularly, global investment funds diversifying their assets based on regional criteria have to reexamine their allocation strategy.

An outcome of the yearly meetings of global leaders in economy and politics at the *World Economic Forum* (WEF) in Davos is the *Global risk report*. The report includes estimations of major challenges to the world obtained from a survey among the Forum's participants. The challenges comprise threats from economy, ecology, technology and society. Among the various stress factors arising from social changes particularly, the risks from higher polarization of societies, wealth disparity and migration are addressed (WEF 2017, p. 11). Similar to ecological factors, the effects from social risks are diverse and unfold into multiple dimensions.⁹ Destruction in the course of aggressive conflicts, the costs of restoring peace and the impact on social security systems due to global migration affect further the value of financial assets and stress mitigation policies (further examples of social unrest are given from Bowman et al. 2014, pp. 10–15). Furthermore, the amplifying connectivity between these aspects must be taken into account; for example, rising temperatures will decrease water availability and thus increase migration (further examples are given from WEF 2017, p. 16).

SST approaches on the other hand are not only designed to trace solely the negative outcomes from changing scenarios. Inherent to transformations in ecology and society there are also new opportunities for mitigating damage and even for creating value (Gramlich and Finster 2013, p. 633). Where some companies and regions are affected from sustainability stress

factors, others may benefit from a warmer climate and the immigration of citizens. Similarly, where some industries suffer from scarce and expensive resources, other companies involved in decarbonization, renewable energy and recycling may take advantage of the sustainability-related opportunities.

As a consequence of looking at structural aspects of sustainability scenarios, the following aspects for modeling SST approaches for financial markets should be considered:

- Structural effects for industries and countries arising from ecological and societal transformations will overlay the traditional purely economic structures and become more important in the future.
- As a consequence of the structural overlay from sustainability-related factors, new patterns of connectivity between companies, industries and regions will emerge and thus imply new patterns of correlations and common exposures.
- As far as responses within SST models to these structural changes are considered, new stress mitigation directions for stress assessment (e.g., rating concepts including the exposure to scarce resources) and stress mitigation (e.g., diversification approaches based on the exposure to climate change) and therefore new stress modeling functions are needed.

7.3.3 Sustainability Stress Testing from a Dynamic Perspective

Whereas the buildup of stress is mostly ignored at first, the financial system tends to react to perceived stress in a more immediate and very sensitive way. Depending on tipping points or thresholds of financial stress, the markets adjust dynamically in a series of amplifications and feedbacks (Krishnamurthy 2010). Usually, after a time of exaggeration, the system gets back to a new equilibrium (mean reversion).

In comparison, stress factors from the socio-ecological environment at first tend to develop gradually in a mid- and long-term dimension. In this regard, projections about the rise in temperature or the scarcity of fossil fuel resources often extend to the end of the century (Meadows et al. 2004; Vivid Economics 2013, p. 68). However, socio-ecological stress factors then may reach tipping points of their own, and exceeding these thresholds—unlike in finance—is expected to lead to non-reversible consequences:

- In case the Gulfstream ceases to circulate, it cannot be reactivated with subsequent tremendous effects on the climate of the northern hemisphere.
- In the case of crops and water, the rise in temperature may imply a sharp, sudden and mostly irreversible loss (King et al. 2015, pp. 8–9).

Also, measures to mitigate socio-ecological stress cannot be applied with immediate effects as in the financial markets where lowering interest rates or the expansion of liquidity supply from the central bank may have an almost instantaneous impact. In contrast, adaptation policies for socio-ecological stress must be incorporated much earlier. On the other hand, policy responses for the mitigation of expected sustainability risks (Gramlich 2014, pp. 230–233; Schoenmaker and van Tilburg 2016b) may occur suddenly and define a higher burden for the institutions.¹⁰

SST approaches may consider reactions from the financial system in different ways. As the awareness of financial risks through ecology and society increases, investors are supposed to switch into less-exposed assets (CISL 2015). However, this is more a short-term reaction to the effects rather than a response to the long-term causes of the problem (King et al. 2015, p. 146). Alternatively, SST approaches have to consider the extent financial institutions may proactively contribute to the ex ante mitigation of stress. This may happen through the extension of activities into decarbonization, renewable energy and recycling technologies. CISL (2015) models the temporal interaction between future physical damages from climate change and present adaptation from the markets: It is assumed that today's expectations of investors about future sustainability stress “provide a bridge” (CISL 2015, p. 8) between the two time dimensions. The impact of scenario-dependent behavior of investors is then quantified for different types of financial portfolios. Figure 7.2 illustrates possible interactions within the SST framework.

In a similar way, the effects from sustainability-related stress factors are supposed to propagate with different dynamics. A first phase may assume that the institutions successively become aware of the damages from sustainability stress factors and shift away from potentially risky financial assets (CISL 2015). It may also assume that with higher public awareness of sustainability risks and changes in their customers' investment behavior, financial institutions involved in critical sectors may be exposed to reputational problems and therefore be constrained to change their investment policy.

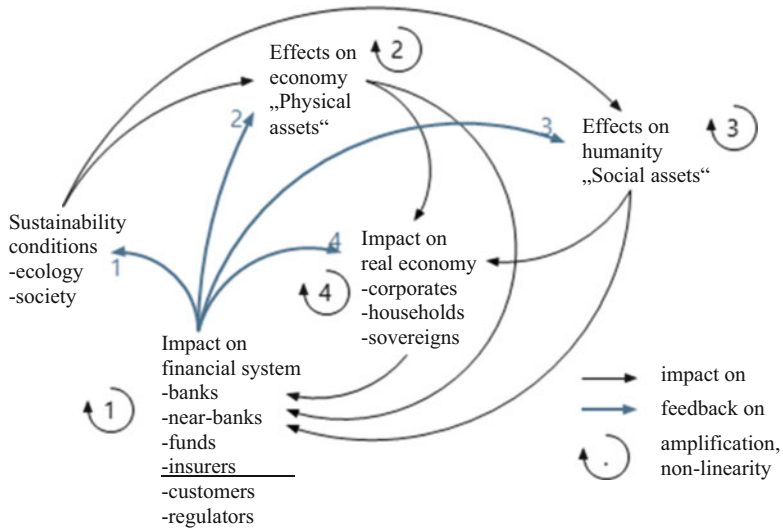


Fig. 7.2 Impacts, feedbacks and amplifications in the sustainability stress test framework

A second phase may assume higher public sensitivity and higher legal requirements. Governments may impose restrictions on companies engaged in critical activities and therefore indirectly also impact the profitability of financial stakes in these companies. Financial regulation may estimate a higher default risk from funding environmentally and socially critical investments and therefore require a higher capital ratio of the institutions (Schoemaker and van Tilburg 2016b, p. 326).¹¹ In a third phase, the sudden awareness of sustainability risks from private investors and their following some leading investors (herding) may lead to a financial tipping point and imply crashes in the financial markets. Finally, as sustainability stress factors materialize more and more across the economy and society, in a fourth phase the financial institutions may fail because of overall unsustainable conditions.

Main challenges for conceptualizing SST frameworks from a dynamic perspective are related to these points:

- Sustainability stress factors exhibit a different time pattern than purely economic factors with a longer period of gradually increasing stress levels, however, with final tipping points that are assumed to be irreversible.

- Stress reactions from the financial system may occur in different phases including the reallocation of financial assets based on different perceptions of sustainability risks as well as bank runs with presumably non-linear effects.
- SST frameworks should incorporate possible positive feedback on the sustainability stress environment that comes from adjusted investment and funding strategies on financial markets.
- Basically, the time pattern of financial stress is to relate to the time pattern of sustainability stress and their potential interactions (ESRB 2016b, p. 9) where in an extreme scenario tipping points in financial and the socio-ecological systems may coincide.

7.3.4 *Techniques of Sustainability Stress Test Models*

At the core of SST modeling are the functional relationships that connect the different elements of the framework. This functionality is needed to link the external sustainability stress factors with the internal economic framework, model transmission pathways within the real and financial markets, design feedbacks within the economic system and between economy and the external system as well as finally deriving the quantitative outcome from the SST framework.

Existing SST concepts mainly focus on the effects from climate change, and climate-related functions are primarily based on the IPCC (2014) trajectories for temperature. The trajectories are then transformed into macroeconomic effects on production and consumption where on the one hand, damage functions demonstrate the system's vulnerability and on the other hand, transition functions the system's adaptability to a changing sustainability environment. Stress testing approaches in this regard usually design scenarios as a consistent set of combinations from stress factors and the economic system's responses. For example, Mercer (2015) considers four risk dimensions—progress of technology, resource availability, physical impact, policy targets—that are combined with four adaptive responses to climate change: strong mitigation, coordinated mitigation, limited mitigation with low damages, limited mitigation with high damages.

Existing SST modeling techniques provide different directions how to comply with the multiple modeling challenges (Bowman et al. 2014, pp. 30–31). As mentioned, these approaches may include micro and macro concepts or top-down and bottom-up approaches. Models for public use include modeling from the perspective of monetary policy (Batten et al. 2016)

Table 7.2 Concepts of sustainability stress testing the financial system

| <i>Author(s)</i> | <i>Objective</i> | <i>Technical approach</i> | <i>Aspects</i> |
|--|--|--|---|
| Club of Rome (Meadows et al. 1972, 2004) | Interaction of growth and resources Exponential modeling | System dynamics approach (World3) to simulate scenarios of growth Feedbacks among five variables: population, industrialization, pollution, food, resources | Self-limitation as a strategy Pessimistic assumptions |
| Stern (2006, 2009) | Global effects, climate change Effects from climate policy | Different scenarios for rise in temperature Simulation of economic damages from climate change (PAGE2002 model) | Comprehensive modeling Size of damages is criticized |
| Mercer (2011, 2015) | Quantitative impact from climate change Effects on portfolio construction | Sensitivity of asset classes and industries to risk factors is modeled Four climate risk factors within four scenarios Different climate pathways at 2100 | Mitigation of emissions, climate adaptation Interaction of natural and human systems |
| Klomp (2014) | Effect of natural disasters on banks' distance to default | Count measure of disaster events to account for number and timing of catastrophes Z-score to measure distance to default Z-score regressed on count measure | Integration of disasters, banks, regulation Micro approach |
| CISL (2015) | Stress testing confidence shocks from climate change sentiments Risk mitigation | Three IPCC scenarios of climate change (policy) and related investors' behavior Oxford economic model to examine shocks Application to four standard portfolios Financial effects within next five years due to changes in asset allocation | Sentiments and tipping point behavior Dynamic not explicitly modeled |
| EIU (2015) | Climate value-at-risk 2100 Impact on financial assets | EIU forecasts and updated DICE model for direct and indirect climate impact on economy Dividend and capital approach to calculate financial climate losses Monte Carlo analysis | Most losses from weak growth and low asset returns Exponential loss from rise of temperature |

(continued)

Table 7.2 (continued)

| <i>Author(s)</i> | <i>Objective</i> | <i>Technical approach</i> | <i>Aspects</i> |
|-------------------------|---|--|---|
| Batten et al. (2016) | Climate change effects for central banks Conceptual approach | Channels propagating the effects from physical risks and transition risks Multiple patterns of connectivity and interactions in the financial system Stress tests for physical and transition risks | Connectivity across institutions and sectors Central bank policy left open |
| Battiston et al. (2016) | Effects from climate policy on financial institutions Impact of connectivity | Shocks triggering losses from different types of assets in carbon-sensitive sectors Seven economic sectors, three types of assets, three basic types of actors Financial institutions connected via equities, direct and indirect links to sectors | Propagation of shocks via connectivity and second rounds Mostly linear relationships |
| ESRB (2016b) | Transition into low-carbon era Implications for regulation | Transmission channels via macroeconomic impacts of energy and exposure of financial system to carbon-intensive assets Price- and quantity-based interventions | Conceptual framework Transition risk is emphasized |
| WEF (2017) | Analysis of global risks and risk connections | Perception survey based on 750 experts: business, academia, society, government Emphasis on connectivity of global risks | Shifts in risk relevance over time Qualitative study |

or macroprudential regulation (ESRB 2016b) whereby models for private use primarily focus on the effects for financial portfolios of investors. An overview is given in Table 7.2. In a comprehensive discussion of modeling approaches, Vivid Economics (2013, pp. 64–69) distinguishes five techniques relative to the extent of issues addressed: Bottom-up studies investigate impacts on specific sectors, integrated assessment models link single models, adaptation integrative assessment models explore effects of adaptation to climate change, multi-asset models assess cross-sectional interactions and extreme weather event studies consider the impact of all kinds of extreme weather simultaneously.

Among the integrated assessment models the most advanced functional approaches are the DICE/RICE, PAGE, FUND and WITCH models (an overview is given from Gillingham et al. 2015; Nordhaus 2014).¹² The concepts basically differ in the way they model the range of climate effects and the effects from climate policy. A classification suggested from Demekas (2015) for macroprudential stress tests can similarly be applied for SST frameworks. Here, partial equilibrium models focus on specific market institutions but do not account for connectivity. General equilibrium models aggregate specific sectors or institutions and their connectivity and mostly rely on balance sheet or market price data. More technically, connectivity is assessed based on multivariate density functions or Merton-type models. Finally, stress test models for the financial system as a whole (top-down) are distinguished.

From a similar technical point of view, EIU (2015, p. 35) suggests for the calculation of future losses from climate change first a dividend approach where potential damages are assessed as discounted cash flows from reduced dividends. Alternatively, the capital approach estimates the value of physical stocks after damages and links this estimate to the value of financial stocks. Depending on the propagation and effects of shocks within the economic system, on the one hand physical risks are modeled on the damage from the deteriorating human and natural environment. On the other hand, the effects from transition risks are assessed, here the effects from adjusting to new regulation and technology during the transfer into a low-carbon economy (Battiston et al. 2016).

The multiple patterns of connectivity and behavior in the financial system have to be captured appropriately as an essential and specific component in the overall SST framework. Up to now, only few approaches exist to model explicitly the structural and dynamic characteristics of financial markets. For example, CISL (2015) emphasize behavioral effects and non-linearities, Batten et al. (2016) explore the connectivity among financial institutions and the ESRB (2016b) includes potential amplifiers such as the leverage ratio and linkages among banks and insurers.

While there are some similarities among the different technical approaches, a clear and consistent framework for functional modeling is lacking. However, this may also be conceived as an advantage as principally complex phenomena should be assessed from multiple perspectives (Vivid Economics 2013, p. 5) and their results be integrated. The SST functional modeling can thus be commented as follows:

- Among the core elements in the functional SST modeling are damage and transition functions for the real markets and functions to translate their effects into the financial markets' parameters of solvency and liquidity.
- In particular, the specific pattern in the financial markets' responses to the real markets and the external system and thus the effects from amplification, feedback and herding have to be functionalized.
- Given the complexity of the phenomena to be modeled, the functional modeling cannot be executed in an exact mathematical way, yet it should be based on flexible, modular approaches as for example multiple scenarios or simulations based on distributions.
- Besides the effects from climate change, other ecological and social stress factors must be functionalized as well as their interdependence.

7.4 CHALLENGES OF SUSTAINABILITY STRESS TESTING

The basic challenge of SST models for financial systems is to cope with the complexity of socio-ecological and economic systems and their interaction. In particular, the structural pattern of the systems, their behavioral dynamics and the resulting challenges for the model functions must be addressed. Specific problems are related to the long-term nature of sustainability stress factors in combination with the short-term behavior of economic, particularly financial markets affecting the trade-off between the costs of present investments into sustainability against their future benefits. Given these challenges, a SST framework cannot only be conceived as an extension of existing systemic stress models, but as a modeling class of its own.

A basic response to complexity is to model the SST framework from different perspectives, with different objectives and different functional techniques.¹³ Ideally, the single models are designed in a modular fashion and can be integrated. As a consequence of the multiple dimensions, a joint effort from experts in economic and natural sciences is necessary (ESRB 2016b, p. 2). Although the measurement of impacts from sustainability stress factors on the real and financial markets is predominant, the effects from deteriorating environmental systems cannot be measured solely as a financial number, but must include elements of a social and ethical value. Up to now the climate-related effects on financial portfolios have been the focus of SSTs. However, there are many more environmental challenges besides climate change to consider. Also, critical aspects from societal transformation are still lacking in the SST framework.

The focus of this contribution is on the importance of connectivity and behavioral patterns inherent to financial markets for SST modeling. It is argued that the particularities of the financial system imply specific responses with regard to the sustainability stress factors. Therefore, the modeling concept for financial patterns needs to be conceived as an elementary sub-model within the overall framework. Otherwise, the SST framework would not comply with the specific challenges of a systemic (macro) stress test. In addition, the expected changes of correlation structures, common exposures and contagion need to be assessed in a forward-looking way and incorporated into the overall SST modeling as well as effects from sustainability driven changes in regulation and the institutions' business models.

A particular challenge is related to the different trajectories for sustainability stress factors and stress reactions within the financial system. Where sustainability stress is supposed to expand gradually over a long-term horizon, financial markets display much more frequent series of stress. The resulting question is, if rising concerns about sustainability might trigger a tipping point on the financial markets where the consequences may be negative on the one hand but lead to increased adaptation on the other. Alternatively, it may be asked if the absence of support for adaptation from the financial markets will lead to a collapse in the external socio-ecological system with a simultaneous collapse of the financial markets, hence a double threshold exceedance or a tipping point squared.

New functional modeling concepts might be suitable, thereby emphasizing the integrated and behavior-related assessment of the sustainability stress context. This refers also to modeling the potential differences in the behavior of the different types of financial institutions included and their customers. In addition to the predominant approaches from econometrics, further concepts from agent-based modeling, network theory, system dynamics and econophysics have to be explored (Helbing 2010, pp. 14–17; Haldane and May 2011; Gramlich and Oet 2017). Furthermore, the extension of SST frameworks toward early warning systems has to be considered with an expected higher sensitivity of the financial system's responsibility for sustainability.

NOTES

1. For simplicity, the term risk management will be used hereafter thereby including risk and return management.
2. In his investigation of the effects from natural disasters on financial fragility, Klomp (2014, pp. 181–182) refers to capital adequacy, asset quality, managerial quality, profitability, liquidity and reputation.

3. Basically, the concept of sustainability refers to an overall balance in economy, ecology and society and includes also sustainability stress factors within the financial markets (Gramlich 2014, pp. 224–227).
4. In this regard, Mercer (2015, p. 9) distinguishes the concepts of welfare (monetary concept) versus well-being (extended concept). Schoenmaker and van Tilburg (2016b, p. 330) suggest to incorporate long-term value creation into the corporate governance code of institutions. Lydenberg (2016, p. 60) refers to “jobs created, energy saved, health outcomes achieved” as possible elements.
5. An exception is the model from CISL (2015) that specifically focuses on a change in the sentiments of the financial markets with respect to sustainability adjustments. Feedbacks are also discussed from Vivid Economics (2013). Major financial feedbacks are discussed from Gramlich and Oet (2017).
6. Similarly, the ESRB (2016b, p. 2) refers to macroeconomic conditions, the value of carbon-intensive assets and insurers’ liabilities from natural catastrophes.
7. An advanced concept to represent the diverse institutions in financial markets and their connectivity is suggested from Batten et al. (2016).
8. King et al. (2015, p. 10) state that the risks of climate change are “systemic.” Schoenmaker and van Tilburg (2016b, p. 329) suggest that also financial supervision of ecological imbalances should be globally coordinated.
9. Helbing (2010, p. 2) states that “many major disasters affecting human societies relate to social problems.”
10. As an example, CISL (2016, p. 21) refers to the sudden policy intervention from the German government toward nuclear energy after the earthquake in Japan and the damages in nuclear power plants.
11. However, this would still be a “soft landing” (ESRB 2016b, p. 4; Schoenmaker and van Tilburg 2016a, p. 2).
12. DICE/RICE stands for Dynamic/Regional Integrated model of Climate and the Economy, PAGE for Policy Analysis of the Greenhouse Effect, FUND for Climate Framework for Uncertainty, Negotiation and Distribution and WITCH for World Induced Technical Change Hybrid model.
13. Suggestions for assessing the complexity of systems for systemic risk and SST models are given from Helbing (2010, pp. 14–17), Vivid Economics (2013, pp. 6–7), Gramlich and Oet (2017) as well as from Demekas (2015, pp. 21–28) for macroprudential stress testing.

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Responsible Investment Requires a Proxy Voting System Responsive to Retail Investors

Ian Robertson

8.1 INTRODUCTION

Shareholders of public corporations are entitled to two property rights: a share of the *economic* benefit, usually through dividends or capital gains; and a means of asserting their *ownership* views by voting their shares in person or by proxy in corporate annual general meetings (AGMs) or other special meetings.¹ Economic rights have developed over centuries (Macfarlane 2002) and remain strong today (La Porta et al. 1999). Shareholders may be large institutions or small retail (individual) owners, but whether they invest in a corporation's shares directly or through intermediaries (e.g. mutual funds), lawmakers and regulators have ensured they receive an equitable share of profits.

However, the effective exercise of ownership rights has bifurcated since the 1970s; institutions have increased their proxy voting as a core element of responsible investment (Clark and Hebb 2004), while retail investors' proxy voting rates have decreased substantially (Broadridge 2015; U.S. Securities and Exchange Commission 1976). Retail shareholders own approximately half of publicly traded shares (U.S. Federal Reserve Board 2014a), and if

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responsible investment is to continue its growth trajectory (Global Sustainable Investment Alliance 2015), their participation must be encouraged.

Institutional investors began to vote their proxies to influence companies' governance (G) and later their environmental (E) and social (S) practices (now collectively labelled ESG). The re-assertion of ownership rights had its origin in two developments: the enactment in 1974 of the Employee Retirement Income Security Act (ERISA) in the United States, which established a fiduciary duty for pension plan managers and required them to vote proxies in plan-holders' best interests; and the connection of ESG issues to long-term financial performance (Clark and Hebb 2004). The incorporation of ESG factors into the selection of stocks and the voting of proxies—the core activities of *responsible investment*—appears to pose a challenge to retail investors under the current regulatory system.

What began as a fiduciary responsibility and means to improve financial performance has expanded from company-specific ESG considerations to encompass broader aspects of capitalism and society. For example, engagement with companies about CEO pay is a governance issue with a direct financial impact—each dollar not paid to a CEO is an additional dollar to be split amongst shareholders. The same CEO pay issue can also be considered within the context of the current era of liberal (free-market) capitalism that, in addition to generating global wealth, has produced both high levels of domestic income inequality and the global financial crisis (Kotz 2009; Milanovic 2016). Proxy voting is a point of intersection between individual property rights and capitalism.

Recommendations to re-engage retail investors in responsible investment will be most effective if they reference: the history of property rights and the development of the corporation, the social context of liberal capitalism, how the retail brokerage and proxy systems serve retail investors, and the impact of recent changes within the brokerage and proxy systems.

Regulators focus predominantly on operational issues within the proxy system, such as end-to-end reconciliation of vote totals (Canadian Securities Administrators 2013; U.S. Securities and Exchange Commission 2015b). Consideration of low retail participation rates is typified by suggestions to vary the colour of envelopes to entice higher response (U.S. Securities and Exchange Commission 2015b), though on occasion more comprehensive consideration is given (U.S. Securities and Exchange Commission 2010). All suggestions to improve the proxy system should be encouraged, but re-engagement of retail investors requires re-imagining of the system within the broader context outlined here. The primary focus is on the

United States, but where helpful reference will be made to other jurisdictions, in particular England for historical context and Canada for comparison of regulatory frameworks.

8.2 STAGES OF CAPITALISM: THE LINEAR MODEL(S)

Academic models can be useful for illustrating relationships over time or within a system. Robert Clark's 'Four Stages of Capitalism' model shows the dissociation of owners' economic rights over time (Clark 1981). Clark wrote that capitalism could be divided into four overlapping stages, and Clark (no relation) and Hebb (2004) later added a fifth:

1. an entrepreneurial start in the nineteenth century when legal frameworks were first established and corporations grew in popularity, size, and scope under owner/operators;
2. a second stage leading up to the Great Depression when professional business managers were employed, which introduced the agency issue and the separation of economic interests (capital) from control;
3. a third stage beginning in the early 1900s and peaking in the 1960s, which introduced financial intermediaries such as investment managers, which further separated capital owners' economic interests from the selection of companies;
4. fourth, beginning in the late 1970s, a second set of financial intermediaries which directed even smaller pools of capital such as employee retirement savings to different investment managers;
5. fifth, rising in use and impact in the new millennium, the incorporation of pension funds' active engagement with companies on ESG issues (Clark and Hebb 2004).

The successive models proposed by Clark, and then Clark and Hebb, are intuitive because the stages are chronological, but they mix the treatment of economic and ownership rights and are therefore incomplete. The economic and ownership components of property rights are combined at the first stage but separate at the second. Stages three and four describe financial intermediaries that separate owners from their capital, yet economic rights remained strong, and beneficial share-owners continued to receive the financial benefits to which they were entitled. The fifth stage re-introduces ownership rights (Fig. 8.1).

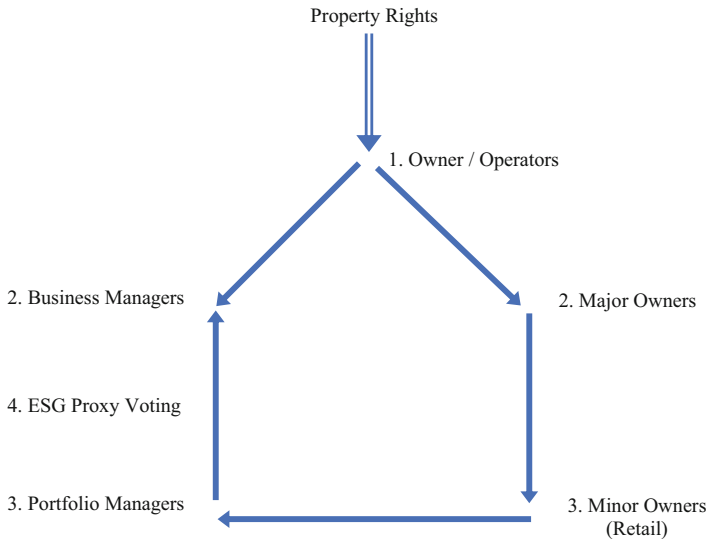


Fig. 8.1 Stages of capitalism (Adapted from Clark (1981) and Clark and Hebb (2004))

This chapter introduces a new pentagonal ‘Stages of Capitalism’ model which shows the evolution of economic and ownership rights within capitalism. Both the linear and pentagonal models share the first two stages in common, but the pentagonal model clarifies the relationship between economic and ownership rights by combining stages three and four and drawing a connection between the final and the second stages to make a closed rather than linear system. This situates responsible investment within the current era of liberal capitalism, highlights a gap in the exercise of ownership rights by retail (minor) investors, and serves as a foundation from which to recommend improvements to the proxy system. The new model allows the recommendations to be appreciated in support of two broad goals: to nudge corporate ESG behaviour towards social norms rather than just legal requirements and to re-engage retail investors within liberal capitalism.

Before returning to the pentagonal model, the first two stages of capitalism will be examined—the evolution of property rights and the development of the corporation—drawing on events of English history and then shifting to the American context. Further, a helpful chronological framework will be introduced—the alternating eras of liberal and regulated

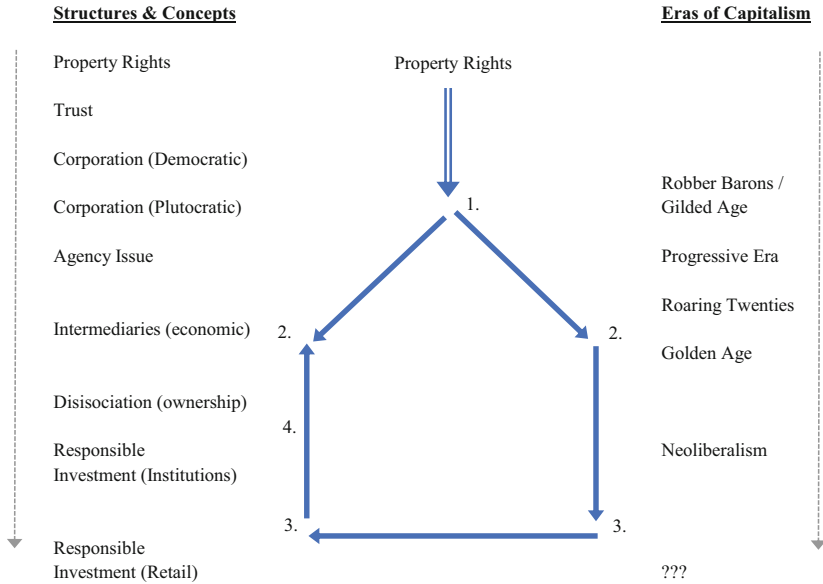


Fig. 8.2 Stages of capitalism—historical context (Adapted from Clark (1981) and Clark and Hebb (2004))

capitalism described by Kotz (2015)—which also relies heavily on property rights and corporate development and the philosophical underpinnings of the social contract introduced by Thomas Hobbes and John Locke. Figure 8.2 shows the pentagonal model within the evolution of property rights and the stages of capitalism, which are described next.

8.3 PROPERTY RIGHTS AND CORPORATIONS

8.3.1 Property Rights

Writing during the uncertainty of the English Civil War, Thomas Hobbes in his book *Leviathan* reasoned that in the absence of some form of organization, individuals would be in perpetual conflict. It would be a ‘free-for-all’ as individuals fought to obtain goods or protect those they already possessed and the resulting life of man would be “solitary, poor, nasty, brutish and short” (Hobbes 2009). Hobbes proposed that individuals instead should

enter in to a *social contract* whereby they would trade some of their rights to an all-powerful state in return for protection of their property and the ability to emerge from their ‘state of nature’—a proposition that contained elements of liberalism and totalitarianism.

Writing a short time later, John Locke proposed his own version of a social contract for the protection of rights, which formed the basis of liberalism (Taylor 2010), and was incorporated into the founding principles of the United States (Fukuyama 1992; Hartz 1991).

Governments have responded to the unequal impact of capitalism by considering the best ways to maintain or adapt the social contract. These have included alternating eras in the United States in which the government’s role has been limited to the effective protection of property rights (liberal capitalism) or expanded to moderate certain aspects (regulated capitalism) (Kotz 2015).

Legal historian F.W. Maitland chronicled the evolution of laws and precedents from Anglo-Saxon times—our *common law*—which led to a new form of organization based on the individual. This gave rise to three important structures—the Trust, the Corporation, and the Stock Exchange—and over time developed into our liberal market system (Macfarlane 2002; Michie 2001b).

8.3.2 *The Trust*

Macfarlane (2002) notes Maitland’s conclusion that the Trust was a unique institutional structure which sprang from England’s impersonal, contract based economy in the thirteenth century. The Trust could be used to pass property from one generation to the next, or to establish entities engaged in public good or charity, and to maintain the property’s independence from king or state. “The private man who creates a charitable trust does something that is very like the creation of an artificial person, and does it without asking leave of the State” (Fisher 2015, pt. 1704).

8.3.3 *The Stock Market*

“The origins of the modern global securities market lie in medieval Italy” (Michie 2007, p. 2). From that thirteenth century origin, securities trading shifted north over the centuries to reflect new trading and commercial centres, establishing successive hubs in Bruges, Antwerp, and Amsterdam.

State directed commerce and trade, known as mercantilism, led to the creation by government charter in 1602 of the Dutch East India Company, which raised permanent capital through the issuance of a large number of shares to the public to finance its trading operations (Michie 2007). Though the English East India Company predated the Dutch one and was important for its role in popularizing the joint-stock company form, it was very closely held and therefore had little impact on the development of the London securities market.

Later that century the South Seas Company was chartered in England and the similarly purposed Mississippi Company in France. They enticed investors into an investment frenzy and market bubble. The inevitable market collapses led the British government to pass “the Bubble Act of 1720 [which] made illegal the formation of any unincorporated joint stock company, and the issue of transferable shares therein” (Johnson 2010, p. 114) and which “set back the formation of corporations (incorporation) in the UK for one hundred years” (Mayer 2013, p. 101). The Bubble Act was repealed in 1825, and the subsequent passing of four separate acts between 1844 and 1862 laid the legal framework for corporate capitalism which brought exponential growth in material wealth to much of the world (Johnson 2010).

Michie offers a helpful definition of a stock exchange by which he identifies the first stock exchange forming in London in March 1801.

A market where specialized intermediaries buy and sell securities under a common set of rules and regulations through a closed system dedicated to that purpose. (Michie 2001a, p. 5)

In the United States, the Buttonwood Agreement of 1792 codified New York’s informal system for trading bonds and established what would become the New York Stock Exchange, but it did not yet meet Michie’s definition as a closed system.

8.3.4 *The Corporation (Stage One)*

8.3.4.1 *Market Liberalization*

The centuries long thread of customs, practice, and legislative progress outlined by Maitland helps explain England’s unique standing (Macfarlane 2002), but Johnson (2010) notes that in practice there were still two types

of changes needed before more fertile ground would allow the joint-stock company to flourish. First, the individual needed more opportunity within the marketplace and second, better protection before the courts. Both issues remain fundamental to liberal capitalism today, with the former represented by various global trade agreements (Baumol et al. 2007) and the latter by strong property rights (La Porta et al. 1999).

8.3.4.2 *Corporate Ownership and Proxy Voting*

Like European mercantilist corporations, Dunlavy (2004, p. 5) writes that in the United States, “the early corporation was a state-created, legal ‘person’ with well-defined powers.” Shareholders were active rather than passive corporate owners, ‘trustees of its capital’ (Dunlavy 2004, p. 5). Property rights—economic and ownership—were intact, and the corporation was subordinate to the state, consistent with the social contract proposed by Hobbes and Locke. Dunlavy continues:

Then, in the last two decades of the nineteenth century, a momentous change occurred: the corporation came to be regarded, on the one hand, as intrinsically private – that is, as arising not out of state action but out of the private actions of individuals – and ultimately, on the other hand, as a “natural person.” (Dunlavy 2004, p. 6)

The same change had evolved over centuries in England, and in both places it produced the same result; “the once active member [shareholder] became merely a passive investor in the corporation” (citing Horowitz, Dunlavy 2004, p. 6). Corporations began increasingly to raise capital and trade through stock exchanges, further dissociating formerly ‘active’ owners.

How shareholders exercised their ownership rights—their proxy votes—also has a long history. Dunlavy summarizes the methods as bound by two extremes—a democratic one vote per shareholder (similar to how we elect governments); and a plutocratic one vote per share (which gives larger shareholders greater input, and is the system we generally use today for public corporations)—with a variety of mixed methods that gave a declining number of additional votes for increased shareholdings. The democratic form was inherent to the membership orientation of mercantilist corporations and professional guilds (and would be familiar to members of co-operatives today), but by the late 1700s sustained debate about the merits of plutocratic voting rights led to partial adoption of the other two

methods. By the early to mid-1800s the democratic, mixed, and plutocratic forms were equally common, and by the late 1800s plutocracy was the norm (Dunlavy 2004).

The establishment of the corporation as a ‘natural person’ with inherent rights, the dissociation of minority shareholders’ ownership rights through plutocratic voting, and the geographic distribution of ownership via stock exchanges all served to cleave the formerly combined economic and ownership rights. The dissociation continued in the following decades and has accelerated more recently to the point where proxies are seldom voted by retail investors (Broadridge 2015).

Plutocracy and minority shareholding also contributed to the agency issue described below. In the late 1800s, however, the shareholders’ primary concern was receipt of their fair share of the profits. Questions of the corporation’s place within the social contract wouldn’t be raised for almost fifty years as part of corporate social responsibility, and the value of proxy votes to engage corporations on ESG issues wouldn’t be considered for almost a century.

In the meantime, on both sides of the Atlantic, the first stage of capitalism—that of the entrepreneur—was dawning. Well-known figures such as the industrialists, bankers, and speculators Cornelius Vanderbilt, John Rockefeller, Andrew Carnegie, J.P. Morgan, and Jay Gould were emerging as owner-operators, and they enjoyed both the economic and ownership rights of their companies (Geisst 2012; Kotz 2015). The figures have been referred to as ‘Robber Barons’ and the era as the Gilded Age, and it marked the beginning of the first period of liberal market capitalism (Kotz 2015) and the first stage of capitalism on both the linear and pentagonal models.

8.3.4.3 *Eras of Capitalism: Liberal Versus Regulated*

Classic Liberalism, which built upon Hobbes’ and Locke’s social contract and which from the eighteenth century had equated liberty with property rights, began to give way under the new corporate form to regulated capitalism in the late nineteenth and early twentieth centuries (Gaus et al. 2015; Kotz 2015). It was based upon three beliefs: that markets based upon private property could be unstable, that government could help mitigate the instability, and that “property rights generated an unjust inequality of power that led to a less-than-equal liberty . . . for the working class” (Gaus et al. 2015, pp. 8–9).

Responding to the excesses of the Robber Barons, in 1900 a new era of regulated capitalism began under the leadership of the banks, which desired a more stable environment for growth and control. Popular support was

provided by two social movements, the Progressives and the Socialists (Kotz 2015), and the period became known as the Progressive Era. After World War I, it was followed by a second period of unregulated liberal capitalism known as the Roaring Twenties, which featured both housing market and stock market bubbles and ended in the Great Depression.

In the early years of the Great Depression, two academics, Adolf Berle and Merrick Dodd, debated “whether corporations should be treated as public institutions with obligations to mitigate the [economic] system’s inherent instability, even if these obligations conflicted with maximizing shareholder returns” (Bratton and Wachter 2008, p. 102). It had much in common with the Progressive era’s regulated capitalism and was an early consideration of whether corporations had a ‘social responsibility’ in addition to profit maximization (Bratton and Wachter 2008, p. 102). It was also an argument that would resurface decades later as part of responsible investment.

It wasn’t until after WWII that a second sustained era of regulated capitalism began, this time with a post-war cooperative spirit between labour and capital, the promise of new multi-lateral institutions and globalizing trade and a new economic keel—Keynesian economics, in which government fiscal policy helped stabilize the natural boom-and-bust business cycles. This Golden Age of regulated capitalism produced more than two and a half decades of high growth which was “widely shared among most, if not all, of the population” (Kotz 2015, pt. 876). Eventually it was met by new challenges, including declining corporate profits, high inflation, and high unemployment. According to Kotz (2015), the challenges were met by business’ abandonment of collective bargaining, corporatisation of media and politics, and a new (free-market) economic orthodoxy led by Milton Friedman and Frederick Hayek. A third era of liberal capitalism began, referred to as Neoliberalism, starting symbolically with the elections of Thatcher in the United Kingdom and Reagan in the United States.

Neoliberalism is . . . a theory of political economic practices that proposes that human well-being can best be advanced by liberating individual entrepreneurial freedoms and skills within an institutional framework characterized by strong private property rights, free markets, and free trade. (Harvey 2005, pp. 1–2)

The definition could easily describe the Gilded Age, the Roaring Twenties, or the Victorian era’s legislative changes that established the

corporation. As in the Roaring Twenties, it set the US economy on a path of corporate expansion and wealth generation but also asset bubbles and growing inequality (Milanovic 2016; Picketty 2014). From 1986 to 2012, for example, “almost half of U.S. wealth accumulation [was] due to the top 0.1% alone,” and wealth inequality was “almost as high as in the 1916 and 1929 historical peaks” (Saez and Zucman 2016, pp. 521,523). Visible new members of the ultra-wealthy cohort include the newly stock-optioned super manager class of corporate executives, who have enriched themselves on the back of a narrowing shareholder base (Picketty 2014; U.S. Federal Reserve Board 2014b).

On a global scale, Neoliberalism has delivered uneven results. Many developing (particularly Asian) economies have benefitted enormously, while in the West it has “failed to deliver palpable benefits to the majority” (Milanovic 2016, p. 21). Instead, it has fostered populist opposition evidenced by: the 1999 Seattle World Trade Organisation protests, the 2011 Occupy Wall Street protests, and the 2016 Brexit vote and US election rhetoric. Kotz (2015) identifies popular support as an important catalyst in the see-saw shifts between liberal and regulated eras of capitalism and notes that high levels of inequality have acted as harbingers of change. He concludes that the global financial crisis in 2008 marks an inflection point away from Neoliberalism, but as transitions can take time (fifteen years between the Roaring Twenties and the Golden Era), he does not specify the attributes of the next era. The pentagonal Stages of Capitalism model introduced in this paper will show that responsible investment could be both the social catalyst for and the economic foundation of the fourth stage of capitalism. The second and third stages must be examined first.

8.3.5 *The Agency Issue (Stage Two)*

Writing at the end of the Roaring Twenties, Berle considered another aspect of the corporation—the agency issue—in which professional business managers are employed, and the suppliers of capital (i.e. the company’s owners) are separated from both their economic rights and ownership rights (Berle 1928).² An informational asymmetry between management and owners shifts control and economic return from the latter to the former and marks the onset of the second stage of capitalism on the linear and pentagonal models. The owner-operator Robber Barons faced no agency issue but increased public ownership through stock markets diluted control—from a

single owner, to a small group of owners, and ultimately to a larger group of dispersed shareholders.

A 1976 paper by Jensen and Meckling re-examined the agency issue and codified it as “the reduced value of the firm caused by the manager’s consumption of perquisites” (Jensen and Meckling 1976, p. 327), essentially a financial tug-of-war over money (economic rights) between managers and shareholders. The paper ignored ownership rights, and any notion of corporate social responsibility was dismissed (Jensen and Meckling 1976). The dual nature of shareholder rights had been reduced to a narrow financial interest. Twenty-five years later, the shift in perspective had become dominant—the financial aspect of property rights had become the normative lens for economists—and it coincided with the shift to Neoliberal capitalism.

The shareholder-oriented model does more than assert the primacy of shareholder interests, however. It asserts the interests of all shareholders, including minority shareholders. More particularly, it is a central tenet in the standard model that minority or non-controlling shareholders should receive strong protection from exploitation at the hands of controlling shareholders. In publicly traded firms, this means that all shareholders should be assured an essentially equal claim on corporate earnings and assets. (Hansmann and Kraakman 2001, p. 442)

Even core governance issues within responsible investment, such as CEO pay, were reduced to an agency issue (Bebchuk and Fried 2003), with no consideration of its contribution to inequality or impact on society. If the economic rights of minority (retail) shareholders could be protected through statutes, regulation, and the actions of larger shareholders (La Porta et al. 1999), then ownership (proxy) rights became secondary.

8.4 RETAIL INVESTORS

8.4.1 *Stock Ownership*

Aggregate ownership may be measured in two ways: the number of retail investors who own stock and the percentage of stock owned by retail investors. First, recent survey data indicate that in 2013 approximately half of the households in the United States owned stock in some form, with about 14% holding it directly in registered or street form³ and the remainder

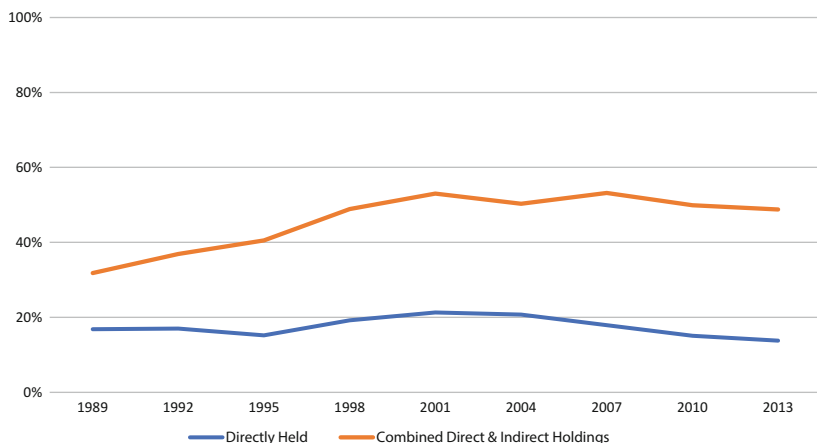


Fig. 8.3 Retail stock ownership: families with stock holdings (Source: U.S. Federal Reserve Board (2016))

indirectly through, for example, mutual funds (U.S. Federal Reserve Board 2014a). This is consistent with 2013 and 2016 US Gallup polls, both of which found 52% of adults owned stock either individually or with a spouse (Gallup 2016). The widespread ownership testifies to the importance of retail investors to establishing the popular support that Kotz (2015) notes is essential during shifts between liberal and regulated capitalism. As will be shown below, the 14% of investors who hold stocks directly face challenges, but according to the pentagonal model of capitalism, also offer great promise (Fig. 8.3).

Second, in 2015 individual investors owned approximately one half of the total value of corporate stocks, with about 40% held directly and 24% through mutual funds (U.S. Federal Reserve Board 2016).⁴ This is a decline from direct ownership of approximately 93% in 1945 and 85% in 1965 but still substantial (citing Goldman Sachs, Ro 2015; Rosenthal and Austin 2016). The size of retail investors' corporate ownership highlights the importance of their proxy votes to full realization of responsible investment goals.

If both aspects of ownership are taken together, they show that approximately 14% of households account for 40% of direct corporate stock ownership (and likely some of the indirect ownership), while 36% of households account for the balance of the 24% of indirect ownership.

8.4.2 *Investing in Stocks: Three Channels*

To invest in stocks directly, retail shareholders usually utilize one of three brokerage firm channels: discount, full-service, or portfolio management. Each brokerage channel entails, respectively, increasing levels of service, advice, and responsibility, with related implications for the service and advice for proxy voting. Though they are regulated by many different organizations, brokerage activities are primarily overseen by the self-regulatory organization Financial Industry Regulatory Authority (FINRA).

Brokerage firms serve an essential role in capital markets. Historically, they charged a commission per transaction—they controlled access to the market and were paid for the *brokering* of a trade between buyer and seller—but over decades have steadily increased the scope and value of their services.

Like the informational asymmetry between company management and shareholders identified by Berle (the agency issue), there is often one between brokerage firms and the investors they serve. This has led to regulations that specify different levels of responsibility to clients depending upon the intermediary's role and relationship, but the rules for economic advice—that is, investment in a stock—are inconsistent with those for ownership rights or the voting of proxies. This mismatch at the brokerage level may be a key contributor to the decline in retail investor proxy voting. Only at the highest level of responsibility, that of a fiduciary, are the responsibilities equal.

8.4.2.1 *Fiduciary Duty*

Fiduciary duty may be based in common law or prescribed by statute. The “relationship is one in which one party (the fiduciary) exercises discretionary power over the significant practical interests of another (the beneficiary)” (Miller 2014, p. 69). FINRA licensed brokers do not have a fiduciary duty. However, if they also become licensed to provide portfolio management services under the Securities and Exchange Commission, they will be required to act as fiduciaries when ‘exercising discretionary power’ over the selection of investments and in the voting of proxies.⁵

The situation is different in Canada where brokers may, and portfolio managers do have a fiduciary duty based in common law rather than statute when licensed under that country's self-regulatory counterpart. The Canadian system lacks the clarity of the SEC's statutory directive to its portfolio managers regarding fiduciary duty and the voting of client proxies

(Canadian Securities Administrators 2012a; U.S. Securities and Exchange Commission 2003). While the definition of a fiduciary is clear, its application can be uneven, and this poses a challenge to effective responsible investment by retail investors in the United States by brokers and in Canada by both brokers and portfolio managers.

Both the United States and Canada are considering changes to increase the number of advisers subject to a fiduciary standard (Canadian Securities Administrators 2012a; U.S. Department of Labor 2017). The proposed US legislation has withstood a court challenge by industry participants (Lynn 2017) but was put on hold shortly after President Trump took office in 2017 (Trump 2017). The American and Canadian initiatives are notable for their stated goals of improving the consistency and level of advice to retail investors regarding economic interests, but are also important for their potential impact on ownership rights and proxy voting, like ERISA's impact on pension managers after 1974.

In some instances, a fiduciary duty will be imposed upon an adviser due to their professional designation, regardless of their licensing. For example, Chartered Financial Analysts and candidates for the CFA charter "... must act for the benefit of their clients and place their clients' interests before their employer's or their own interests" (CFA Institute 2014, p. 2). Professional organizations can support regulators by strengthening their own fiduciary standards and by linking them to the principles of responsible investment and enhanced shareholder returns.

8.4.2.2 *Full-Service Brokerage*

Full-service brokerage firms offer trade execution, settlement, and custodial services. They employ brokers—defined as "any person engaged in the business of effecting transactions in securities for the account of others" (U.S. Securities and Exchange Commission 2008a, p. 4)—who offer advice tailored to each retail investor's circumstances. In the words of one major US brokerage firm, "when handling a brokerage account, your Financial Advisor must have a reasonable basis for believing that any recommendation is suitable for you, but will not have a fiduciary or investment advisory relationship with you" (Morgan Stanley 2014, p. 2).

Proxies are usually delivered directly to investors, but unlike the economic advice provided regarding the suitability of a stock, usually no advice is offered regarding how to vote. Brokers do have some discretion to vote proxies—for beneficial rather than registered owners who hold their shares electronically at the brokerage firm (see following section)—but only on

routine matters. This has the effect of increasing quorum and voting participation rates, but as brokers usually vote in line with management (Gulinello 2010), may be counter to the thoughtful ESG voting required in responsible investment, and does not link investors' ESG views to their ownership rights.

8.4.2.3 *Discount Brokerage*

In 1975, the Securities and Exchange Commission deregulated commissions (U.S. Securities and Exchange Commission 1975), which together with technological and communications advances that fostered cost-efficient trading platforms, led to the advent of the discount brokerage channel. Discount brokerage firms do not offer client-specific advice and essentially offer trade execution, settlement, and custody of investments for a low price, usually through an on-line platform rather than personal contact. Because investors conduct their own research and determine for themselves the suitability of an investment, the obligations from the discount brokerage firm are lower (and less costly) than they would be for a full-service brokerage firm. Proxies are delivered directly to investors and, consistent with the level of economic advice, no advice is given on how to vote.

8.4.2.4 *Portfolio Management*

If discount brokerage is a stripped-down provision of direct access to the stock market, portfolio management is a step up in service, advice, and responsibility from full-service brokerage. As noted above, portfolio managers have a statutory 'fiduciary' obligation to clients rather than the 'suitability' obligation that applies to brokerage relationships. Portfolio managers work with clients to establish overall financial objectives and then invest on their behalf in portfolios of securities—usually leveraging sophisticated platforms to diversify amongst a larger number of investments than a typical brokerage account.

Portfolio management was historically offered to larger institutions such as endowments, pension plans, and ultra-wealthy individuals by dedicated portfolio managers. In the past, if a portfolio manager wished to offer its investment expertise to a retail investor, it was usually done via a mutual fund accessed through a third party (such as a broker or financial planner). Just as technology allowed discount brokers to offer new management services to retail investors, portfolio managers were also able to offer discretionary management of individual securities at lower asset levels, which

meant that retail investors were now served by two groups with different origins.

Regardless of their firm origin, US portfolio managers are required to vote proxies. Canadian retail clients may delegate proxy voting to their portfolio manager, but the administrative infrastructure does not support this well, nor is there a regulatory requirement for the manager to actually vote (Canadian Securities Administrators 2013). Many retail clients will therefore still receive proxies for stocks selected by their portfolio manager.

8.4.3 *The Proxy System*

The important distinction amongst the three types of retail delivery channels is in the level of service and advice and in the level or type of responsibility owed to the client. In all three brokerage channels, though, the retail client remains the beneficial owner of the securities. Brokerage clients (full-service and discount) receive proxies in their mailbox or inbox. Portfolio managers are required to vote proxies on behalf of retail clients in the US but not in Canada.

The proxy system is complex, with more than a dozen participants engaged in over fifty activities (Shareholder Communications Coalition 2017). The core function is the delivery of notice and materials for corporate meetings and, since most shareholders are not able to attend in person, proxies for the casting of their votes. Voting is a key obligation under the Principles of Responsible Investment, and proxies may include shareholder initiatives aimed at particular ESG concerns (UNPRI 2017). In contrast to institutional practices, retail shareholders' inability to vote their proxies effectively is a significant gap in the effectiveness of responsible investment.

Several shareholder choices impact the system, including the way shares are held, and whether the shareholder has agreed to disclose their contact information to the corporation.

8.4.3.1 *Registered or Street Form?*

Each corporation sets a 'record date' for which shareholders will be entitled to receive proxies and vote in a corporate meeting. To focus on their own business activities, corporations usually contract shareholder record keeping duties to an independent transfer agent (U.S. Securities and Exchange Commission 2015a).

Shareholders who are registered directly—for example, if they have a **physical certificate** or if they have taken an extra step to have their shares

registered directly with the transfer agent—will have their meeting materials and proxies sent directly to their registered address. While this system was very common before the SEC reforms in the 1970s, the ‘vast majority’ of investors hold their shares in ‘street form’, or electronically, at a centralised depository—Depository Trust & Clearing Corporation (DTCC) (U.S. Securities and Exchange Commission 2015a). A record of each shareholder’s investments is maintained by the brokerage, but the shares themselves are held and registered collectively (i.e. all clients together) at the depository. DTCC is the registered owner, the brokerage firm is the intermediary, and the investor is the beneficial owner.

8.4.3.2 *The OBO/NOBO Distinction*

When opening a brokerage account, each investor chooses whether to Object to disclosure of their Beneficial Ownership (OBO) or Not to Object to disclosure of their Beneficial Ownership (NOBO) to the companies in which they invest. Just as corporations use a transfer agent, brokerage firms usually contract out proxy voting duties to a specialist firm (usually Broadridge).

Most investors choose not to disclose their contact information, so companies are not able to send them information directly, but rather must rely on the brokerage firm (intermediary) to relay it. It is due to their roles as intermediaries that brokers can vote on routine proxy matters even if they have not received instructions from their client.

When reviewing their shareholder lists with their transfer agent, issuing corporations will see the contact information for all NOBOs, but for OBOs’ would see just the combined shareholdings and the name of an intermediary (brokerage firm). Noting how the proxy system dissociates investors from their ownership rights, the Shareholder Communications Coalition wrote to the SEC regarding the current OBO/NOBO system:

There are no standards or regulatory requirements for how a broker-dealer or bank reviews this classification with its customers at account opening, or on a periodic basis to ascertain if a customer’s preferences have changed. The NOBO/OBO classification is also not established on a company-by-company basis, and many investors – especially individual investors – do not even know how they have been categorized. The NOBO/OBO system impedes communications between shareholders and public companies and also creates barriers to communications among shareholders themselves. NOBOs also represent only a portion of a company’s shareholder base (Shareholder Communications Coalition 2016, pp. 3–4).

8.4.3.3 *Notice-and-Access*

Cross-border securities trading and settlement between the United States and Canada is common so administrative procedures are often reviewed contemporaneously. Both countries have moved to ‘Notice-and-Access’ protocols whereby beneficial owners are sent notice of a meeting along with instructions about how to access meeting materials (usually electronically) and to vote (Canadian Securities Administrators 2012b; U.S. Securities and Exchange Commission 2007). The notice-and-access system follows the communication chains prescribed by form of shareholding (registered or street) as well as OBO/NOBO elections and allows companies to send different forms of information and instruction to different groups. The new protocol saves printing and postage costs but relies further on retail investors seeking the information required to vote their proxies responsibly.

8.4.3.4 *Proxy Voting Trends*

Figure 8.4 shows that in 1976 almost 70% of retail shareholders always voted, and an additional 23% sometimes voted their proxies⁶ (U.S. Securities and Exchange Commission 1976). These data points are extrapolated to show the decline in voting participation between then and now (2008–2015 data) (Broadridge 2015).⁷ The trend line supports the recommendation that regulators should focus more on reversing the secular decline than on fine-tuning the mechanics of the proxy system. Retail

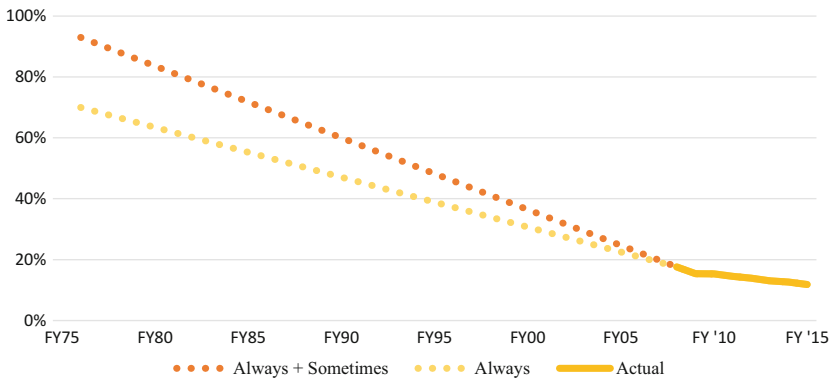


Fig. 8.4 Proxies voted by retail investors (Extrapolated between 1976 and 2008 Sources: SEC (1976) and Broadridge (2015))

investors will not be engaged in responsible investment if the current trend isn't reversed.

An explanation for the decline—that retail shareholders, unlike their institutional counterparts, have been persistently dissociated from their ownership rights since the mid-1970s—is offered below. The continued dissociation entrenches further the third stage of capitalism in the pentagonal model and highlights the challenge remaining in stage four: the re-engagement of retail investors in responsible investment. If retail investors don't vote at all, an important voice in responsible investment is left silent.

8.5 STAGES OF CAPITALISM: THE PENTAGONAL MODEL

Both the four-stage and five-stage linear models presented earlier are incomplete. The four-stage model is not descriptive of capitalism but rather just the various ways in which investors supply their capital for economic gain. The linear form is consistent with the shift in analytical tone regarding agency issues between Berle (1920s) and Jensen and Meckling (1970s), in which ownership rights became secondary to economic rights, despite their centuries long co-development. In the four-stage model, ownership rights disappear after stage two.

Clark and Hebb (2004) in their five-stage model focus on the re-integration of ownership rights, but the linear model can be modified to demonstrate better the re-connection. The new pentagonal or house shape highlights the importance of responsible investment and shows the challenges that remain for retail investors investing directly through brokerage firms. The new model emphasizes processes or concepts related to property rights—economic and ownership—rather than the linear model's heavier reliance on institutional form. Note that the pentagonal model combines the original stages three and four (both relate to intermediaries) so the model again includes just four stages.⁸

8.5.1 *Dissociation (Stage Three)*

Recall that the first stage of capitalism is represented by entrepreneurs, or owner-operators, who reached their Robber Baron zenith in the Gilded Age, but who continue today in smaller companies. The second stage is distinguished by the separation of ownership and control and the introduction of an agency issue. Major owners are large and resourceful but are at an

informational disadvantage compared to the full-time business managers. In the third stage, retail owners have been further dissociated. They invest smaller amounts of capital and are at an even greater informational disadvantage. Financial intermediaries separate minority (retail) investors from corporations, though their property rights remain strong (La Porta et al. 1999). Several additional factors have further dissociated retail investors from their ownership rights, but these rights have not yet received the same level of protection as have economic rights. Without better protection from regulators, responsible investment will remain inaccessible to retail investors.

8.5.1.1 *Dematerialization*

The steady growth of stock exchange trading volumes combined with the manual process of registering, printing, and delivering stock certificates to owners led to “the distressing events of 1968–1971 when an unexpected surge in trading volume caused the securities industry to almost drown in a sea of paperwork” (U.S. Securities and Exchange Commission 1975, p. 2). An unwelcome downturn in markets at that time led to a crisis of paperwork and confidence and to three substantive reforms: the establishment of a central depository for shares, the imposition of net settlement of trades at the end of the trading day, and shifting to electronic or ‘street form’ holdings of shares instead of physical share certificates, a process called *dematerialization* (U.S. Securities and Exchange Commission 2015a).

The reforms were an effective response but dealt only with the economic rights of share ownership. The SEC considered the broader impact of dematerialization but reasoned it had no other practical option (U.S. Securities and Exchange Commission 1976). Proxies and annual reports continued to be delivered by mail. Dematerialization dissociated shareholders from the tangible aspects of ownership they had enjoyed in the United States since the 1700s—the physical share certificate (Donald 2007; U.S. Securities and Exchange Commission 2015a).⁹ The implementation of stock dematerialization mirrors the decline in proxy voting shown in Fig. 8.4.

8.5.1.2 *Proxy System Reforms: Notice-and-Access*

Figure 8.5 shows investors who receive full proxy packages are much more likely to vote than are those who receive an electronic package or a notice-and-access letter. The significant decrease in information sent to retail

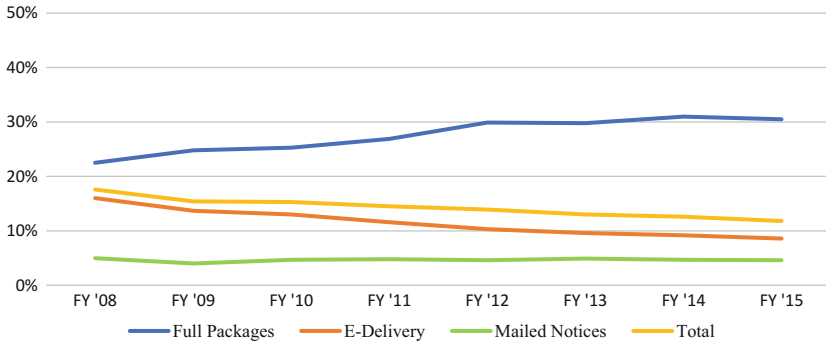


Fig. 8.5 Retail positions voted by delivery method (Source: Broadridge (2015))

investors correlates with an immediate and noticeable decline in retail voter response (U.S. Securities and Exchange Commission 2008b).

Declining voter turnout in general elections has been linked to voters' ages (Blais and Rubenson 2013), and is a plausible explanation here, as older voters may be more likely to request a full package over electronic delivery. An alternate explanation, also based on election research, is that receipt in the mail of a full package reinforces an ownership connection with the company and an obligation to vote as part of a social norm (Gerber et al. 2008). The social norm explanation is consistent with the high proxy voting rates in 1976 shown in Fig. 8.3, before the dematerialization of physical share certificates.

Figure 8.6 shows the number of shares voted, rather than the number of shareholders (positions). The number of *shareholders* voting their proxies is considerably lower than the number of *shares* voted, indicating that small shareholders are less likely to vote. Two possible explanations are that larger (wealthier) shareholders are more likely to be served by portfolio managers, who as fiduciaries vote their proxies, or that smaller shareholders may be more inclined to 'free ride', as "it is simply not worthwhile ... to acquire information so as to vote" (Downs 1957, p. 147).

Retail investors' dissociation from their proxy rights is evident and most pronounced amongst smaller shareholders and those receiving notice rather than a mailed package. Though the pentagonal model of capitalism diagram is symmetrical, retail investors at the third stage vary in their separation from the business managers in the top left, depending upon their level of dissociation. Regulators should take note that it is heading in the wrong direction.

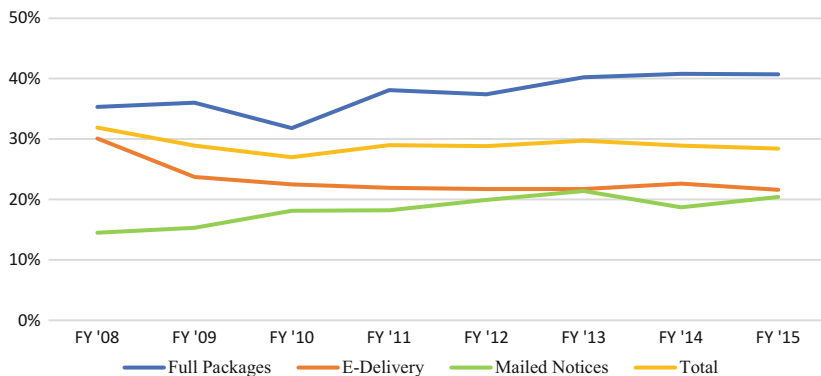


Fig. 8.6 Retail shares voted by delivery method (Source: Broadridge (2015))

8.5.1.3 Behavioural Finance

Behavioural research has contributed much to finance and offers explanations of many retail investor actions. A 1975 study showed that subjects who chose a lottery ticket themselves attached a much higher value to it than did those who were assigned a ticket. Though the economic value was identical in each case, participants felt a sense of ownership and control over the outcome when they participated in the process (Langer 1975). Portfolio managers choose stocks for retail clients, resulting in greater dissociation compared to investors who choose stocks themselves at a discount brokerage. Advice from a broker on a suitable stock would fall between the two.

Investors have been similarly dissociated by an increase in the number of stocks in their portfolios. Brokerage firms have used technology and mass customization to efficiently recommend and track a larger number of stocks. As a result, the stock positions in a brokerage client's portfolio are often smaller, more numerous, and less familiar to them.

The short-term focus of market participants has been suggested to be the self-reinforcing activities of two groups: business leaders, who publicly set short-term earnings targets and then manage results to meet those goals; and investors who are attracted to the short-term results (Brochet et al. 2012). Both business leaders and investors may be predisposed to short-term focus (Clark 2011); the former may be incited financially, while the latter may be responding to behavioural issues such as overconfidence (Barber and Odean 2000) or to a weaker ownership connection.

Diminished participation in the stock selection process, increased diversification, and shorter holding periods may combine as both cause and symptom of dissociation, resulting in a lower propensity to vote proxies. Behavioural research supports the concept that portfolio managers who choose stocks should also vote proxies¹⁰ and questions the asymmetry between brokers' provision of stock but not proxy advice.

8.5.1.4 Globalization and Neoliberalism

Ownership rights were first dissociated in the Victorian era by the establishment of the corporation as a 'natural person' with inherent rights, the dissociation of minority shareholders' rights through plutocratic voting, and the geographic distribution of ownership via stock exchanges. Since that time, corporations have grown in scale and geographic reach. The export-led growth of the Golden Era was followed by foreign branch plants and then multi-national operations in the Neoliberal Era (Harvey 2005), which increased the geographic separation of shareholders from corporate head offices (Westbrook 2015). What in the past had been local—good for both General Motors and America—became more complicated; the connection to corporate operations had become connection to a brand.

Retail investors' affinity for a company is often based on proximity and familiarity (brand) (Barber and Odean 2008), similar to the process described below for values-based investing. Based upon the increase in stock trading frequency (Barber and Odean 2011) and declining proxy voting rates, retail investors are less inclined to voice dissatisfaction via their proxies than by selling (or not purchasing) a stock.

The multi-national scope of corporations, their size relative to many nation-states, and their transformation into brands raises questions about the original social contract between individuals and the state. Mercantilist corporations of the 1600s such as the Dutch East India Company were also large with expansive operations, but they were creations of the state—charter companies—with a democratic shareholder membership. Because retail shareholders seldom vote their proxies, they are unable to ensure corporate citizens respect their role within the social contract.

Neoliberalism “has pervasive effects on ways of thought to the point where it has become incorporated into the common-sense way many of us interpret, live in, and understand the world” (Harvey 2005, p. 2). Ironically, while it “emphasizes the significance of contractual relations in the marketplace” (Harvey 2005, p. 2), it relies on corporate supremacy and relegates small (retail) shareholders to the provision of capital—and as demonstrated

by the low proxy voting levels—with little accommodation for or interest in their ownership rights.

One of the governance issues addressed by responsible investment is executive pay, which has contributed to wealth inequality and to a socio-economic gap in which corporate elites gather globally at events such as the World Economic Forum in Davos, Switzerland to exchange ideas (Harvey 2005; Picketty 2014). The gap is also one of power—a version of the labour/capital struggle (Kotz 2015). Retail investors have less in common with corporate leaders and feel less connected to the companies in which they invest, and their dissociation contributes to a lowering of expectations regarding the efficacy of their proxy voting.

8.5.1.5 Summary

The evolution from stage two to three is more than the introduction of portfolio managers as intermediaries. Retail investors have been dissociated from their stocks because of discrete actions such as the dematerialization of physical share certificates (and introduction of summary paper and then on-line statements) and by the imbalances caused by Neoliberalism. Though the pentagonal diagram is presented symmetrically, the distance between stage two and three is dependent upon the number of economic (portfolio manager) intermediaries and upon the variable impacts of ownership (proxy voting) dissociation.

The three investment channels—portfolio manager, broker, and discount broker—are notable for the different gaps they generate. They dissociate investors to different degrees, but also offer opportunities to reconnect retail ownership rights through responsible investment, completing the fourth stage of the pentagonal model that was started by pension managers and more recently incorporated by portfolio managers serving retail clients.

8.5.2 Responsible Investment (Stage Four)

8.5.2.1 History

Responsible Investment is a broad term encompassing several areas. In the nineteenth century, “groups of mostly Christian investors began screening their investments for activities they considered sinful,” and in 1928 the first fund using similar values screens became available to investors (Knoll 2010, p. 684). Values-based negative screening gained popularity, including efforts to avoid military contractors during the Vietnam War, companies

conducting business in South Africa during apartheid, and more recently to avoid fossil fuel companies. Values-based investing—often referred to as Socially Responsible Investing or SRI—may also involve positive screening, focussing on companies producing positive social outcomes (e.g. solar power) or those which meet higher social standards. In both negative and positive screening, the focus is on investment returns and not on *active ownership* or proxy voting.

A recent further step along the values chain has been the development of *impact investing*, which combines the twin goals of an investment return and a social impact. Though it re-integrates economic and ownership rights, it is not usually part of retail investors' participation in the broad public markets.

8.5.2.2 *The Ownership Voice*

With their large, illiquid holdings, and their fiduciary obligations to optimize returns and reduce risk over long timeframes, pension funds and other institutional investors are hampered in using values-based screens to *exit* investments. Instead, wrote Albert Hirschman in 1970, they are advised to use their *voice* “to change rather than to escape from an objectionable state of affairs” (Hirschmann 1970, p. 30). The use of voice through direct engagement and proxy voting is consistent with the more recent concept of a *universal owner*, in which the externalities of one firm impact the operations and profitability of others, rendering divestment ineffective both economically and with respect to ESG. Divestment leaves externalities unaddressed and results in the portfolio's underperformance (Monks and Minow 2011); nonetheless, it is still the primary method by which retail investors holding individual stocks act on their ESG concerns. Several studies show investment outperformance over benchmark indices for responsible investment strategies broadly (Clark and Viehs 2014; Nagy et al. 2015) and for corporate engagement specifically (Dimson et al. 2015).

The adoption of responsible investment by institutional investors overlaps with the growing awareness of environmental issues, popularized by Rachel Carson's 1962 book *Silent Spring* and more recently the issue of climate change. It also coincides with the decline of the Golden Era's regulated capitalism and the subsequent rise of inequality under Neoliberalism. Although the aim of responsible investment is to enhance economic outcomes by advancing social ESG norms, it may also be viewed as a response to the macro aspects of Neoliberalism and globalization. For example, global expansion has allowed companies to use labour or

| | 2012 | 2014 |
|---------------|--------|--------|
| Europe | 49.0 % | 58.8 % |
| Canada | 20.2 % | 31.3 % |
| United States | 11.2 % | 17.9 % |
| Australia | 12.5 % | 16.6 % |
| Asia | 0.6 % | 0.8 % |
| Global | 21.5 % | 30.2 % |

Fig. 8.7 Responsible investment managed assets—level and trend by region (Source: Global Sustainable Investment Alliance (2015))

environmental practices that would be unacceptable in their home jurisdictions, prompting institutional investor response.

Figure 8.7 shows the recent increase in responsible investment assets in several jurisdictions. It includes institutional assets (e.g. pension funds) as well as retail investments such as mutual funds. It does not include stocks held directly by retail shareholders but is consistent with another recent survey of that group and does indicate a broad level of interest in responsible investment. When combined with the proxy voting data from Fig. 8.4, the data highlight the gap between retail investors' interest in ESG issues and the efficacy of the proxy voting system in support of that interest if they invest directly in stocks. The voice of pension funds, endowments, and other stage-four investors is organized, funded, and articulate, but it is dwarfed by the tens of millions of retail investors who own stock directly and who can provide the social momentum necessary for change noted by Kotz (2015). The voice of retail investors who own stocks directly is quiet but offers tremendous support to the institutions that have led the way so far in responsible investing and the fourth stage of capitalism.

Figure 8.7 shows large differences amongst countries. This may be due to several factors, including differences in: regulatory and institutional support, demand levels, and models of capitalism (European welfare liberalism versus US Neoliberalism), and could be investigated in a separate paper, perhaps correlating responsible investment with types of capitalism.

8.5.2.3 *Reintegration of Ownership Rights*

Active ownership emerged through institutional investors, in particular pension funds, which first engaged companies in aspects of governance to address agency issues and transparency, and later incorporated environmental and social issues into their dialogue and proxy voting in order to mitigate long-term ownership risks (Clark and Hebb 2004). The integration of ESG issues into corporate engagement and proxy voting provided a new framework for the analysis and selection of suitable investments and was distinguished from the values-based screening embraced by retail investors by the reclamation of ownership control over corporate behaviour. The United Nations backed Principles for Responsible Investment (UNPRI) provided legitimacy and promulgated a framework that asset owners, investment managers, and industry could adopt, but other than an educational module, they do not yet include the retail investor channel.

The pentagonal model shows dissociation as the third stage of capitalism and the reconnection of ownership rights through active proxy voting as the fourth—the link that reconnects the ownership rights back to the business manager. The agency issue identified by Berle between the business owner and the business manager is central to the second stage and is shown as a red curved line in the diagram. There exists a similar agency issue between portfolio managers and business managers, which in stage four is represented by the same red arc in Fig. 8.8.

Notice that the fourth stage includes only one retail investment channel, so while the outside lines are now connected (major investors, portfolio managers), two brokerage channels (green dotted lines) remain unconnected. In Canada, all three brokerage channels are unconnected, which enforces the importance of regulatory clarity and action. Statutory fiduciary obligations would be appropriate for Canadian portfolio managers and should be considered for brokers in both countries, but this would be inappropriate for discount firms.

8.6 RECOMMENDATIONS

Kotz draws a pattern in the ebb and flow of types of capitalism, with inflection periods after economic crises or stagnation and extremes in wealth inequality—an observation supported by Picketty's centuries long time-series data (Kotz 2015; Picketty 2014). Appraising property rights, the corporate form, and stock markets over a similar time frame situates the

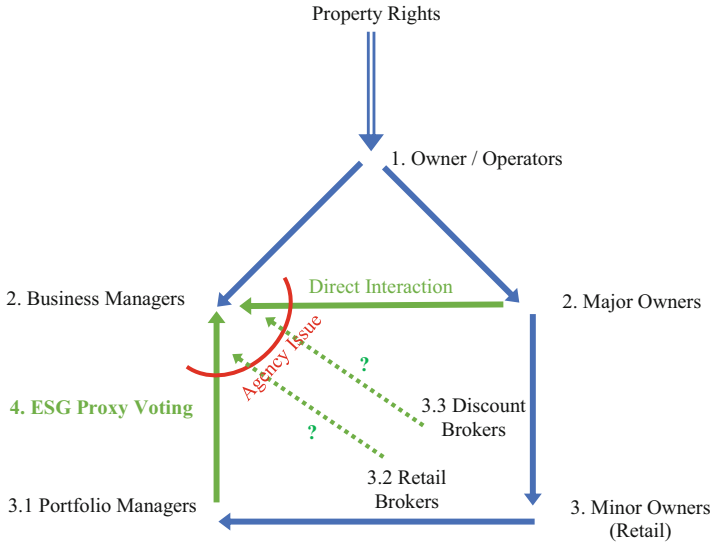


Fig. 8.8 Stages of capitalism: the retail ownership gap (Adapted from Clark (1981) and Clark and Hebb (2004))

rise of responsible investment as the start of a fourth stage of capitalism. To capitalize on Kotz’s inflection point, it still requires popular support, part of which can come from the broad base or retail shareholders.

With over one half of stocks in the United States owned by retail investors, and with the data showing their interest in responsible investment, re-establishment of effective ownership rights should not only lead to positive ESG outcomes and improved investment performance but also help embed responsible investment within the next era of capitalism. The catalyst for broader ESG engagement should be reappraisal of the proxy system for retail investors, for “the very vitality of the capital markets depends so heavily upon informed and knowledgeable communications” (U.S. Securities and Exchange Commission 1971, p. 1). Institutional investors have been important leaders in this regard, using their proxies and direct engagement to change corporate behaviour. Despite their large ownership stake and proxy voting power, they are small in number and work within the existing system rather than advocating for systemic change. Institutional investors have the resources to work within the current system, but retail investors have neither the resources nor incentive to self-organize.

“Unless the number of individuals in a group is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, rational, self-interested individuals will not act to achieve their common group interests” (Olson 1971, p. 1). The effort required for individual investors to become informed about each issue for each stock they own is an insurmountable challenge. Regardless of how smooth or finely tuned the proxy system becomes—though regulators and practitioners should continue to work to this end—retail investors will neither vote directly nor organize collectively to produce a solution. The solution rests primarily with regulators, who will require support from industry participants, corporations, and not-for-profits interested in issues of governance or responsible investment.

The proxy system is under review by the SEC and Canada’s securities regulators, but their indicated approaches do not address the broader, systemic issue of the secular decline in retail investor proxy voting shown in Fig. 8.4. They should continue to address the inefficiencies in the system—important goals to be sure—but if they leave unaddressed the broader issue of engaging retail investors, responsible investment will not reach the full promise of embedding ESG factors in capitalism and society. Instead, like the use of colourful envelopes cited earlier, the changes will produce benefits at the margin. Regulators should seek transformative change in the following three ways.

8.6.1 *Fiduciary Duty (Part II)*

The ERISA legislation in 1974 established the requirement for corporate pension and employee benefit plan managers to act as fiduciaries, including the voting of proxies (U.S. Department of Labor 2008). Portfolio Managers not governed by ERISA will in any case be regulated by the SEC (in some cases delegated to the state), which similarly requires them to vote proxies on clients’ behalf (U.S. Securities and Exchange Commission 2003). The Department of Labor’s proposed (now paused) new rules would have required all investment professionals offering advice on *individual* retirement plans such as IRAs and 401(k)s to be considered as fiduciaries. They are primarily intended to address potential conflicts of interest and are silent with respect to proxy voting, but might be expected to evolve to include provisions in the future, thereby nudging the retail operations of FINRA regulated brokers to a more effective proxy system. The prospective changes would apply only to individual retirement plans

and not taxable accounts, but any changes to the proxy voting architecture for the former could easily work with the latter; an individual client often has both retirement and taxable accounts with the same broker. Discount brokerage firms are unlikely to be included as fiduciaries, but other potential measures are possible.

The distinction between fiduciary and non-fiduciary roles and accounts may still be unclear to many retail investors, but each step towards common requirements is helpful. The regulatory goal should be similar levels of responsibility for economic rights and ownership rights, commensurate with the level of service and advice in each of the three retail channels described earlier.

In addition to regulatory change, CFA charterholders could be required to vote proxies as part of their duty to serve clients' best interests (CFA Institute 2014), in particular if the duty is linked to evidence of better investment performance. Like the conclusions reached earlier by many ERISA pension funds, a 2015 study found that responsible investment itself was a fiduciary duty—that incorporation of ESG factors in to the selection of stocks and in the voting of proxies was obligatory (Sullivan 2015). The study's findings support the recommendations made here to both regulators and CFA Institute.

8.6.2 *The Client Account Form*

The proposed regulatory and professional organization changes are based on broad principles (i.e. fiduciary duty). Administrative changes may also be effective. For example, when opening a brokerage account, acknowledgment of the level of investment risk an investor is willing to assume (low, medium, high) is required. A similar question regarding ownership rights (i.e. proxy voting) could also be asked regarding an investor's interest in responsible investment.

While ensuring investment recommendations are suitable to the stated level of risk, the individual stocks in an account may differ amongst brokers, but their selection will be based upon common principles of risk (e.g. size, liquidity, earnings stability, and growth). Ideas regarding responsible investment, including proxy voting, will also differ amongst brokers and investors, but they too will be based upon common ESG principles.

Regulatory changes in 2009 to brokers' ability to vote proxies without clients' instruction prompted the suggestion that brokers receive blanket instructions up front, so they may vote accordingly on clients' behalf (Beller

et al. 2010). While the suggestion was not linked to responsible investment, blanket guidance could easily incorporate questions about responsible investment.

8.6.3 *Client Account On-line Access*

ERISA required fiduciaries to make available proxy voting procedures and records of past votes, and while the Department of Labor doesn't specify how, many larger organizations provide it on-line (U.S. Department of Labor 2008). Some take the additional step of sharing in advance how they intend to vote, which can be helpful to discount brokerage investors who conduct their own research. Market participants may wish to consider how publicly available proxy guidance could be aggregated and summarized for ease of use by these investors.

Most brokerage firms offer on-line access so clients can view their investment holdings and transactions. This should be expanded to include proxy voting. Information of upcoming votes and past voting records should be included. Many brokerage firms use Broadridge for both investment record keeping and proxy voting, but despite Broadridge's significant work in on-line proxy voting platforms, the two systems have evolved differently and are accessed separately. Work would be required to bring them together. In a letter to Canada's regulator regarding the distribution of mutual fund reports to investors, Broadridge commented about "the convenience to investors of accessing fund reports at one familiar site for all positions held rather than accessing each of the reports at a different fund company site" (Broadridge 2015, p. 21), which supports in principle the centralized proxy viewing system suggested here.

Blockchain, a promising new technology best known for its Bitcoin application, may offer help in this regard. Blockchain is a new system of record keeping in which records of ownership are maintained by a distributed network rather than central corporate servers. Many participants in the capital markets, including stock exchanges, regulators, financial intermediaries, and market participants, are exploring its use, which could include reintegrating the economic and ownership rights of investors.

8.7 CONCLUDING REMARKS

The governance issues within corporations and stock markets are complex, and retail investor proxy voting is just one of many items to be addressed. Regulators must also grapple with the independence of proxy advisory

firms' advice, the effect of monopolist firms such as Broadridge, the structure and election process of corporate boards, policies for shareholder proposals, and whether issuing corporations want to engage their retail shareholder base (some may not like the feedback they receive).

While property rights developed over many centuries, corporations and modern capitalism are relative latecomers. We should strive for a more inclusive system—for its own sake, because property rights are important and because it offers the promise of a better future—but we should not be disheartened if it takes time.

The different eras of capitalism must have seemed so promising at first and then so terrible when they petered out (1970s) or collapsed (1929), but they gave way to reflection on the social contract and, as Kotz describes, to popular support for the next era. Writing about the early European securities markets, Michie notes that their evolution was not dictated by government or “the needs of any particular regime” but rather by the broader demands of trade and finance (Michie 2007, p. 27). Today, it is the demands of responsible investment—the need to address the negative externalities of corporate capitalism while still enjoying the very many benefits it has produced—that impel changes to the retail proxy voting system.

Broad support for responsible investment can be significantly enhanced by engaging the democratic base of retail shareholders. Large institutional investors and portfolio managers enjoy the plutocratic voting power of their shareholdings and are lauded for their role in addressing ESG issues, but they are not substitutes for popular support. If they truly believe in the substance of their ESG corporate engagement, they should also advocate to regulators and government for systemic change to complete the fourth stage of capitalism that they so capably began.

NOTES

1. While corporations may issue multiple, subordinated, or non-voting shares, it is assumed here that each share is entitled to one vote.
2. Writing a century earlier, Adam Smith in *The Wealth of Nations* identified agency issues as well, but Berle's work is more contextual to the public corporation and liberal capitalism.
3. The actual figure will be higher than 14% as retirement accounts and managed assets, which may also hold directly owned stock, are not included.
4. Including personal retirement accounts but excluding defined benefit plans.

5. Portfolio manager is a generic term describing the function. The regulatory terms for the positions are Registered Investment Adviser (RIA) for the firm and Investment Adviser Representative for the individual. Both firm and individual are usually called RIAs.
6. The survey had a 24% response rate (23,600 out of 97,100 questionnaires). Respondents identified as individuals (21,143), institutions including trusts and estates (2263), and no response (189). Proxy voting behaviour: always (16,467), sometimes (5463), never (1417), and no response (253).
7. Some care should be taken interpreting the data as the SEC and Broadridge methodologies are different and they may also use different definitions of 'retail investor.' Broadridge also publishes an annual report (Broadridge 2016) which shows a 28% participation rate. The lower figures used in the graph are consistent with my professional experience, but either set of figures would represent a significant decline from the 1976 SEC data.
8. Though there is some overlap, the four stages of capitalism should not be confused with the alternating eras of regulated and liberal capitalism described by Kotz (2015).
9. In my early days in the investment business in the 1990s, I encountered many investors who had purchased their shares many years prior and who—despite the extra risk and work involved in keeping their certificates safe and in depositing quarterly dividend cheques—were loath to deposit their certificates into street form. They valued the physical ownership, much as many today still retain their old record albums or CDs despite the availability of subscription digital music services.
10. The behavioural research also highlights again the gap in Canada between the portfolio manager's selection of stock but lack of proxy voting obligation.

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The Creation of Social Impact Credits: Funding for Social Profit Organizations

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9.1 INTRODUCTION: IMPORTANCE AND PURPOSE

The authors sit on several nonprofit boards and have listened to a combined several decades of budget cycles and approvals. Each budgeting cycle for a nonprofit involves the inevitable discussion of grants applied for and awarded (lost), donations sought and general trends, and, in some cases, fees for services. There may be a discussion about the annual fund raising event that involves an inordinate amount of effort relative to the very low return for the amount of energy invested. Given this funding model, the majority of revenue brought into the organization is restricted by the terms of the grant or institutional investors. The restrictions placed on the funds force the nonprofits to have many planning meetings about how to increase their non-restricted funds for long-term growth. While the quest for growth is a strategic issue mostly the concern of for-profit entities, the sources of funding and legacy donors restrict the strategic choices of nonprofit

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organizations. Further, the economic downturn of 2007 forced many nonprofits and donors to rethink their funding models and put additional pressures on organization. Given this context, there is increased need to rethink the nonprofit sector and funding mechanisms.

Most nonprofits are faced with the dilemmas of how to pay for the development of their human assets, how to maintain their facilities, pay for oversight and management, invest in new program exploration, and provide support. In short, all those items that are covered in the secondary activities of for-profit organizations' value chain are generally excluded from restricted funds to nonprofits. Donors expect all of the funds to go directly to services without consideration of how the organization is providing the means for the support. To this end, the motivations behind this chapter are to provide a framework wherein a financial instrument is developed that provides the organizations with the managerial discretion to execute on the programs and projects necessary to be effective. Given the proposed investment instrument, we seek to provide a sustainable means for these organizations to diversify their revenue portfolios. Further, we wish to promote the reclassification of the nonprofit sector to the social profit sector. The former language bars the sector from investment in necessary enabling activities and has a pejorative connotation while the latter suggests the creation of social utility that deserves investment.

The market for thinking about funding for the social profit sector and social benefit is already changing. In 2012, Goldman Sachs announced the signing of a SIB worth \$9.6 million in support of recidivism-reducing therapy for Rikers Island juvenile prisoners. This SIB was the very first one issued in the United States and only the second one in the world (Dagher 2013; PBS NewsHour 2013). With the SIB, the risk is directed away from taxpayers and toward the donor. In this relationship, Goldman Sachs, the donor, invests the money through an intermediary, to the desired program. The intermediary assures the outcomes of the desired program. If the program achieves the espoused goals as evaluated by the third party then the Government "pays" for the success in the form of "profit" but if the program fails to achieve the desired end results, then the donor takes the loss and the Government has no responsibility.

Since the Goldman Sachs investment, there has been a surge of attention toward social-financial mechanisms that reduce risk to taxpayers and social benefit and address public policy priorities. For instance, the state of Massachusetts announced its desire to negotiate a SIB to help solve the issues of homelessness and juvenile crime (Center for American Progress 2012a),

both issues of social and public policy concern. More broadly, SIB interest has expanded beyond the United Kingdom and the United States to other countries such as Australia, Canada, Colombia, India, Ireland, and Israel (Azemati et al. 2013) who have also seen the potential benefits of SIBs. While not directly espoused as a reason to invest in SIBs, there is the added benefit that these programs align interest through an increase in oversight by the third parties, due diligence by the donors, and input by the various Governments through policy inputs.

However, we recognize that not all in the nonprofit arena are in favor of the SIB; there is some vocal criticism about the instrument. Those in support of SIBs note that the increased capital provided to nonprofit organizations and social-based companies can immensely broaden their societal benefit (Bugg-Levine et al. 2012). Alternatively, those who oppose the SIB instrument state that it promotes “anti-philanthropy” sentimentality due to potential increase in payments that the Government returns to the investor in the form of principal and interest upon successful completion of the contract (Macdonald 2013, p. 37). During a presentation at the Allegheny Harvard Yale Princeton Club in 2013, one participant commented that such mechanisms cannot work due to the differences in various sectors of the nonprofit industry and further, that market dynamics cannot be applied to this sector. It is our belief and the argument that we will present herein that there are better funding instruments available to the social profit sector which align interests, reward performers, and increase total social benefit, and we present one such instrument.

In the following section, we present a more detailed discussion of social impact bonds, the concept that we extend to social profit credits. Since SIBs are a relatively recent financial instrument introduction, there is sparse information on the actual long-term market performance: social and economic. The newness of this instrument provides opportunity for improvement and to this end, we introduce the concept of the social profit credit (SPC). Following the discussion of the SPC, we present a case study that applies the SPC model as an example of how it may work in practice. The data of the case study as well as the building of the SPC within the library industry is presented followed by a discussion and limitations.

9.2 SOCIAL IMPACT BONDS

As previously stated, social impact bonds (SIBs) are a relatively new type of financial instrument first introduced in 2000 by New Zealand economist Ronnie Horesh. However, it was a full decade later that the first SIB was issued in the United Kingdom (Shiller 2013). The SIB allows a private investor, typically a large corporation, to fund a social profit organization's operations. If the funded organization achieves the espoused targets at the end of a specified time period as verified by a third-party auditor which will need to be identified but may be firms such as accounting firms, then the investor receives back their investment with interest from the government. The government is willing to pay the investor the principal plus interest from savings that the government realizes through reductions that it would otherwise have spent but has no obligation for repayment if the organization fails to meet the metrics. However, should the funded organization fail to reach its goal, then the discount rate the following year will be greater since the *risk* of return is increased. The interest rate associated with the SIB is determined by the actual performance of the social profit organization and is subject to variability; hence, like the market, some SIB performance may be more volatile than others. Further, there is a risk of loss to the investor. If the funded organization does not meet the metrics dictated by the SIB, the government is not required to pay back the investor (Dagher 2013). The investor receives a profit only in the event that the organization exceeds the stated metric of the SIB. Hence, the SIB is known as a "pay for success" initiative (Pettus 2013). Baliga (2013) stated that this flips the traditional model of the government funding inputs to one that funds outcomes.

The issuance of the SIB involves a variety of stakeholders as depicted in Fig. 9.1: *Social Impact Bond Network*. As illustrated in Fig. 9.1, the successful issuance of the SIB requires:

1. society has a need that is not otherwise met by for-profit market dynamics;
2. the Government has a need and desire to promote the programs that society demands and for which the actions will increase the overall utility of its constituents;
3. nonprofit providers who are willing to deliver on the necessary programs;

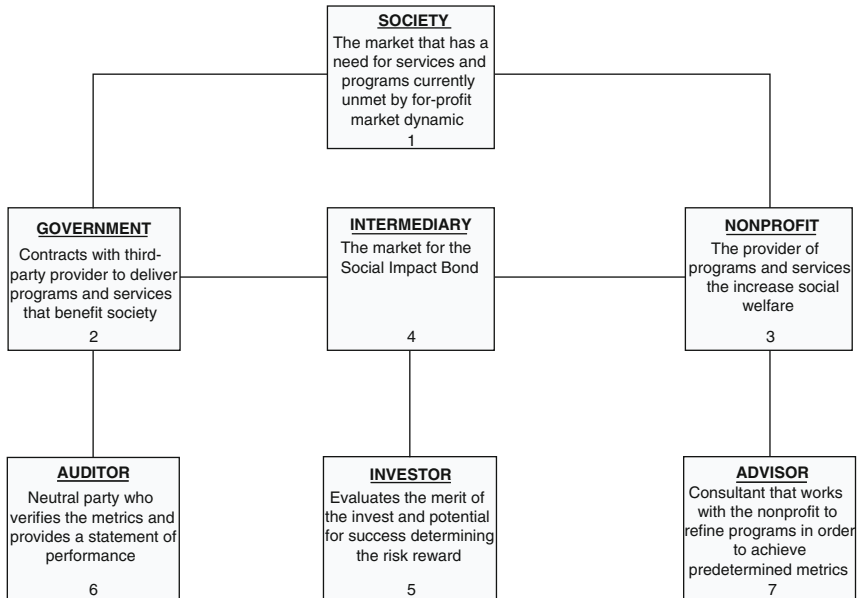


Fig. 9.1 Network of stakeholders

4. an intermediary acts to develop, valuate, and issue the SIB and repayments as necessary between the Government, the nonprofit organization, and the investors;
5. investors who are willing to *risk* some level of financial capital in the SIB instrument;
6. auditors working with the Government issuing statements of assurance and performance for which the Government will repay or not the SIB
7. finally, advisors working with the nonprofit firms to assure compliance with the contract and achievement of the predetermined benchmarks.

In particular, the Government, nonprofit organizations, and investors all have to be aware and agree to the terms of the instrument outlined in the social impact bond as they would in any financial issuance (McKinsey & Company 2012). Additionally, there needs to be a separate agency to issue the bond and manage the funding. Unbiased data analysts are also required

to track the nonprofit's progress during and at the close of the social impact bond agreement (McKinsey & Company 2012).

Perhaps the most important part of a social impact bond is having somebody willing to invest. Unlike the typical corporate or individual donation, the SIB has the potential of non-performance which implies the risk of loss (McKinsey & Company 2012); with a donation, the donor is assured at least a tax write-off, whereas with the SIB, the investor may lose all monetary value. This market for investors is reduced to those who are both philanthropic and socially oriented and who have a propensity to subsidize programs and services that achieve social goals (Center for American Progress 2011). In theory, these "socially minded investors" should be willing to accept a smaller return on the social project compared to other possible investment options. If a potential investor applies market investment decision criteria to the SIB market, then a "typical" investor may opt for market investments in anticipation for larger returns. The *expected return* of the SIB is largely a function of the amount that the Government expects to realize in savings from the social project and thereby commute to the investor (Pettus 2013). The return to the investor is an increasing function beyond the achievement of the predetermined metrics but is typically capped (Azemati et al. 2013). The overall transaction costs of each SIB are costly since the metrics, programs, and investors all have to be independently negotiated. The transaction costs associated with each issuance suggest that the size of the SIB has to be rather large to make the effort meaningful.

Each of the SIBs is open to interpretation since each one is negotiated on an individual basis. Much like the issuance of an initial public offering, the investor has to receive disclosures of potential investment risks as well as the measures of performance to which end the metric must be based upon real, measurable social outcomes (Center for American Progress 2012a). Therefore, the SIB contract must give the following specific information: target population, termination date, and a goal percentage or measurement to meet minimum acceptable performance (Center for American Progress 2012b). Additionally, the data for the nonprofit must be accessible and reliable to calculate the performance measurements (Center for American Progress 2012b), hence the need for third-party assurance of performance statements.

While there are clearly risks to the investors and high transaction costs, there is good reason to implement the SIB since there may be upsides associated with the instrument. For example, this is a way for nonprofit

organizations to acquire necessary capital resources to deliver on their programs beyond the traditional annual appeals. Since the SIB requires performance, society is assured that only those organizations that are able to meet the expectations apply thereby rewarding high-performing nonprofits. Hence, driven by a need to attract investors, the nonprofits that are the most efficient and effective in developing solutions to social problems will be the ones that utilize this instrument and social utility will be increased (Fox and Albertson 2011). Efficiency will also be increased through the best allocation of the capital achieved through the bond. Through the competitive pressures put on the nonprofit, they will be able to naturally evolve their business plans and management styles to focus on outcomes (Fox and Albertson 2011). Additionally, the contracts are normally set for an extended period of time (typically two to four years), which gives nonprofits ample time to realize the efforts invested into their programs (Vogel and Klissurski 2013).

There are clearly upsides for both the investor and the nonprofit organization, but there are also reasons why the government benefits from participation in the SIB. The programs provided by the nonprofit organization under the SIB contract are privately funded, and therefore the risk is privatized and protects the taxpayer from having to cover the losses that may occur if the programs fail or do not reach the necessary targets to be economically justified (Sheffield 2013). The government only “pays for success”. Because it only pays for the outcomes, the government does not have to make the decision for what programs it wants to fund or how it wants to allocate its budget (Center for American Progress 2010).

Social impact bonds are certainly an innovative financial instrument to fund social programs and services. However, as suggested, the nature of the one-off development of each bond makes the transaction costs associated with them unattractive in most situations. Further, the bonds are used to fund specific programs and not the organization as a whole. The funding of specific programs has the result of restricting the use of the funds to the program under question. Many nonprofits have a “bucket” or programs that they engage in which also need funding and support. In fact, it is the synergy in the related services provided that often results in the overall benefit created by the organization. What the organization needs is a source of unrestricted funding that can be used as the leadership deems necessary to achieve the overall organizational needs. In the following section, we build on the concept of the social impact bond and suggest a

financial instrument that can be used across a social profit industry in support of overall operations with a lower overall transaction cost: the social profit credit.

9.3 SOCIAL PROFIT CREDITS

Conceptually, we support the concept of the social impact bond. However, given the high transaction costs and restrictive nature of the SIB, we propose the creation of social profit credits (SPC). The SPC has all of the benefits of the SIB while reducing the costs associated with them and broadens the applicability. Like the SIB, the SPC shifts the risk from taxpayers to the market. The SPC is also focused on social issues and helps to conceptually reinforce that organizations in this segment of society are creating profit albeit social and not necessarily economic profit. Further, the SPC too has the potential to return gains to the investor beyond the investment amount.

However, unlike the SIB the development of the metrics is agreed upon by the industry segment and applicable to all organizations operating in that segment. For instance, if an organization is operating in the housing segment (e.g. emergency housing or housing for homelessness) then all organizations in the housing area will be evaluated against some agreed-upon metric. Perhaps the metric in the previous example is the ratio of those individuals who maintain permanent residence in five years to those placed. In this way, small-size organizations can “compete” with larger organizations, and this addresses the overall quality of the placement. Since the agreed-upon measure applies to all firms within the segment, there is no need to negotiate a different metric for each organization and issuance of the financial instrument thereby lowering the transaction costs. Additionally, there is no need for an intermediary to negotiate the metric. The evaluation criteria can be developed in concert with the appropriate governmental agency and the segment trade organizations.

In the case of the SPC, the intermediary serves the purpose of broker who issues, reissues, and trades in the SPC. The intermediary takes the issuance to market for sale on behalf of the social profit organization. Investors are free to buy and sell their SPC freely in the market and may make the decision to buy a small amount of the issuance or all issues. Like many other investment instruments, the SPC is issued as a “certificate” that has some value of which the organization may decide to issue one certificate with a large value or many certificates with smaller values attracting a larger pool of potential investors. Unlike stock, this SPC does not signify

ownership in the organization so much as an investment in the organization for a specified period of time.

Like the SIB, the SPC has the potential for loss. However, unlike the SIB performance is not directly refunded by the Government. In the case that the SPC exceeds expected performance, the Government does not refund the investment to the investor through repayment by taxpayers. Rather, the investor is able to write off the face value of the certificate on the individual or corporate returns and claim the gains as a fully “refundable” credit. The result is that there is either a reduction in tax obligation or refund of overpayment.

With respect to the SIB, the investor is locked into the investment until termination of the investment period. With respect to the SPC however, the investor has the opportunity to liquidate his or her holdings of the credit in the market prior to the completion date. The SPC allows for the creation of a secondary market for the credits. Additionally, the social profit organization may decide to hold onto some portion of its credits for future sale. If the organization needs to stagger or stage the receipt of income to manage cash flow or if it believes that the value of the credit in the market will increase in the future due to increases in performance, then it may decide to withhold some of it issue. This aligns the social profit organization’s interests more fully with society and the market’s interest.

There are still more differences between the SIB and the SPC. We include an example in the remainder of the paper to illustrate the difference, demonstrate proof of concept, and discuss some of the key challenges. In the following section we discuss the library system and a measure of performance. We then build a social profit credit for the industry, discuss the results, and present the potential application. Finally, we discuss the results and challenges with moving forward.

9.4 THE PUBLIC LIBRARY SYSTEM IN THE UNITED STATES

Public libraries have long been considered a public and social good. Andrew Carnegie used his wealth to create the Carnegie library system with the recognition that everyone should have access to material to improve their position in society. The Little Free Library movement at littlefreelibrary.org boasts more than 50,000 community-driven libraries. Nonetheless, like most social profit organizations, libraries constantly struggle with budget constraints. Further, we recognize that not all libraries live up to the same standards. Our choice to use the public library system in the United States

differs from where most applications of social impact bonds have been applied. As reported by Azemati et al. (2013), globally the application of social impact bonds have been applied to programs that deal with issues such as homelessness, unemployment, youth outcomes, and early childhood education. In this regard, our work differs from previous application but builds on the work done therein. However, our work extends the application of SIBs beyond previous applications to a national system of programs and applies the credit concept instead of a bond approach. For this study, the public library system was used to demonstrate exactly how such a framework would operate and the effects it would have on the entire industry, society, and government. While the performance measurement applied here is specific to libraries, there is no reason why the social impact credit framework could not be implemented in any social profit sector, including public schools and hospitals.

The public library system was selected for the demonstration of the SPC because there is a cast amount of credible data available for libraries and there is an existing body of discourse around performance of libraries. The Institute of Museum and Library Services has a data file available for each fiscal year that includes information about print and electronic materials, circulations, population service area, employees, budgets and expenditures, and income. Additionally, libraries inherently provide value to society. It is generally accepted that literacy rate is one indicator of the overall level of 'successes' for a society. Higher level of literacy is associated with better quality of life, better informed citizenry, increased economic development, and overall life satisfaction. Through the programs and books available through the libraries, knowledge and excitement about the world, outreach, connection, and public good are developed. Literacy and knowledge are the social profit that is created through the public libraries that can be measured through the data that is available from the IMLS.

The Government has limited fiscal means to support society through the national library system. Further, repayment to investors of the SIB may be equally difficult to achieve. The economic downturn in 2007 demonstrated how difficult it can be to fund nonprofit activities. The limited resources that the Government has to provide and the lack of donations available during periods of economic struggle make instruments like SPCs much more appealing. Potential investors for these types of instruments are looking for a way to make their investments go further; to this end, the SPC allows the investor the potential to realize a capital gain while serving a social good.

To date, however, there is no clear consensus on a single measure of library performance which may account for the lack of application of SIBs to this segment. Data is available for the books, media, circulations, employees, expenses, revenues, and programs of almost every public library in the country through the Institute of Museum and Library Services. The database includes information on total resources (electronic and hard copy books), programs offered by libraries, revenues and expenditures of the libraries, and full-time library employee information (Institute of Museum and Library Services 2013). While all of this data exist, there is not currently a shared agreement on how to aggregate the data to measure overall success. We use this existing data to demonstrate proof of concept but recognize that we are sampling data for convenience rather than collecting data to capture what a shared meaning of performance is (Lance and Cox 2000). Put another way, we are building theory from existing data rather than collecting data to test a theory. Thus stated, there are two measurements that can be used to evaluate a public library, both based off of the IMLS data.

The first index is the Hennen's American Public Library Ratings (HAPLR) which was created by Thomas Hennen, Jr. and has been published since 1999. The HAPLR weighs 15 input and output variables for each public library about its circulations, employees, visits, and materials (Scheppke 1999). One potential criticism of the HAPLR is that it over-emphasizes circulations and excludes any electronic media that can contribute to a library's social value (Lyons 2007). This index has been criticized because it does not provide enough data to decision makers to make well-informed choices (Nelson 2007). The HAPLR does make a statement about libraries, but that statement is elusive since the ratings may be too approximated, based on skewed data, wrongly interpreted, or insufficient measures of impact (Lyons and Kaske 2008).

The Library Journal Index (LJI) was created in 2008 as a response to the dissatisfaction with the HAPLR index. The LJI combines four per capita measurements: visits, circulations, program attendance, and users of electronic services (Lance and Lyons 2008). One may criticize the LJI in that it scores libraries based only on the quantity of services that a library provides with respect to its service population. However, the LJI uses only available data, makes a value judgment that all of its categories are equal, and groups and ranks the libraries based on the amount that they spend and not the population size like the HAPLR.

Recognizing the limitations of both measurement systems, we selected the HAPLR data to build an example of the potential functioning of the SPC. In the next section, we present the data collected from the HAPLR as well as modifications that we made to the calculations. In reality, once the model is adopted more broadly, a panel of informed decision makers would be assembled to fully develop the metric by which the library segment of the social profit market would be evaluated against.

9.5 DATA

In order to demonstrate the concept that we have promoted within this chapter, we selected the HAPLR Index as the basis for evaluation to determine social profit creation (loss) by each library relative to the overall library industry. While some might claim that the HAPLR is not the best measure of performance for libraries, it was not the intent of this work to prove the efficacy of the measure but rather to demonstrate the functionality of the financial instrument. The HAPLR Index makes use of various categories that are believed to achieve library social missions. These categories include items such as the following:

- Material expenditures which presumably is an indicator of how much of a library's budget goes to programs and mission
- Full-time staff, a number that suggest the level of service that might be provided to the patron
- The number of periodicals
- Volumes
- Visits
- Circulation
- Expenses

It would be unreasonable to assume that all libraries in all locations have similar abilities to perform on their mission. For instance, libraries in larger cities might well have greater numbers of visits not because they are better libraries but because they merely have larger populations. Hence, it is necessary to normalize the data in order to facilitate the comparison of libraries in less populated areas with libraries in more populated areas. This should hold true in any segment of the social profit industry. Therefore, we ensured that all of the data was normalized instead of using the population categories the HAPLR provides.

Table 9.1 Variables and calculations using Institute of Museum and Library Services fields available at <https://www.ims.gov/>. Weights are from Hennen’s HAPLR calculation found at <http://haplr-index.com>

| i | x_i | c_i | <i>IMLS data categories</i> |
|----|----------------------------------|-------|--|
| 1 | Material expenditures per capita | 2 | $\frac{PRMATEXP+ELMATEXP+OTHMATEXP}{POPULSA}$ |
| 2 | FTE staff per capita per 1000 | 2 | $\frac{TOTSTAFF}{POPULSA/1000}$ |
| 3 | Periodicals per capita per 1000 | 1 | $\frac{SUBSCRIP}{POPULSA/1000}$ |
| 4 | Volumes per capita | 1 | $\frac{BKVOL}{POPULSA}$ |
| 5 | Visits per capita | 3 | $\frac{VISITS}{POPULSA}$ |
| 6 | Collection turnover ratio | 2 | $\frac{TOTCIR}{BKVOL}$ |
| 7 | Circulation per FTE staff hour | 2 | $\frac{TOTCIR}{TOTSTAFF \times 52 \times 40}$ |
| 8 | Circulation per capita | 2 | $\frac{TOTCIR}{POPULSA}$ |
| 9 | Reference per capita | 2 | $\frac{REFERENC}{POPULSA}$ |
| 10 | Circulation per hour | 2 | $\frac{TOTCIR}{HRSOPEN}$ |
| 11 | Visits per hour | 1 | $\frac{VISITS}{HRSOPEN}$ |
| 12 | Circulation per visit | 1 | $\frac{TOTCIR}{VISITS}$ |
| 13 | Expenditures per capita | 3 | $\frac{TOTOPEXP}{POPULSA}$ |
| 14 | Budget to materials ratio | 2 | $\frac{PRMATEXP+ELMATEXP+OTHMATEXP}{TOTOPEXP}$ |
| 15 | Expenditure per circulation | 3 | $\frac{TOTCIR}{TOTOPEXP}$ |

Further, as might be expected, Hennen did not believe that all items contributed equally to the performance of the library and weights each item relative to its contribution to meeting the mission of the library. We pulled the final data needed to calculate the HAPLR score from the Institute of Museum and Library Services, applied the HAPLR categories and weight, and normalized them for population size. A full list of the variable, weights, and calculations is presented in Table 9.1.

The modified HAPLR score is calculated as follows:

$$modified\ HAPLR = \frac{\sum_1^{12} x_i c_i}{\sum_{13}^{15} x_i c_i};$$

where x_i refers to each category and c_i refers to the weight of that category. Functionally, this ratio is similar to a Tobin’s Q value or an asset to debt ratio. With this function, libraries that are above parity, HAPLR greater than 1, are producing social profit while libraries that are below parity are producing a social loss. Diving into the overall factors, one might be able to

determine the source of the high (poor) performance, but it is more important to note that it is the sum of the activities that the library is engaged in and the way in which it allocates its resources and capabilities that accounts for the performance. Hence, like their for-profit counterparts, it is the decision to engage in some activities at the exclusion of others and the way in which they are engaged that produces the performance that is demonstrated.

In theory, society should like to reallocate resources from those organizations that are creating a social loss to those organizations that are better performing. One might suggest that the libraries in areas with smaller populations have less of an opportunity to get funds, but the data does not suggest this. The results suggest that performance is randomly scattered with respect to population density. Likewise, one might suggest that underperforming libraries need the funding to improve services, yet we see underperforming libraries that receive a lot of funding which suggests that funding itself is not the issue. We do not mean to suggest the removal of the library that is underperforming from its community since it is providing a service that is necessary but perhaps the merger or acquisition (consolidation) of the poorer performing library with the better performer. The HAPLR is a lagging indicator and suggests how a firm has performed in the previous period. Hence, in this regard, we are making the assumption that previous performance is suggestive of future performance. The current model does not contain leading indicators that would be more suggestive of future performance which may be considered in the future.

Results suggest that the average library is performing well overall. Of the 9084 libraries in the sample, the mean is 1.48. However, the minimum value is 0.001. A value of 0.001 suggests that the library has a great deal of improvement to accomplish and may well be suited for acquisition or change in management. The library that has the 0.001 HAPLR is by no means alone; more than 3370 libraries had scores below 1.00. There are many that were at the 0.99 mark, and one may well argue that those on the cusp may be afforded the opportunity to improve themselves. Conversely, there are a great many libraries whose score is well above 1.00. The maximum score in the sample is 34.68 which suggests that this library is realizing operational efficiencies that others are not able to realize. From a utility perspective, society would want this institution to take operational control of the lower performers or find mechanisms to transfer the knowledge to the underperforming firms. Demonstrating that one does not have

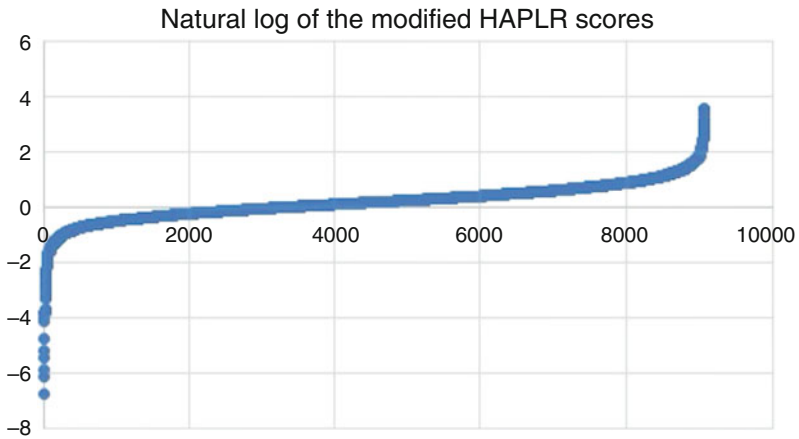


Fig. 9.2 Natural log of HAPLR

to be large to perform well, among the top 25 performers using this score is a bookmobile.

Figure 9.2 presents the results of plotting the natural log of the modified HAPLR scores. If we were to apply this model to the for-profit industry, we would be able to see where firms were realizing gains relative to others within their industry through the ability to charge higher prices, realize lower costs, or both. However, in the social profit sector, we are only able to fully monetize the cost of programs delivered; it is much more difficult to determine the price of the services provided. Hence, a “scoring” mechanism allows the industry to evaluate overall performance. In Fig. 9.2, the plots of the 9085 records of library HAPLR scores allow us to visualize the relative performance of each of the libraries. The benefit of the score is that the market is able to evaluate the libraries’ performance irrespective of size or location since the score is normalized.

Those libraries in Fig. 9.2 whose score is above “0” we would state have created a “social profit” while those libraries whose score is below “0” we would claim have created a “social loss”. This is not to say that the libraries whose score is below “0” have not served a social good. Rather, the claim that we make is that they have underperformed relative to the other libraries in the sector. This claim is that, *ceteris paribus*, society would prefer to divert the resource to those libraries that have better utilization and create greater social profit.

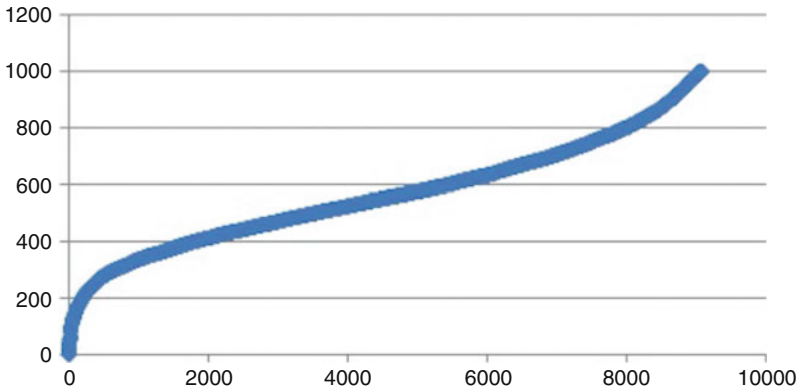


Fig. 9.3 Credit price

Figure 9.3 presents the results of the price that an investor would pay for the credit in the initial market. The credit price takes into consideration a number of aspects of the stakeholders: the library performance and risk, investor expectations, the market in general, and the issuer. To determine the prices of the credit, several steps have to be taken. First, we assume that the face value of the credit is \$1000. Of course, larger and smaller face values are possible but for sake of demonstration, we selected the \$1000 instrument. An investor who pays full face value for the credit is communicating that there is no risk and expectation that the full face value will be “returned” at the end of the investment period. It may be worth issuing larger denomination credit instruments in cases where one desires a smaller number of investors for a larger project. However, one might argue that it is easier to get the community to invest in the credits if the face value is lower.

Second, each of the libraries was ranked based on each individual performance. Figure 9.3 suggests the distribution and shape of the ranking. The rankings ranged from 1 to 9085, and the larger the HAPLR score, the better the relative performance. The next step in determining the price of the credits was to calculate the undiscounted value which corresponds to the “write-off” amount. The write-off amount is the corresponding value that the investor would be able to claim on the tax return as a credit if the organization performs as expected. For purposes of this demonstration, we calculated the write-off value as follows:

$$\text{Write-Off} = (\text{Face Value}) * (\text{Rank})$$

Finally, the issue value of each certificate is determined by taking the write-off value and applying a risk-free rate plus a risk premium—functionally, this is analogous to an investor deciding to donate the money rather than investing in the instrument. We then subtract a commission fee that we assume will be imposed by the issuing agent. The final calculation is applied to each of the libraries to determine the credit:

$$\text{Social Impact Credit Value} = \left[\frac{1000 \times \text{Percentile}}{1 + r_f + r} \times (1 + r_c) \right] + \text{Fee}$$

Where r_f is the risk-free rate, r is the risk premium, and r_c is the expected return of the credit. For illustrative purposes, we assume a fee of \$1.00 per credit, a risk premium and rate of credit return of 0.10, and the risk-free rate of 0.11. It is important to note that the issue price of the credit is a lagging value and that the actual performance of the credit is dependent upon the realized performance of the social profit institution, the library in this case. Hence, the issue value of a credit in time t is based on the performance of library x in the most recent period and reflects investor expectation of the x 's performance in some period of time in the future. While our model considered one-year credit instruments, we can envision the use of three- and five-year instruments as well. To validate the actual value of the credit amount, the issuing agency will need to verify the results. We imagine that the investor would then receive something like an Internal Revenue Service form 1099 with gains or losses.

9.6 DISCUSSION

We focus on discussing the implications for the library system, but the discussion could apply to any social profit segment equally. How it is applied in any particular example in the social profit industry (i.e. museums, homelessness, food, etc.) will need to be worked out. This provides an opportunity for the community and the segment to have a dialogue around what they consider to be a good “performance” measure. For instance, with respect to homelessness, the measure may be a ratio of dollars given to people housed with an inclusion of recidivism. In the case presented, the libraries receive the capital from the sale of the social impact credits minus

the commission and fees. As soon as the library receives the capital, we predict that it will feel pressure to perform so as to meet market expectations. The library will also want to perform well so as to attract additional investors to raise further capital and appreciate the value of those credits held for future sale. As a result, there could be an acceptance of a set of best practices and mergers and acquisitions in this nonprofit yet competitive sector. We anticipate that this performance-driven segment will result in a continually rising level of performance as best practices diffuse throughout the segment. Currently, there are websites such as <http://www.libsuccess.org> that maintain a compilation of ideas to make libraries successful, but there seems to be a lack of an official set of best practices. After some time, libraries may start keeping track of what they do to increase their visitors or expand their reach in the community. Other libraries, driven by competition, may decide to actively adopt the practices that more successful libraries have, and thus the total social benefits to society would increase.

Others have stated that the governance and funding of libraries tends to be political (Hennen 2005). Stated differently, the funds that a library receives are determined in part by their relationship with national and municipal consideration. How much difference library consolidation may have on overall social impact is unknown (Hennen 2005). We propose that the social impact credit framework may remove political rationalization regarding funding behind the potential mergers and acquisitions between libraries that may happen. In this regime, mergers would occur when a library sees an opportunity to grow and create more social good and not because they were forced to consolidate due to public financing that was insufficient to operate alone. Mergers of libraries and larger systems create efficiency in the library system as an Ohio librarian believes, and Ohio has some of the best performing libraries in the country (Klentzin 2010). Hence, mergers, coupled with increased funds, mean even more societal benefits; we propose that this would happen in any segment of the social profit industry similarly.

While social impact credits remove a lot of risk for the government, they create a lot of work and future regulation. Even though they do not have to worry about paying a lump sum to the investor, they do have to worry about not getting as much revenue. It only makes sense that the lower the taxable income is for an investor, the less the amount of taxes paid. However, if the government was able to raise enough funds for the library system through social impact credits, then it would not matter that the taxes were less than expected. On average, the net to the tax base should be positive since the

sum of the gains and losses may be near zero but the gains in savings from grants not provided will be greater. Hence, the net impact to society ought to result in a positive utility function. Of course, tax codes need to be meticulously revised for social impact credits to work in this way. At the end of each fiscal year, the Government would have to make sure that each library submitted their data so that the credit holders would have the information in enough time to submit their taxes. It would be a rather quick turnaround time, so trusted data collectors and auditors may have to be hired to make sure the process is completed with integrity and in a timely manner. As with corporate bonds, we recognize that this system is inherently biased toward larger organizations given the cost of issuance. However, this system does not preclude the continuance of smaller, individual donations. It is likely that there will be consolidation of smaller organizations by larger ones which may result in greater synergies as systems are established rather than individual operations.

Whether the government body in control of the social impact credits is the federal, state, or local government has yet to be determined. Could different states have different rates of returns on their credits? If an investor lived in Pennsylvania, could he or she purchase a credit for a library in Ohio or California? These are the types of questions that legislators would have to answer when creating the laws for the social impact credit.

We fully recognize that *social profit and value cannot be perfectly measured*. Although social value is not simply an abstract concept and can be generated by nonprofits through operationalizing their mission, assigning a financial value to the output of a nonprofit organization's activity is not a common practice (Quarter and Richmond 2001). If the social value is generated through operationalizing their mission, it is still hard to measure even if you know the mission of the nonprofit organization. There are so many ways that a library promotes social growth that it cannot be narrowed down into one category. This is going to be an issue for social impact credits in general. In the Riker's Island example presented at the beginning of this chapter, is measuring recidivism the best way to see the social impact and success of the program? Just because the program participants did not get sent to jail at the end of the bond duration does not mean that they will not be caught in the future or even that they are not committing crimes anymore. Until society is certain that the metric used to measure the social value of a social profit company is reasonable and/or accurate as a representation, then this framework has limited or no merit as a social-financial mechanism.

A hypothetical example with easy numbers where an investor may not be willing to invest in a social impact credit:

Assume a social impact credit for Library A is currently priced at \$100 and an investor has \$100,000 to donate to Library A. After the commission and fees, the credit is valued at \$90. So, the investor can buy 1000 social impact credits for Library A. \$90,000 of the investment goes to the library, and the remaining \$10,000 is put toward paying commission and fees.

In order for this to work, the investors have to be willing to pay the issue fees and commission and accept the possibility of a loss. If the investor was particularly philanthropic, he or she may want to just donate the \$100,000 to library for two reasons: (1) the library would get all of the money, and (2) he or she would be guaranteed to write the entire amount off as a donation.

If Library A was able to perform well enough using the \$90,000 investment, then perhaps their write-off value at the end of the year would be \$200. This means that the investor could write off \$200 for each of his 1000 credits for a grand total of \$200,000.

On the other hand, if Library A was not able to perform well, their write-off value at the end of the year may only be \$50. Unfortunately, the investor could only write off \$50 for each credit for a total of \$50,000, an amount equal to only half of the original investment. Then, they also have to pay taxes on the \$50,000 they were not able to realize as a loss.

Investors have to have faith that the library that they choose will do better than the year before. This may lead to hands-on type of environment where investors want to be able to have a say in the programs and materials the library has to offer. This would undoubtedly make the libraries better for society and promote literacy throughout the country.

In order to attract more investors, the commission may have to be set lower than intended or planned. The investors who want to participate for philanthropic reasons as well probably want as much money as possible to go toward their library.

Another possibility to make the social impact credit more attractive is to increase the risk premium. Perhaps these credits are riskier than the 10% assumed in the study. In theory, increasing the risk premium would not lower the amount of funds brought in. If an investor only has \$100,000 to donate, that is all he or she will invest. It might bring in more money because the downside risk and amount you might lose would be minimized. However, it might be a fine balance between what would sell more social

impact credits and what would lower federal and state government income too much compared to the library funding received.

An additional point to note is that due to the risk involved, the investor may not be a person but possibly a corporation who wishes to lower their high taxes. Corporations have more flexibility and could possibly be able to afford to take on the risk of not writing as much money off as they expected.

One of the more exciting consequences is that this nonprofit-based system opens itself into a financial market. This means that there is the possibility for selling options on social impact credits like calls, puts, swaps, spreads, futures, and so on. It has the potential to be a fully functioning miniature stock market where investors have the opportunity to hedge their risks, making the whole idea of a social impact credit more attractive.

A possible negative consequence is that the drive to perform to increase the modified HAPLR score could take over the quality of social impact. Libraries could just start focusing on circulating as many books as possible. However, more circulations do imply that they are providing more social worth to their service population, but it could come at a cost to their programs or electronic sources. If a score is used that does accurately measure a broad spectrum of social impact aspects, then this should theoretically be a nonissue.

9.7 CONCLUSION

This work was motivated by a number of issues. First, our work with nonprofits has driven us to help to change the way the industry is viewed and help others come to see the industry as created utility albeit utility not necessarily in economic terms but in social profit. Therefore, we urge others to use the terms social profit enterprises instead of nonprofit firms, the former possessing more positive connotations than the latter. Second, motivated by the frustration that we have heard from the industry over the limitations placed upon it by restricted funds, we proposed a mechanism that will allow for the development of greater amounts of non-restricted funds that a social profit firm could place in operational areas that have the potential to deliver greater social gains. Further, the mechanism proposed has the added benefit of greater alignment of “donors” economic interest with public interest through better vetting of the management of the social profit firm. Third, the instrument proposed within this chapter has the potential to incentivize the creation of a secondary market wherein the social profit firm as well as initial investors can negotiate new issues or

reselling of the social profit credit to raise additional capital and signal intention. Fourth, we presented the development of the social bond and its application in the social profit sector to demonstrate an analog of our proposed model. Finally, we illustrated how market dynamics associated with this type of instrument will contribute to continuous improvement in the sector.

In an early presentation of this work, one participant vocalized a concern that individuals motivated by profits think that market dynamics can be applied to any sector. We are not, however, naïve nor are we driven purely by market dynamics. We recognize that within any segment of the economy, there exists frictions and inefficiencies that put limits on performance; this holds true throughout. As a society, what we would like to do is ensure that overall utility is increased and all individuals experience the satisfaction appropriate to them. Money is merely a measure of overall utility. To that end, we were motivated to develop an instrument that would further reduce the friction and inefficiencies in the social profit sector through the alignment of interests and provide a better mechanism to communicate the degree to which one organization within a sector is better increasing utility than another and then reinforcing those actions contributing to the success. While this may appear on the surface as “cold capitalism” in a sector motivated by “human touch”, it is in fact driven more by the desire to see total utility increased.

Since the perceived value of money is not uniform, economists like to talk in terms of *utility*. If sustainable development is about the continued increase in overall social utility, then the social profit credit provides a mechanism to help facilitate the total number of utilities in the system. As stated previously, where for-profit models have yet to be developed to serve social needs, the social profit sector steps in to serve the social demand. The social profit credit acts as an instrument to reward those that are performing greater thereby continuing development in a way that is sustainable.

Given the proceeding, we recognize that there is still a great deal of work to be completed; this is only the start but a good one we hope. First, we recognize that we presented a model here that was built on the HAPLR by a team in isolation from the library community. While we did draw on the existing literature in the domain, the measure chosen was selected for convenience and for demonstration purposes only. Further, we modified the HAPLR measure and does not necessarily reflect consensus within the

library community. Therefore, as a starting point, the library community needs to reach a general consensus on the measure against which it will accept to develop the credits around. Second, this score is not appropriate to all sectors within the social profit industry. Each segment will need to develop its own measures; what is appropriate for organizations providing shelter is very different from a museum which is very different than healthcare. Third, there has to be the development of third-party organizations that will measure, issue, and certify the results. We are inclined to believe that auditing and financial firms are ready to step into this area but may need to be reconsidered. Finally, the Internal Revenue Service and the Securities and Exchange Commission need to be brought into the conversation to ensure public safety and proper tax codes are developed.

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Crowdfunding Sustainable Enterprises as a Form of Collective Action

Helen Toxopeus and Karen Maas

10.1 INTRODUCTION

The necessity of transitioning to a low-carbon, sustainable economy has become more urgent in recent years (Andersen 2007; Ellen MacArthur Foundation 2012; Stern 2008). Existing or nascent enterprises are increasingly trying to change or set up their business in a sustainable manner to contribute to global sustainability goals. However, one of the main impediments of building a sustainable enterprise is finding external financiers willing to carry the risks of transitioning to doing business in a low-carbon, sustainable way (Campiglio 2016; Mont et al. 2006; Scholtens 2006; Tukker 2015). Different approaches can be taken to stimulate sustainable investments such as regulation, taxes and subsidies, and influencing consumer preferences. Many studies aim to find out whether sustainable investments deliver higher

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financial returns for the investor in comparison to non-sustainable investment, which would provide a straightforward argument to invest in sustainable enterprises. A recent study, based on established US firms, shows that sustainable companies attain better financial results compared to a comparable non-sustainable set of firms, but that it takes on average 5–7 years to achieve this (Eccles et al. 2011).

However, inevitable to any transition, many sustainable enterprises are early stage, innovative businesses, trying to change the way business is being done in a certain sector. These smaller, early stage sustainable enterprises arguably face a more difficult financing constraint than established firms moving towards sustainability. One part of the financing constraint of sustainable small and medium-sized enterprises is related to general innovation-specific issues such as lack of track record and collateral, high technological risk and risk of spillover of R&D investment to other firms (Brancati 2015; Cincera and Santos 2015; Giudici and Paleari 2000). The second part of the financing constraint is specific to sustainable enterprises and relates to their objective of creating societal impact (positive externalities) in their course of business. Rational choice theory predicts that financiers are not willing to invest in collective payoffs unless they can be fully appropriated, thus creating a ‘double externality problem’ (Faber and Frenken 2009; Rennings 2000). This means that the time horizons for small-scale sustainable enterprises to appropriate financial payoffs from their innovative, sustainable activity are generally long-term and uncertain. Nevertheless, sustainable innovation by small and mid-sized enterprises is crucial for transitioning toward a sustainable economy. Due to the small-scale and high-risk nature of these type of businesses, we believe that the ‘higher financial return’ argument, used as rationale for investment in established sustainable firms, cannot be the sole driver behind investments in these enterprises.

We argue that it is time to shift our focus away from monetary payoffs as the main driver for investors in sustainable investments and towards a more complex, behavioral reasoning on investment decisions for sustainable enterprises. In order to better understand how to move towards a sustainable financial system supportive for sustainable enterprises, we direct our focus towards crowdfunding, which has been argued to be especially well positioned to financing sustainable enterprises (Calic and Mosakowski 2016; Lehner 2013). This can be partly explained by the fact that crowdfunding is a particularly suitable financing tool for early ventures (Block et al. 2017; Bruton et al. 2015), addressing the innovation-related part of the financing constraint. On top of that, some authors suggest there is a particularly good match between crowdfunding and sustainable

enterprises, which has been mainly explained using legitimacy theory (Calic and Mosakowski 2016; Lehner 2013). This feeds back into the second—sustainability—part of the financing constraint, which we focus on in this chapter.

More work is needed to understand what may drive sustainable enterprise crowdfunding. Legitimacy theory argues that individual crowdfunders may be particularly willing to fund sustainable enterprises due to growing societal support for social/sustainable entrepreneurship (Calic and Mosakowski 2016). Although this explanation takes into account the decentralization of the financing decision to small, non-professional investors, it lacks a more structured analysis of crowdfunding as different institutional setting which leads to a decision-making that is different than that in traditional financial institutions.

In this chapter, we therefore use collective action theory (Olson 2009; Ostrom 2010) to analyze the institutional setting of crowdfunding to understand how this can be a potential successful way of funding sustainable enterprises. We believe collective action theory allows for a structured answer to the question of why crowdfunding can be a good fit with financing sustainable enterprises. This therefore leads to the core question of this chapter: how does collective action theory help us explain the potential success of crowdfunding for sustainable enterprises?

We continue this chapter as follows: first, we give an overview of the existing literature on crowdfunding for sustainable enterprises. Next, we give an overview of the findings of collective action theory in order to apply this to sustainable enterprise finance. We explain our methodological framework and undertake a rule-based analysis of crowdfunding to find matches and mechanisms that can drive successful collective action in crowdfunding. We conclude with recommendations for the design of financial decision-making for collective action based on our current analysis of crowdfunding.

10.2 WHY DO CROWDFUNDERS INVEST IN SUSTAINABLE ENTERPRISES?

In the past ten years, the development of crowdfunding markets has raised the question of whether crowdfunding is particularly well suited to finance sustainable enterprises, and if so, why? Current research suggests several

mechanisms that could explain why crowdfunders might be particularly willing to fund sustainable enterprises.

The legitimacy theory perspective argues that the focus of crowdfunders on the mission and core values of an enterprise, as well as the ‘democracy’ of having many small funders, fits well to sustainable enterprise finance (Calic and Mosakowski 2016; Lehner 2013). In the case of renewable energy crowdfunding, a combination of normative, gain and hedonic motivations is found (Dóci et al. 2015; Vasileiadou et al. 2016). Also, the limited monetary motivations of social/sustainable entrepreneurs can be a strong signal that they are more outcome-focused, reducing the risks of moral hazard and increasing legitimacy of the investment as perceived by the crowdfunder (Lehner 2013).

Obtaining community benefits has also been proposed as a motivation for crowdfunders to invest in a crowdfunding project (Belleflamme et al. 2014). The utility of crowdfunders increases through the consumption/investment experience that they undergo as part of their funding decision (Ordanini et al. 2011). A prerequisite for this additional utility is that they become part of the community of the enterprise and are thus in some way connected to its social network (Belleflamme et al. 2014; Ordanini et al. 2011). Arguably, creating a community around an enterprise is easier if some collective benefit is expected to be created, which is implicitly the case for sustainable enterprises.

Contract failure theory predicts that non-profit-oriented sustainable enterprises are more focused on quality and outcomes and therefore are better at obtaining funds from the public (Belleflamme et al. 2014; Hörisch 2015). Rational choice theory, on the other hand, predicts that crowdfunders will not prefer sustainable enterprises to general enterprises except if they deliver competitive financial payoffs. From this perspective, enterprises that focus (partly) on providing or contributing to a common good that investors cannot capture in the form of individual financial return will be less successful in finding investors compared to purely for-profit enterprises.

Empirical evidence about the potential of crowdfunding to finance sustainable enterprises shows mixed results. Calic and Mosakowski (2016) find that technological and film/video crowdfunding projects on Kickstarter (www.kickstarter.com) with an environmental or social focus are funded more successfully than projects without such a focus, partly mediated by creativity and third-party endorsements. On the other hand, Hörisch (2015) finds no significant relationship between environmental focus and

funding success of projects on the crowdfunding website Indiegogo (www.indiegogo.com). Our current understanding of crowdfunding for sustainable enterprises is still in its infancy and begs refinement. With this study we aim to build on existing knowledge by analyzing the ‘crowdfunding’ route to sustainable enterprise finance through a collective action lens.

10.3 COLLECTIVE ACTION THEORY AS A LENS FOR SUSTAINABLE ENTERPRISE CROWDFUNDING

Collective action theory, based on work by Olson (2009) and Hardin (1971), departs from rational choice theory by empirically identifying three behavioral types (Levine and Prietula 2014; Vollan and Ostrom 2010): (1) cooperators, who will unconditionally add their share to provide a collective good; (2) conditional cooperators, who copy the (expected) behavior of others and (3) free or easy riders, who will contribute (next-to) nothing—behavior predicted by rational choice theory. Field and lab experiments show that the second type, conditional cooperators (also referred to as reciprocators), usually consists of around half of the population (Fischbacher et al. 2001; Frey and Meier 2004). Conditional cooperators play a crucial role in generating either low or high levels of collective action, since their behavior is conditional upon the behavior of others. The incidence, visibility and expectations of the share of cooperators and ‘free riders’ in the population will affect whether they cooperate or not (Vollan and Ostrom 2010).

Collective action theory has increased our understanding about institutional arrangements that improve our ability to organize collective action (Ansell and Torfing 2016; Ostrom 2014). In the area of natural resource management, for example, design principles have been identified that improve the ability of groups to successfully undertake collective action (Cox et al. 2010; Ostrom 2010, 2014; Vollan and Ostrom 2010). More generally, empirical studies have shown that some institutional arrangements, such as face-to-face communication between participants in a social dilemma, improve cooperative outcomes (Balliet 2010; Fehr and Gächter 1999; Fehr and Schmidt 1999; Fischbacher et al. 2001; Nowak 2006).

The willingness of crowdfunders to finance sustainable enterprises can be framed as a social dilemma. Collective payoffs created through the investment cannot be appropriated by the enterprise, nor by the individual investor. Nevertheless, funders seem willing to invest in sustainable

enterprises through crowdfunding. This fuels our hypothesis that crowdfunding is an institutional arrangement which fosters collective action, such as sustainable enterprise funding. Therefore, we structurally analyze what aspects of the institutional structure of crowdfunding could potentially drive successful collective action. If we find institutional arrangements for collective action in crowdfunding, this can be applied strategically in order to successfully obtain funding for sustainable enterprises.

We give an overview of the most important institutional arrangements that have been empirically shown to lead to increased collective action (Table 10.1). For each arrangement, we provide the most relevant (if available, meta-analytical) source.

Not all of these arrangements will be applicable to crowdfunding. We use this overview of design principles for collective action as a starting point for an institutional analysis of crowdfunding.

10.4 METHODOLOGY: RULE CLASSIFICATION OF CROWDFUNDING

Following literature on cooperation for the commons (Kitsing and Schweik 2010; Vollan and Ostrom 2010), we apply the rule classification approach to crowdfunding. The rule classification method was developed by Ostrom and Crawford (2005) as part of the Institutional Analysis and Development framework (Ostrom 2010). Rule classification allows for a structured analysis of an institutional setting. Rules are defined as ‘shared understandings among those involved about what actions are required, prohibited or permitted’ (Ostrom 2010). Ostrom and Crawford (2005) distinguish seven types of rules that can be used to describe the institutional arrangements of any type of action situation:

1. Position rules: what positions can be taken by participants?
2. Boundary rules: how can participants enter or exit positions?
3. Choice rules: who has the authority to make decisions?
4. Aggregation rules: are there any joint decisions in the decision process?
5. Information rules: what information flows between participants?
6. Payoff rules: what rewards exist for different actions?
7. Scope rules: what outcomes are accepted?

Table 10.1 Overview institutional arrangements for collective action

| <i>Institutional arrangement</i> | <i>Design principle or mechanism</i> | <i>Main source(s)</i> |
|--|--|---|
| Clear boundaries for users and resources | Clear and locally understood boundaries between legitimate users and nonusers. Boundaries separate a specific common-pool resource from a larger social-ecological system | Ostrom (2010) |
| Balanced provision and appropriation | Appropriation rules are congruent with provision rules; the distribution of costs is proportional to the distribution of benefits. Appropriation and provision rules are congruent with local social and environmental conditions | Ostrom (2010) |
| Collective choice arrangements | Most individuals affected by a resource regime are authorized to participate in making and modifying its rules | Ostrom (2010) |
| Monitoring (users and resources) | Individuals who are accountable to or are the users monitor the appropriation and provision levels of the users and the condition of the resource | Ostrom (2010) |
| Graduated sanctions | Sanctions for rule violations start very low but become stronger if a user repeatedly violates a rule | Ostrom (2010) |
| Conflict resolution mechanisms | Rapid, low cost, local arenas exist for resolving conflicts among users or with officials | Ostrom (2010) |
| Minimal recognition of rights | The rights of local users to make their own rules are recognized by the government | Ostrom (2010) |
| Nested enterprises | When a common-pool resource is closely connected to a larger social-ecological system, governance activities are organized in multiple nested layers | Ostrom (2010) |
| Group size | In smaller groups/communities, more frequent interaction allows for increased trust through reputation building and mutual monitoring, and participants are more likely to believe their contribution will make a difference. At the same time, group size needs to be large enough to enable provision of the natural resource even if only a subset of the group participates | Poteete and Ostrom (2004) |
| Group heterogeneity | Shared social, cultural or economic characteristics increase predictability of behavior and imply common interest and/or higher trust levels which can improve collective action. However, resource and interest heterogeneity can also lead to better collective action by a subset of the population when some participants have higher benefits from cooperating and/or more resources to share | Oliver et al. (1985), Poteete and Ostrom (2004) |

(continued)

Table 10.1 (continued)

| <i>Institutional arrangement</i> | <i>Design principle or mechanism</i> | <i>Main source(s)</i> |
|----------------------------------|--|--|
| Communication | Communication prior to and during social dilemmas increase cooperation levels between participants, in particular for larger group sizes and for face-to-face (versus written) communication | Balliet (2010) |
| Sequential decision-making | Participants take account of whether and how much others have contributed to determine their own contribution to a collective action | Granovetter (1978), Oliver et al. (1985) |
| Contribution size | For smaller endowments/effort sizes, contributing to collective action is more likely | Ostrom (2014) |
| Activation thresholds | All-or-nothing mechanism ensures risk-free commitment; a contribution is only activated if the minimally needed commitment is pledged | Cheng and Bernstein (2014) |

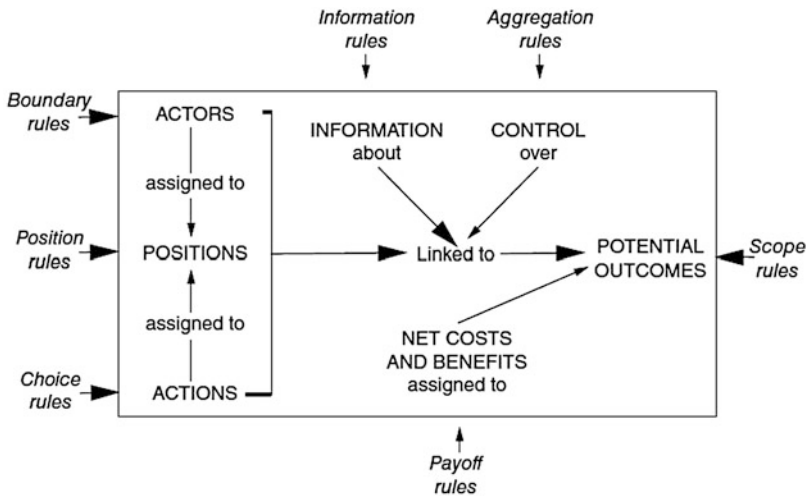


Fig. 10.1 Rules as exogenous variables affecting the elements of an action situation (Ostrom 2010)

We apply rule classification to crowdfunding, describing the different rules for crowdfunding to understand how crowdfunding may facilitate sustainable enterprise finance through collective action. Figure 10.1 (below) indicates how the different rules influence different aspects of any action situation. A classification of rules allows us to analyze the playing field for collective action in crowdfunding. We analyze the seven different types of rules for crowdfunding in turn (Ostrom and Crawford 2005). We base our rule description on international peer-reviewed academic literature about crowdfunding (Belleflamme et al. 2015; Mollick 2014; Moritz and Block 2016; Polzin et al. 2017).

10.5 ANALYSIS: RULE CLASSIFICATION AND POTENTIAL FOR COLLECTIVE ACTION

Our analysis consists out of two steps. First, we carry out a rule classification of crowdfunding. Second, we match existing findings from collective action theory to the rules found in crowdfunding to understand the potential of crowdfunding for bringing about collective action in finance.

10.5.1 *Description of Rules in Crowdfunding*

There are three types of positions that can be taken by participants in crowdfunding (**position rules**). The first position is that of the entrepreneur looking for funds. The second position is that of the funders who pledge money. The third position belongs to the crowdfunding platform who acts a financial intermediary by brokering the relationships between entrepreneurs and funders.

The entry requirements (**boundary rules**) for each position are similar or lower compared to other financial intermediaries (such as banks). Entrepreneurs are screened by the crowdfunding platform before being permitted to attract funds via their website. For crowdfunding platforms, there are national legal requirements, but these are generally less stringent than for other financial intermediaries and depend on jurisdiction, the type of crowdfunding and the size of the funds being attracted. For funders, the most important entry requirement is that of having a minimum amount of funds available to pledge.

The authority to make decisions (**choice rules**) which generate the final funding decision is divided between the three types of participants in

crowdfunding. Platforms decide which entrepreneurs get to present their enterprise on their website, based on pre-screening on aspects such as risk/return profile and scope of the enterprise. Entrepreneurs choose which platform they want to fund on for which amount and what they want to offer their funders in return (i.e. interest rate, size of equity stake, type of reward). Crowdfunders decide per enterprise whether they want to invest and what amount (based on the proposed payoff).

Crowdfunding is a typical case of joint decision-making (**aggregation rules**) since crowdfunders invest sequentially and in the aggregate decide whether an enterprise obtains funds and how much. Most platforms employ a threshold (all-or-nothing) mechanism for campaigns. Only if a group of funders jointly commits enough funds to reach the minimum amount that the enterprise needs is a positive funding decision reached, usually within a timeslot (i.e. 30 days). If this threshold is not reached, the enterprise receives no funds, not even those that were pledged.

Information rules in crowdfunding affect this aggregation process, since potential crowdfunders have real-time publicly available information about how many funders have pledged what amounts up to that moment (per person and in total). This information often includes the identity of funders who have already pledged to participate, depending on whether funders choose to be anonymous or not. Furthermore, funders are able to ask questions in public to the entrepreneur; these Q&As become publicly available information on the crowdfunding website and/or social media. Furthermore, entrepreneurs provide potential funders with information about the enterprise and the project to be funded using a project description including information about the entrepreneurs, an investment sheet, a video and information about the payoff offered per amount pledged.

The costs and benefits for each of the three participants (**payoff rules**) depend on the type of crowdfunding that the entrepreneur chooses to employ: donation, reward, debt or equity. In general, platforms obtain a success fee for each funded enterprise, framed as a percentage of the amount pledged, in exchange for the cost they make in screening the enterprise and marketing it to their crowd. Entrepreneurs incur costs to be screened by the crowdfunding platform, to market themselves to the crowd and to answer questions from potential funders. Also, they pay for the brokering services of the platform and commit a certain return to the crowd. Crowdfunder payoff is heterogeneous and can consist of both tangible and intangible benefits. Tangible benefits can include a product or service, a fixed interest payment, profit sharing or buy-out as well as provision of a collective/public good.

Intangible benefits include warm glow (Andreoni 1990), community benefits, such as feeling part of a group or being allowed to give input to production decisions (Belleflamme et al. 2014), and build-up of social capital (Colombo et al. 2015).

Finally, **scope rules** in crowdfunding define what types of enterprises or projects can be funded on certain platforms, which often have platform-specific criteria based on type of crowdfunding, amount funded, sector or risk level. Based on their funding scope, such as reward-crowdfunding (www.kickstarter.com) or societal impact-focus (www.oneplanetcrowd.com), we find many different types of crowdfunding platforms where each facilitates different types of investment decisions.

10.5.2 *Matching Collective Action Theory to Crowdfunding Rules*

Although rule classification applied to a new institutional setting in itself is insightful (Kitsing and Schweik 2010), our goal in this chapter is to use this rule classification to find overlap between crowdfunding rules on the one hand and institutional arrangements which improve collective action, on the other. Through a literature search on collective action and social dilemmas, we create an overview of arrangements that are found to increase collective action or cooperation between actors (Table 10.1). We match the collective action—enhancing institutional arrangements with crowdfunding rules (see Table 10.2).

From this full overview of ‘matches’ between crowdfunding and institutional arrangements that foster collective action, we find quite some overlap and combinations to be made between the different aspects of the institutional arrangements. Many matches between crowdfunding rules and collective action arrangements are partly driven by the same underlying rules. In particular, the low *boundary rules* for becoming a crowdfunder (low amount of funds needed per investment decision) in combination with a funder’s ability to make enterprise-specific funding decisions (*choice rules*) seem to create ample opportunity for collective action, simply because direct provision of finance for enterprises is opened to more individual participants than before.

For a comprehensive overview of our findings as described in Table 10.2, we combine them into three mechanisms through which crowdfunding can foster collective action for sustainable enterprise finance: (1) use of social networks (2) heterogeneous contributions and payoffs and (3) aggregation

Table 10.2 Overview arrangement for collective action matched to rules in crowdfunding

| | <i>Matching rules in crowdfunding to collective action mechanisms</i> |
|--|--|
| Clear boundaries for users and resources | Enterprise-specific crowdfunding campaigns make it very clear what money is pledged for (and which sustainability goal is addressed) Boundaries to enter as crowdfunder are low due to small starting amounts Boundaries to become a crowdfunding platform are relatively low, leading to a heterogeneous crowdfunding market (however, could be due to the start-up phase of this market) |
| Balanced provision and appropriation | A large crowd of potential funders (low entry boundaries) allows for selection of funders who have a higher payoff/preference from a certain type of collective action based on region, network, sector or interest which can improve willingness to fund Different types of payoff can be formulated in order to best address the preferences of potential funders and investment sizes |
| Collective choice arrangements | Low boundaries to fund 'democratizes' the funding decision compared to other financial decisions Spread of information in regional or thematic networks involves a large group of potential funders |
| Monitoring (users and resources) | The inclusion of an entrepreneur's social networks and/or users in the funding community allows for informal monitoring through repeated interaction |
| Graduated sanctions | Not applicable |
| Conflict resolution mechanisms | Crowdfunding platform provides legal contracts defining agreements made regarding the use of money and payback period or profit sharing but not regarding sustainability milestones |
| Minimal recognition of rights | Most jurisdictions have officially created laws for crowdfunding as a financial tool |
| Nested enterprises | Sustainable enterprises often address one specific sustainability need, located within a sector or business lines (creating a sustainable version of an existing product). This enterprise-specific approach leads to multiple governance layers each addressing a subset of existing sustainable goals |
| Group size | The low entry boundaries for crowdfunders in general allow for a large potential group of funders, of which only a small part needs to participate to provide enough funding for the enterprise When a crowdfunding campaign targets a specific crowd (i.e. local neighborhood or client group), repeated interaction |

(continued)

Table 10.2 (continued)

| <i>Matching rules in crowdfunding to collective action mechanisms</i> | |
|---|---|
| Group heterogeneity | can increase reputation building, trust and/or mutual monitoring; furthermore participants are more likely to believe their contribution will make a difference Low boundaries to entry and heterogeneous potential funding participants mean that funders can self-select into a sustainable enterprise funding campaign that best fits their preferences Network or interest-based crowdfunding around a common sustainability goal addressed by an enterprise can increase predictability of behavior and therefore mutual trust through homogeneity <i>within</i> the funding community |
| Communication | Cheap talk can occur both face-to-face in social networks surrounding the sustainable enterprise as well as online on social media and on the crowdfunding page of the enterprise, where crowdfunders can communicate their (intent to) pledge and reasons for doing so to other potential funders |
| Sequential decision-making | Crowdfunding makes it transparent in real-time how many other funders have already contributed, the amounts and in which time period. Furthermore, identities of previous funders are often made known |
| Contribution size | Crowdfunding allows for contributions to specific enterprises starting at small amounts (for enterprises usually between 100 and 250 Euro) |
| Activation thresholds | All-or-nothing mechanism means a pledge is only activated if a minimum amount of funding has been reached, lowering the risk that the money will not be spent well. A timeslot (i.e. 30 days) increases the urgency to contribute within a fixed time period (deadline) |

Table 10.3 Three main mechanisms for collective action in crowdfunding

| <i>Relevant rules per collective action mechanism</i> | <i>Network-based funding</i> | <i>Heterogeneous contribution and payoffs</i> | <i>Aggregation in thresholds</i> |
|---|------------------------------|---|----------------------------------|
| Position rules | | | |
| Boundary rules | ● | ● | ● |
| Choice rules | ● | ● | ● |
| Aggregation rules | | | ● |
| Information rules | ● | | ● |
| Payoff rules | | ● | |
| Scope rules | | ● | |

within thresholds. Also, we indicate which rules are driving each mechanism (Table 10.3).

10.5.2.1 *Mechanism 1: Collective Action Through Social Networks*

Since crowdfunding is often network-based, collective action can be enhanced in several ways. Information distributed about the enterprise, especially for early backers, often comes from the entrepreneur who mobilizes existing strong and weak ties (family, friends, clients, previous investors or business relations). First, knowing the person(s) behind the enterprise has been shown to affect the information used for the decision-making and can decrease fears of moral hazard (Granovetter 2005; Polzin et al. 2017). Secondly, the homogeneity of actors within a social network may be larger, which increases trust about expected behavior and can therefore facilitate collective action, if participants fund based on the expectation that others will put in a share of the funds as well (Poteete and Ostrom 2004). Third, smaller, well-defined group size can be conducive to collective action because a single contribution is expected to make a real difference (Olson 2009; Ostrom 2010). Also, opportunities for frequent interaction rise as group size decreases, which leads to a higher importance of reputation (Poteete and Ostrom 2004). However, the group size of the potential funding community still needs to be large enough to include enough contributors and to allow for self-selection of funders who receive the highest payoff from contribution to collective action, that is, due to preferences or reputation (Oliver et al. 1985). Furthermore, resource heterogeneity within a potential funding network can be useful since higher resource endowments make it easier to pledge funds (Oliver et al. 1985).

10.5.2.2 *Mechanism 2: Collective Action Through Heterogeneous Contributions and Payoffs*

Heterogeneity of choice and payoff rules in crowdfunding may improve collective action for sustainable crowdfunding by allowing for fine-grained matching of investor contribution and payoff preferences in line with enterprise characteristics. By designing the contribution and/or payoff structure of a crowdfunding campaign based on specifically targeted funders such as users, clients, believers or local citizens, the benefit for a funder of joining a campaign can be maximized, enhancing collective action. Bringing *appropriation* (benefits) and *provision* (costs), in line with each other by locating costs within the community that will profit from shared benefits, is one of Ostrom's design principles for governing natural resources (Ostrom 2010)

and may also facilitate collective action in crowdfunding. For example, consumers or players in a certain value chain that wish to use a sustainable product or want to be part of an inspiring community may be willing to invest in or pre-purchase the product since they are motivated to bring it to market. Crowdfunding platforms are able to offer multiple types of payoff (i.e. products) to create niche markets targeted at specific segments (such as users). Furthermore, size of contributions to a crowdfunding campaign may vary considerably, depending on a participant's financial endowment and also willingness to contribute. In general, more people are willing to make smaller contributions (Ostrom 2014); therefore, the option to pledge heterogeneous amounts is likely to facilitate collective action in crowdfunding.

Also, crowdfunding platforms can define their scope by selecting enterprises that fit the preferences of a specific crowd, making it easier to match funders to sustainable enterprises based on their preferences and payoff expectations. As an example, Oneplanetcrowd, a Dutch sustainable crowdfunding platform, invited all funders of a car sharing initiative (Snappcar) to invest in a tool sharing platform (Peerby) based on their previously revealed funding preferences (type of enterprise and type of payoff).

This payoff-mechanism is likely to interact with the first network-mechanism, since increasing individual payoffs through niches can mean that individuals who benefit most from a collective cause are already part of an enterprise's existing social network as members, clients, believers or local citizens. However, we need to distinguish between them because the underlying rules driving the two mechanisms are different. The network-mechanism is relationship-driven, conveying information, trust and reputation to stimulate collective action; the payoff-mechanism is driven by heterogeneous payoff (cost and benefit) rules that can positively affect the willingness to contribute.

10.5.2.3 Mechanism 3: Collective Action Through Aggregation Within Thresholds

The sequential, online and transparent aggregation and information rules of crowdfunding in a threshold model may improve collective action due to conditional cooperation between individual crowdfunders (Cheng and Bernstein 2014; Frey and Meier 2004; Keser and Van Winden 2000). Crowdfunders who observe the investment of others may decide to add their funds to contribute to societal impact in a similar way as communication between actors can lead to cooperation in common-pool resource

dilemmas (Vollan and Ostrom 2010). Within this mechanism, the legitimacy argument can play a role: if others choose to invest, this creates a quality signal that the enterprise may be effective in reaching its goal (Lehner 2013).

Furthermore, information about previous funder decisions is skewed. Potential funders see only the ‘cooperating’ funders who decided to invest, but have no information about funders who considered funding but opted out. There is therefore a larger chance that conditional cooperators will follow the example of the previous funders if their perception is that many funders joined within a short time frame (proxying for a high percentage of positive funding decisions), even though they do not know how many funders decided *not* to fund. This skewed information provision can help collective action come about based on the behavior of the unconditional cooperators (early backers). Mirroring this process, low numbers of funders during the first time period of a crowdfunding campaign mean collective action will probably not come about, since conditional cooperators will gauge there to be too little cooperation going on and may therefore opt out, as well.

10.6 DISCUSSION: WHAT RULES LEAD TO COLLECTIVE ACTION IN CROWDFUNDING?

In this chapter, we apply findings from collective action theory to the institutional arrangements of crowdfunding in order to explain why and under what circumstances sustainable enterprises are more likely to be successfully funded than mainstream enterprises. Previous work on sustainable enterprise crowdfunding uses (mainly) legitimacy theory to explain why sustainable, social or environmental enterprises could be more successful than mainstream enterprises at crowdfunding, despite predictions from rational choice theory (Calic and Mosakowski 2016; Hörisch 2015; Lehner 2013). Empirical evidence on this question is scarce and mixed.

We apply collective action theory to understand the potential contribution of crowdfunding to sustainable finance. We discuss what institutional arrangements within a crowdfunding campaign can lead to successful funding based on institutional arrangements that foster collective action. Our analysis results in three main mechanisms that can explain why sustainable enterprises may be crowdfunded easier than mainstream enterprises.

Each mechanism consists of several rules embedded in crowdfunding. Here, we briefly discuss our findings and their implications.

The easy access to crowdfunding for individual participants, due to the small starting amounts, creates a large diversity of potential crowdfunders. We find that the boundary and choice rule architecture of crowdfunding is a key institutional driver behind all three mechanisms for collective action in this type of finance. Increased access to financial decision-making, starting at small amounts, has been framed as ‘democratization of finance’ by some (Shiller 2013), although it diverts from real democracy since participation depends on individual resources (Hörisch 2015). Nevertheless, investment decision-making is opened to a much larger ‘crowd’ compared to when this was restricted to traditional financial players. This in itself is likely to influence which enterprise gets funded.

The first mechanism, network-based funding, builds on this increased funding access to stimulate collective action. Information about the crowdfunding campaign is distributed through existing ties/relationships, which changes the incentive structure of the financing decision and increases trust levels. We are not the first to conclude that crowdfunding is network-based. On the contrary, it has been brought forward as a defining aspect of crowdfunding (Moritz and Block 2016; Wal et al. 2016). However, the link between crowdfunding being network-based and its potential for organizing collective action/sustainable finance is novel.

The second mechanism, collective action through heterogeneous contributions and payoffs, links back to balanced provision and appropriation, one of the design principles for successful collective action in natural resource management (Ostrom 2010). It is also in line with the concept of ‘fairness’, which has been studied empirically in the cooperation literature (Fehr and Schmidt 1999). The larger flexibility to create niche matches between entrepreneurs and specific funder types creates an opportunity to increase individual payoffs to a funder who values a particular mix of (non-financial) payoffs (Geobey et al. 2012). Renewable energy projects are an example of sustainable entrepreneurial projects that can generate financial payoff, climate change mitigation and community benefits for its crowdfunders (Dóci et al. 2015).

Finally, the third mechanism, collective action through aggregation in thresholds, is dependent on the aggregation and scope rules in crowdfunding. This mechanism can be traced back to research carried out on critical mass (Oliver et al. 1985) and to findings on conditional cooperation (Levine and Prietula 2014; Ostrom 2014; Volland and Ostrom 2010).

Furthermore, aggregation in thresholds has been pinpointed as a successful strategy in the context of crowdfunding (Cheng and Bernstein 2014). The tendency of crowdfunding campaigns to either succeed in bringing together the money or fail to do so with a wide gap is generally attributed to information cascades and increased trust through signaling by early backers (Colombo et al. 2015; Vismara 2015). Signaling by early backers, influencing the investment decision of subsequent funders, is also commonplace outside sustainable enterprise funding. However, if we find that sustainable enterprises are more successful at bringing together funds than mainstream enterprises—all else being equal—our hypothesis is that an additional part of this ‘herding’ behavior in crowdfunding can be attributed to collective action surrounding sustainable goals. Empirical evidence is needed to unravel these two different mechanisms.

Another aspect that needs further attention is distinguishing between collective action for innovative entrepreneurship, in general, and sustainable innovative entrepreneurship specifically. The provision of innovation to a society can also be framed as collective action, since more people benefit than just the investors, and the high-risk levels of innovation finance are often not compensated by its returns (Faber and Frenken, 2009). In particular for a transition toward a sustainable economy, which needs a lot of product and service innovation, an argument can be made that collective action targets both sustainability and innovation. This links back to the argument made by Calic and Mosakowski (2016) that willingness of funders to invest in social enterprises is partly mediated by creativity levels, and this is also pinpointed in the double externality problem (Faber and Frenken 2009).

One important practical finding from our analysis is that collective action for sustainable enterprise finance does not happen automatically by opening a project page on a crowdfunding platform. In order to ‘put to work’ the rules and mechanisms in crowdfunding for a sustainable enterprise, a campaign strategy needs to be well thought through and targeted towards a specific audience. Also, some sustainable enterprises will be better suited for crowdfunding than others. Building up a community that is committed to the sustainable enterprise for idealistic or practical reasons, such as users or fans, is a key ingredient. Building up a social network is important in general, since the entrepreneur can inform individuals personally about their campaign which improves collective action both from a network-based and payoff perspective. Getting early backers within this community to commit, preferably with their identity revealed, will stimulate conditional

cooperators to follow. The bigger an entrepreneur's community or network is, the easier it is to get at least a small part of them to participate. Also, crowdfunding of a sustainable consumer product or service is likely to be easier than a business-to-business product or service, since individuals are more likely to become involved if they see themselves as potential consumers and therefore understand/support the value proposition (Ordanini et al. 2011).

10.7 CONCLUSION

This chapter is a conceptual exercise to better understand potential mechanisms that enhance sustainable finance by applying collective action theory to crowdfunding. We use a rule classification framework to indicate which institutional arrangements in crowdfunding appear conducive to organizing collective action. By combining collective action theory with the growing body of academic literature on crowdfunding, we argue that understanding the application of rules embedded in crowdfunding can foster increased investments in sustainable entrepreneurship through network-based funding, heterogeneous contribution and payoff and aggregation in thresholds. Below, we provide limitations and future directions of our research.

10.7.1 *Limitations*

Our study has some important limitations. For one, the conceptual analysis is conducted for crowdfunding in general, whereas in practice, rules between platforms can differ. Additionally, since this is an industry that still needs to mature, rules may evolve. Furthermore, we focus on crowdfunding via intermediary platforms, whereas not all projects are mediated, leading to different funding incentives (and lack of screening) if there is no platform involved.

Secondly, by undertaking a rule classification of crowdfunding, we leave out other external variables that strongly affect the ability of an institutional setting to create collective action, such as biophysical conditions and attributes of the community (Ostrom 2010). These variables need to be taken into account in further research.

Third, we lean strongly on theory and evidence from common-pool resource research—notably the work of Elinor Ostrom—whereas collective action for crowdfunding sustainable enterprises concerns many different types of social or environmental payoffs that are not as clearly defined as

many common-pool resource dilemmas. Although we limit ourselves to analyzing collective action (which can involve commons), more work needs to be done to understand how the specific social and environmental payoffs produced by sustainable enterprises affect the ability to create collective action. A further step is to improve our understanding regarding what type of sustainable enterprises and business models are well suited for crowdfunding using collective action dynamics.

10.7.2 Future Directions

Conceptually applying existing insights from collective action to finance is just a first step. We briefly state three main research directions from which to continue from here.

First, empirical evidence is needed to test the hypothesis that collective action is indeed taking place in sustainable enterprise crowdfunding. It is particularly important to be able to distinguish collective action from other dynamics in crowdfunding such as herding, since early backers also play other important signaling roles (Colombo et al. 2015; Vismara 2015). One way to do this is through a field or lab experiment with two versions of a project: one framed as ‘sustainable’ and one with no mention of sustainability at all and analyzing participation rates of funders.

Second, existing insights about collective action should not only be applied but also further developed in new innovative institutional settings. As technological advancements increase the speed and ease of information transmission and lower transaction costs, crowdfunding (and other financial innovations) can improve and develop as new institutional settings for collective action that were previously not possible in an offline environment. If designed smartly, financial innovation could pave the way for intelligent collective action for sustainable enterprise finance. Crowdfunding and other types of decentralized financial innovation can be used to empirically test and improve upon collective action mechanisms. The next step is to collect and create empirical evidence that can give more insight into how we can improve collective action in finance in order to speed up a transition towards a sustainable economy. This goes beyond collective action in crowdfunding, which will not suffice as a solution to creating sustainable finance but is an important step, in particular for understanding increased decentralization in financial decision-making. Smart use of technology to improve collective action should not only be understood through crowdfunding but also through other types of ‘fintech’, such as development of local and/or

blockchain-based currencies and innovation by traditional players like banks and pension funds.

Furthermore, there is a diversity of sustainable enterprises that will have different abilities to fund themselves using collective action dynamics in crowdfunding. We need to improve our understanding of how different mechanisms to obtain finance for sustainable entrepreneurship can be best applied in practice, including these collective action mechanisms. This can relate to the type of business model that the enterprise is setting up, its stage of growth and the level of customer involvement. A better understanding for sustainable enterprises of when to search for what type of finance will increase the number that make it to the market.

Finally, the ultimate goal of more sustainable finance is the actual societal impact of the enterprises and projects being financed. More research is needed to reach a better prior understanding of whether a decision to finance a sustainable enterprise is likely to lead to a positive societal impact so that this can be included as a criterion in the investment decision (Maas and Liket 2010; Toxopeus et al. 2015).

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Palm Oil: Mitigating Material Financial Risks via Sustainability

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11.1 PALM OIL: INTRODUCTION

Palm oil is an inexpensive and highly versatile oil derived from the fruit of the oil palm tree. It is found in half of all consumer goods on the shelves today in Western grocery stores (World Wildlife Fund 2017)—from chocolate, ice cream, and baked goods to soaps, lotions, and detergents. Palm oil is also used as a petroleum substitute (a biofuel) to power vehicles, heat homes, and manufacture plastics. Palm oil plantations produce more useful oil per unit of land than any other oil crop. Due to its high yields and many uses, palm oil is the most actively traded oil crop in the world (Corley and Tinker 2015).

With annual sales of at least \$50 billion, palm oil is big business (Rushing and Chiu n.d.). Indonesia and Malaysia have expanded their plantations and tripled production over the past 15 years and today account for 85 percent of global production. Indonesia's palm oil estate has gone from 1 million hectares in 1990 to 21 million hectares in 2015. This means that since 1990, 10 percent of Indonesia's total land area has been leased to palm oil concessions.

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In fact, 6.1 million hectares of palm oil concessions in Indonesia are now possibly “stranded land.” Stranded land is a category of stranded assets—assets that “have suffered from unanticipated or premature write-downs, devaluations, or conversion to liabilities.” (Levicharova et al. 2017)

Because of government policies and buyers’ procurement requirements, this stranded land—equal to 10 million football fields or 3 percent of Indonesia’s land mass—is on the balance sheet of many Indonesian companies. It cannot be developed without violating government policies or buyers’ procurement requirements. Financial analysts, portfolio managers, and bankers appear to be unaware that these stranded assets are impacting current financial valuations. Because stranded land is on the balance sheet of these companies, palm oil stranded land is part of global investment portfolios (Levicharova et al. 2017; Rijk et al. 2017).

It is important to understand that at its most basic level, sustainability risks are direct “operational risks.” These direct risks are evident in day-to-day operations, impacting companies’ operations. As a result, these operational risks have indirect impacts across all risk categories. According to the Global Association of Risk Professionals (GARP), these risk categories include business, credit, reputation, liquidity, operational, strategic, market and regulatory, or legal risks. For example, deforestation-linked supply chains may have an indirect impact on market risks originated from direct operational risks. *Market risks* include four subsets of risks that could then be affected by deforestation:

- Commodity price risk, because deforestation-linked palm oil may trade at a discount.
- Equity price risk, because a firm’s equity valuation may suffer from deforestation in its supply chain.
- Interest rate risk, because a firm’s cost of debt may increase due to the increased risk arising from deforestation in its supply chain.
- Foreign exchange risk, because a firm’s currency translation for contracts and pricing may be affected by deforestation risk in its supply chain.

Similarly, deforestation-linked supply chains may also have an indirect impact on credit risks. *Credit risks* include four subsets of risks that could be impacted by deforestation:

- Default risk, because a firm is at risk for default from its inability to sell its deforestation-linked commodities.
- Bankruptcy risk, because a firm may eventually enter bankruptcy due to its inability to sell its deforestation-linked commodities.
- Downgrade risk, because a firm's credit rating may be downgraded as a result of stranded land assets and/or its inability to maintain its credit profile.
- Settlement risk, because a firm unable to deliver commodities that meet its buyers' procurement policies may be unable to complete its contractual obligations.

This chapter starts with palm oil uses, cultivation, and refining and then moves on to case studies highlighting topical risk management themes, discussed in readily understood, non-financial terms. Specifically, the discussion explores both direct operational risks and indirect business, credit, reputation, liquidity, strategic, market, and regulatory/legal risks caused by deforestation in palm oil supply chains. Risks are described through recent case studies with commentary. The chapter concludes by summarizing some of these themes and their implications.

11.2 PALM OIL: WHAT IS IT?

Palm oil is generally derived from the flesh of the fruit of the oil palm tree. In Southeast Asia, oil palm trees used are a hybrid of the *dura* and *pisifera* varieties. They yield generally 4 to 5 tons of crude palm oil (CPO) per hectare per year and about 0.5 metric tons of crude palm kernel oil per hectare per year (Malaysian Palm Oil Board [n.d.](#)). Because palm oil has a higher yield per ton of fruit than other crops, manufacturers and producers choose palm oil over other oil crops. (All tons cited in this chapter are metric tons.)

The oil palm is a monoecious tree—that is, each tree has both female and male flowers. Trees produce fresh fruit bunches (FFB) of between 1000 and 3000 fruitlets per bunch. Single bunches weigh between 10 and 25 kilograms. Fruitlets are spherical and, when ripe, orange-red. Two types of oil can be milled from each fruitlet—palm kernel oil from the seed and palm oil from the fleshy mesocarp surrounding the seed.

Palm trees grow up to 18 meters in height. They bear fruit within 30 months of field planting and are productive for up to 30 years. Consequently, palm oil concessions in Indonesia are leased for 35 years, sometimes with 25-year extensions to allow for subsequent rotations. In Malaysia, palm

oil concessions are leased for 99 years. Palm oil and palm kernel oil are chemically different.

11.3 PALM OIL: USES

Palm oil contains 40 percent oleic acid (monounsaturated fatty acid), 10 percent linoleic acid (polyunsaturated fatty acid), 45 percent palmitic acid, and 5 percent stearic acid (saturated fatty acid). Palm oil is cholesterol-free. Semisolid at room temperature, it has a melting point of between 33 °C and 39 °C. Products derived from palm oil resist heat at elevated temperatures as well as oxidation. Because palm oil requires no hydrogenation for use in food, palm oil is ideal as an ingredient in cooking oils, shortenings, margarines, and other food applications.

CPO is orange-red because of its natural carotene content. During refining, palm oil is fractionated into liquids (palm olein) and solids (palm stearin). Palm olein, the liquid, makes an optimal “blending partner,” because it mixes well with other vegetable oils. Like palm oil, palm olein is also widely used for frying. It resists oxidation at frying temperatures. It also has a longer shelf life than other finished products.

Compared to palm oil, palm stearin, the solid obtained after fractionation, is available at a wider range of melting points and thus is a useful source of natural hard fat for products such as shortening and margarine. It trades at a discount to palm oil and palm olein. There are many other useful palm oil fractions beyond palm olein and palm stearin, among them double-fractionated super olein.

Fractionation of palm kernel oil, obtained from the kernel of the fruit, yields palm kernel olein (a liquid) and palm kernel stearin (a solid). Palm kernel oil, palm kernel olein, and palm kernel stearin are used in margarine, confectioneries, coffee whitener, milk, cream, and coating fats. Palm oil and palm kernel oil also have industrial applications as a plastic substitute and biodiesel.

11.4 PALM OIL: CRACKING

Field harvesting, transportation quality, and time affect oil quality. When the fruit attains full maturity, its oil can achieve 50 percent of mesocarp weight. During harvesting, FFB are cut from the branch and fall to the ground. This can damage the fruit. In fresh and unbruised FFB, free fatty acid content is low. When FFB are removed from tree branches, ripe fruit

soften and degrade quickly, attacked by lipolytic enzymes; with ensuing hydrolysis, free fatty acids increase rapidly. When they are removed during processing, yield drops. To prevent deterioration and thus yield loss, milling needs to begin within 48 hours of harvesting.

For this reason, CPO mills tend to be co-located near growers. There are three types of growers: plantations, cooperatives, and smallholders. The short harvest-to-mill period means that distance to the mill affects market access, price differentiation, and bargaining power—in particular, for smallholders. Vertical integration by state-owned and private enterprises enables enterprises to have greater access to material non-public information than smallholders, to the disadvantage of smallholders.

To sterilize FFB, large-scale CPO mills use steam. This is not available to small-scale mills, most of which thresh bunches before the fruits are cooked, while high-pressure sterilization systems thresh bunches after heating to loosen the fruits (Agriculture and Consumer Protection [n.d.](#)). Small-scale mills may use bunch waste as cooking fuel. Large-scale mills may use bunch waste in cogeneration plants or incinerate it. They may use the potassium-rich ash as a fertilizer.

Heating and sterilization cause fruitlets to separate, allowing for digestion and oil extraction. In this process, palm oil kernels are separated from the palm oil-rich mesocarp. Kernels are later cracked to obtain crude palm kernel oil (PKO). Palm kernel oil is high in lauric and myristic acids. The cracking process also halts hydrolysis and autoxidation, destroys oil-splitting enzymes, protects the commercial yield, and solidifies proteins supporting coagulation. Water-soluble gums and resins can then be removed.

Digestion occurs next. Digestion is the process of releasing the palm oil in the fruit by rupturing or breaking down the oil-bearing cells (Agriculture and Consumer Protection [n.d.](#)).

The next stage is clarifying and drying the oil. Clarification, which removes impurities from the oil, involves thinning the viscous output mixture by adding hot water in a 3:1 ratio. Dilution separates heavy solids from lighter oil droplets. The clear oil, still containing trace water and dirt, is then decanted; moisture must be minimized to reduce autocatalytic hydrolysis. Waste water is dumped into sludge pits (Agriculture and Consumer Protection [n.d.](#)).

Large-scale mills transfer purified and dried oil to storage tanks before selling it downstream. During storage, because oxidation increases with temperature, hot water or steam heating coils are used to maintain temperatures to prevent solidification and fractionalization.

After processing, fiber and palm nuts remain. Fiber is often processed into technical oils to be used for soap making. Nuts are separated, heated, and dried and then sold or transferred to other operators, who process them into palm kernel oil (Agriculture and Consumer Protection *n.d.*). Large-scale mills also use the fiber and nut shells for energy generation.

After this final stage, the most important characteristics of refined, bleached, and deodorized (RBD) palm oil are flavor and odor, color, iodine value, slip melting point, and content of free fatty acids, moisture, and impurities (Cargill 2017).

Finally, empty fruit bunches and palm oil mill effluent can be reapplied to fields to support nutrient recycling (Corley and Tinker 2015).

11.5 PALM OIL: DRIVER OF TROPICAL DEFORESTATION AND CLIMATE CHANGE

Palm oil has been identified as a driver of both tropical deforestation and climate change (Steinweg et al. 2016). Material financial risks often accompany the environmental impacts and human rights abuses associated with palm oil expansion. In 2012 alone, Indonesia lost 840,000 hectares of primary forest (Margono et al. 2013), the largest loss globally. The rapid expansion of palm oil production in Southeast Asia has been connected to serious human rights violations (Skinner 2013), including child and forced labor, now a regulatory concern for the US Department of Labor (Bureau of International Labor Affairs 2016). Migrant palm oil workers are often discriminated against and exploited. Palm oil jobs are often casual or seasonal, with financial stress for job seekers after employment ends. Palm oil creates fewer jobs per hectare compared to cocoa, rubber, rice, and agroforestry (Kuepper et al. 2016a; Rhein 2015).

Gender issues are also a significant financial concern for palm oil companies. The Center for International Forestry Research (CIFOR) reported that Indonesian women who work in the agriculture sector are the “treasurers of household funds” (Thoumi 2016b). Yet a recent survey of the 21 Indonesian companies in the Indonesian Agriculture Index, conducted by Climate Advisers, estimated that women comprise 5 percent of the board of directors of these companies, although women comprise fully 50 percent of the labor force—19 million women—working in the Indonesian agriculture, forestry, and fisheries sector (Thoumi 2016b).

Many countries seeking palm oil finance are developing nations with a need for investments (Kuepper et al. 2016a). McKinsey stated, “Indonesia needs to raise productivity per farmer by 60 percent just to meet domestic demand” (Thoumi 2016b). Women could contribute to increased productivity. As the Green Commodities Programme (GCP) demonstrated, if Indonesian women were provided with the same access to financial and technical knowledge as men, agriculture yields on plantations could increase 20 to 30 percent (United Nations Development Programme 2017).

Many of the countries involved in palm oil have weak governance and legal systems and lack financial and policy instruments to stimulate, regulate, or enforce responsible management practices. For example, since June 2015, Nigeria has prohibited importers from using foreign exchange reserves to fund capital expenditures and trade finance; official corporate foreign exchange reserves may not be used for 41 key consumer staples, including palm oil.

Yet there are problems with these types of bans, as they may not include zero-deforestation commitments. For example, PZ Wilmar, a joint venture between PZ Cussons International and Wilmar International, Ltd., is expanding in Nigeria. The venture’s Lagos refinery can process up to 1000 metric tons of CPO per day, one fifth of all palm oil refined in Nigeria. Both PZ Cussons and Wilmar International are members of the Roundtable on Sustainable Palm Oil (RSPO). PZ Wilmar has planted 30,000 hectares in Nigeria. In 2013, Wilmar International committed to an industry-groundbreaking policy on No Deforestation, No Peat, No Exploitation (NDPE), as zero-deforestation palm oil commitments are known. But it is unclear if Wilmar’s NDPE commitment covers its Nigerian operations of its joint venture. This means that Nigeria may be importing deforestation activities into a region that already suffers from local conflict and uncertain governance.

A list of key systemic financial risks facing palm oil expansion (Kuepper et al. 2016a) include:

- Operational risk: Investments are threatened when key risk management lessons are not applied. Government assurances are insufficient when land banks are contested.
- Stranded assets risk: Contested land banks reduce the present value of future cash flows, negatively affecting financial valuation.
- Financial risk: Failure to obtain free, prior, and informed consent (FPIC) disrupts cash flows. For example, many Southeast Asian or

Liberian investments have been subject to delays, community conflicts, and complaints filed with the RSPO.

- **Reputational risk:** Violations of buyers' procurement policies and financiers' environmental, social, and governance (ESG) criteria damage companies' reputation. This increases revenue-at-risk, earnings volatility, and cost of capital. IOI Corporation's earnings went from positive \$30 million in the second quarter of 2015 to negative \$14.8 million a year later because they violated their buyers' procurement policies.
- **Regulatory and procurement risk:** Companies relying on deforesting land banks may no longer be compliant with buyers' procurement policies. In December 2014, the Government of Peru ordered United Cacao's Cacao del Perú Norte S.A.C., Plantaciones de Ucayali S.A.C., and Plantaciones de Pucallpa S.A.C. to cease operations because of illegal deforestation. The London Stock Exchange delisted United Cacao on February 8, 2017 (RNS, London Stock Exchange 2017). As a result, on July 13, 2017 United Cacao filed a petition in the Grand Court of the Cayman Islands stating it is insolvent.
- **Business risk:** Increasingly, direct environmental factors and human rights considerations—both magnified by climate change—drive business opportunities. Executives must align their firm's risk appetite framework from the executives and board of directors' levels to level of plantation managers. This way, the risk culture informing day-to-day risk management is coordinated at all levels, from executives to the plantation managers. For example, BlackRock's Hildebrand and Winshel (2016) stated that companies who fail to address deforestation risks in their supply chains may be putting themselves at financial risk as a result of climate change and that climate factors are underappreciated and underpriced because they are "less visible" to investors. Simply put, agricultural cycles are changing due to climate change as they exhibit greater variability and magnitude of outcomes. This means it is much more difficult to conduct accurate financial forecasting. At the same, many institutions face social and regulatory pressures to not finance or invest in deforestation practices.

With little arable land remaining in Indonesia and Malaysia, palm oil production is growing in sub-Saharan Africa and Latin America. Capital is seeking growth opportunities. Other countries are expanding their palm oil investments, as global demand is expected to grow.

In the Democratic Republic of the Congo, in 2016, Feronia had a successful equity raise with the CDC Group PLC, UK Government Development Finance Institution, and African Agriculture Fund, though its subsidiary, Golden Oil Holdings Limited. These funds will be used to provide working capital to expand the former Unilever assets in the Democratic Republic of the Congo (Thoumi 2016p).

Also in 2016, the Government of Cameroon nationalized the Cameroon Development Corporation (CDC). CDC is now solely owned by the government. Now operating under technical supervision of the Ministry of Agriculture and Rural Development, CDC is the nation's largest state-owned agribusiness and the second largest employer in Cameroon, with 22,000 workers. CDC stated it will increase its palm oil production 67 percent by 2020, from 270,000 metric tons to 450,000 metric tons. Annual consumption in Cameroon is 385,000 metric tons. The Government of Cameroon set price controls on palm oil and palm kernel oil estimated at €0.69 per kilogram for industry sales. In 2015, the government banned palm oil imports from Indonesia and Malaysia (Thoumi 2016j).

But palm oil development in Cameroon has problems. In September 2016, 244 farmers filed two collective complaints against SG Sustainable Oils Cameroon (SGSOC). The complaints allege land grabbing by SGSOC. The contention is that SGSOC's 20,000-hectare palm oil plantation occupies lands belonging to farmers and that SGSOC had failed to obtain FPIC from the farmers (Thoumi 2016j). Some of these lands are also considered High Carbon Stock (HCS) and/or High Conservation Value (HCV) forest (Greenpeace, 2014).

SGSOC's palm oil plantation was formerly owned by Herakles Farms (Deugoue 2016). Herakles was financed partially by the Blackstone Group (Mousseau 2012) through its subsidiary Sithe Global Power. This relationship is not transparently described within security filings (Thoumi 2016j).

Nigeria has taken a different approach. Although it has a prohibition on importers of palm oil, it also prohibits importers from using foreign exchange reserves to finance in-country palm oil projects. As a result, Nigerian grower Presco saw its revenue in the first half of 2016 increase 60 percent, to \$24 million. But domestic companies have been unable to purchase agrochemicals and required equipment given their lack of foreign reserves. Nigeria's palm oil production has remained at 970,000 metric tons annually since 2012 (Thoumi 2016g).

In 2016, ING raised €80 million in debt for Société Financière des Caoutchoucs SA (SocFin). The debt issuance was for senior unsecured

five-year 4 percent debt to finance land-use expansion for its vertically integrated palm oil and rubber production. Funds were assumed to be used to finance SocFin's expansion in Sierra Leone and elsewhere. ING facilitated this first public debt offering by SocFin. It is unknown whether ING's participation required SocFin to include environmental, social, governance (ESG) safeguards into the use of funds. ING is a RSPO member (Thoumi 2016o).

The same year, CDP published its Global Forests Report (CDP 2016) analyzing corporate risks and opportunities linked to four commodities that drive most tropical deforestation—soy, timber, cattle, and palm oil. CDP's report demonstrated that up to \$900 billion in revenue-at-risk annually is linked to deforestation, based on self-reporting by 187 companies in 2016. On average, 24 percent of these companies' revenues depended on commodities linked to deforestation.

For decades, palm oil has been criticized for its links to corruption, social injustice, and deforestation (Colchester et al. 2006). In Southeast Asia, government officials often awarded oil palm growers legal rights to clear forests in exchange for bribes. Officials generally did not consider the customary rights of the people living within affected areas (Johnson 2015).

Companies exploit confusing and contradictory land ownership regulations. To make way for plantations, companies often force indigenous peoples and others off their land. Sometimes companies use slave and child labor (Skinner 2013). In 2012, 59 percent of the Indonesia's 1000 palm oil companies were linked to land conflicts with local communities (Hadinaryanto 2014). Clearing of forests for palm oil, including in peatlands, has pushed Bornean orangutans and Sumatran elephants and tigers to the brink of extinction and has emitted hundreds of millions of tons of carbon pollution into the atmosphere.

To the extent the industry paid any attention to concerns about deforestation or the exploitation of vulnerable communities, measures were mostly cosmetic (Voices for Biodiversity 2013). Occasionally some companies did the right thing. But mostly, business as usual moved money into the pockets of well-placed palm oil executives, bankers, and corrupt officials. Governments promoted or tolerated this "collateral damage" in the name of economic development. Yet in Indonesia, for example—contrary to public opinion—the entire plantation sector contributes only 3 percent of gross domestic product, despite public subsidies.

As a result, currently in Indonesia, 6.1 million hectares comprise "stranded land" on the balance sheet of palm oil estates, an area slightly less than the size of the Republic of Ireland and equal in size to 10 million football fields (Levicharova et al. 2017).

Stranded land is stranded assets. Stranded assets are “assets that have suffered from unanticipated or premature write-downs, devaluations, or conversion to liabilities” (Caldecott et al. 2015, p. 2).

This magnitude of stranded assets is unknown to financiers. Analysts do not include the value of stranded assets into their financial valuations and forecasts. Yet of Indonesia’s palm oil concessions, 29 percent cannot be developed without violating buyers’ NDPE policies. Ninety-five identified palm oil companies each include at least 1000 hectares of stranded land. With 10 percent of Indonesia’s total land given over to palm oil concessions over the last 25 years, stranded land has been a material economic concern (Levicharova et al. 2017; Rijk et al. 2017).

Traders and refiners—including Cargill, Bunge, and others—have suspended or excluded noncompliant growers from their supply chains due to NDPE policy violations. Recent examples include some of the largest palm oil companies globally: IOI Corporation, Austindo Nusantara Jaya, Sawit Sumbermas Sarana, and Provident Agro (Beekmans et al. 2016; Levicharova et al. 2016b).

Change is occurring, as markets are beginning to understand the economic drivers of deforestation. As of 2014, 71 percent of global forest destruction (Lawson 2014) was driven by agriculture—primarily timber, cattle, palm oil, and soy—with mining and infrastructure development also playing significant roles (Lawson 2014). These economic drivers of deforestation are closely related. Roads to access mines or dams in remote areas open protected forests to deforestation. Soy expansion in South America pushes out cattle farmers who seek new pastures. When improved law enforcement in Brazil limited deforestation, activities shifted to Peru and Paraguay (Graesser et al. 2015).

From the 1990s to the 2000s, deforestation of tropical forest to monoculture plantations dramatically increased in the Brazilian Amazon for soy, and in Indonesia and Malaysia for palm oil. Consequently, Brazil, Indonesia, and Malaysia became the target of advocacy campaigns.

Brazil then embarked on reforms in the soy and cattle sectors. These included the creation of multistakeholder processes, temporary moratoria, and monitoring and mapping programs and the creation of a rural land registry. Brazil’s rate of deforestation subsequently began to decline steadily.

Since 2014, the Indonesian and Malaysian palm oil sector has seen the number of buyers with NDPE and zero-deforestation commitments increase to more than 111 (Forest Trends n.d.). This growth has occurred

largely in response to advocacy campaigns exposing deforestation and social conflicts. These buyers' NDPE procurement policies resulted in material financial risk for growers who did not adhere to the policies. Environmental degradation and social conflict have produced a material pricing signal observed in financial markets.

To mitigate these material financial risks, companies have invested in legal chain-of-custody certification mechanism, the RSPO, to maintain their access to markets and to demonstrate compliance with buyers' NDPE policies. By early 2017, RSPO covered 17 percent of the global palm oil market. At 12.15 million metric tons, demand for RSPO products has provided an innovative market signal, enabling corporations to execute upon their NDPE and zero-deforestation policies in a transparent, time-bound manner.

Since 2014, corporations have rapidly made NDPE policies. As Paul Polman, chief executive officer of Unilever, said, "It takes only a handful of sizable companies to reach a tipping point and to transform markets" (Center for Global Development 2013).

For example, social pressure in 2016 pushed the Swedish corporation AAK to integrate a NDPE policy when it acquired California Oils on September 5, 2016, a major US buyer of palm oil. California Oils is now implementing AAK's NDPE policy. In 2015, California Oils imported 9.6 percent (110,000 metric tons) of US palm oil imports, primarily for the US instant noodle market. In fact, over 80 percent of KLK's palm oil shipments to the United States go to California Oils, accounting for 44 percent of California Oils' total imports. California Oils' second largest supplier is IOI Corporation.

Toyo Suisan, Nissin, Sanyo Foods, and Nongshim account for 84 percent of the US instant noodle market. Together, they own 22 percent of the global instant noodles market. Instant noodles are generally 50 percent by weight palm oil (Thoumi 2016m).

Analysis of bank financing of 16 Southeast Asia palm oil companies between 2006 and 2015 clearly demonstrates that banks are key palm oil financiers. Underwriting is dominated by US and Malaysian banks. In fact, most banks surveyed have weak to no ESG policy relevant to the material financial risks in the palm oil sector. But generally, from 2010 to 2015, the sustainability performance of the Southeast Asia palm oil companies that received more loans and issued more bonds had improved (Brascamp et al. 2017a).

11.6 CASE STUDY: PLANTATION SIZING, GROWTH, AND YIELD

Oil palm trees begin bearing fruit in their third year (Thoumi 2016). Yield increases over time, generally peaking after 20 years. As yields decrease, trees' economic life winds down. But meteorological data (Ofosu-Budu and Bruce 2013) demonstrates that seasonal water and sunlight deficits that drive growth and yield calculations are inconsistent at the same latitude across different longitudes. This means that West African and Southeast Asian palm oil production yields vary considerably. For example, according to the International Finance Corporation (Stenek and Connell 2011) and the Ghana Oil Palm Development Company Limited, commercial plantations in Ghana can achieve yields of 14 metric tons per hectare (NTHC Securities Limited 2003), while Indonesian yields may exceed 28 metric tons per hectare (Corley and Tinker 2008).

Studies suggest that to achieve optimal growth and yield, oil palm trees need:

- Consistent daily solar radiation for five to seven hours of at least 15 megajoules per square meter.
- Evenly distributed annual rainfall, without a marked dry season, of 2000 to 2500 millimeters (Stenek and Connell 2011).

11.6.1 Possible Seasonal Solar Radiation and Water Deficits

Recent meteorological observations may explain this seasonal deficit in solar radiation across latitudes. The reason, based on both satellite and ground-based observations, is that southern West Africa summers are “frequently affected by an extended cover of shallow, non-precipitating clouds only few hundred meters above the ground.” These clouds are “associated with nocturnal low-level wind speed maxima and frequently persist into the day, considerably reducing surface solar radiation” (Knippertz et al. 2011).

NASA satellite data measuring sunlight between June and November in five separate places within Sierra Leone, Ivory Coast, Cameroon, Benin, and Nigeria found that these five localities experienced roughly 55 percent of the average monthly sunlight compared to three other locations in Indonesia and Malaysia.

Data from the Ghana Oil Palm Development Company also suggests that monthly soil moisture deficits—a function of rainfall and other hydrological processes—are occurring.

11.6.2 *Possible Impacts on Regional Investments*

Seasonal CPO yield deficits impact financial performance in West Africa, due to the potential for an increase in seasonal and migrant labor costs and higher fixed costs for CPO refining resulting from the seasonal decrease in mill utilization and other financial impacts (Kuepper et al. 2016a).

This means that for West African investments to be profitable, the region's nations may need to maintain current corporate tax holidays, high fixed domestic palm oil prices, and high import tariffs and duties imposed on edible oil imports. Finally, economies of scale may not be realized for investments in mill and plantation infrastructure unless corporations adopt smallholder outsource models.

11.7 CASE STUDY: INDONESIA'S 2015 PALM OIL-LINKED FIRES TWICE AS BAD FOR INDONESIA'S ECONOMY THAN THE 2004 TSUNAMI

Indonesia is the world's fifth-largest emitter of greenhouse gases, due to the conversion of its forests and carbon-rich peatlands. These shifts in land use have ecological and social consequences, because Indonesia's forests are home to thousands of plant and animal species and because 50 to 60 million Indonesians depend directly on forests for their livelihoods.

In 2009, President Susilo Bambang Yudhoyono issued a decree mandating a 26 percent reduction in greenhouse gas emissions by 2020. In 2016, President Joko Widodo (also known as Jokowi) followed, banning new oil palm and mining concessions. Also in 2016, Indonesia revised its peatland regulations (Rijk et al. 2017; Thoumi 2016o) to include:

- A moratorium on any new land clearing in peatlands.
- The establishment of protection and utilization zones in peatland ecosystem areas for the planting of certain peat-friendly plants.
- A prohibition on the building of any new canals.
- Making it illegal to burn peatlands.
- A scientifically rigorous approach to water-level compliance to define peatland ecosystem damage.

Indonesia is the largest palm oil supplier globally, with exports of 23.3 million tons in 2015–2016. As of April 2017, the US Department of Agriculture (USDA) forecast that Indonesian 2016–2017 palm oil production

would reach 34 million metric tons. Indonesia's palm oil estate occupies 21 million hectares (Foreign Agricultural Service, USDA 2017).

Nevertheless, Indonesia's palm oil sector suffers from large-scale corporate ESG concerns. That was particularly evident during 2015's catastrophic palm oil-linked fires. Meanwhile confidential analysis suggests that many Indonesian companies do not follow Indonesia's 1999 Anti-Monopoly Law, Indonesia's 2014 Plantation Law, and recent Indonesian regulations covering peatlands and the Indonesian Sustainable Palm Oil registration system which might have mitigated these catastrophic fires and their associated \$16 billion negative economic impacts.

The total estimated economic costs of the fires exceeded \$16 billion (Glauber and Gunawan 2016)—more than double the damage and losses from the 2004 tsunami (which affected provinces in Indonesia and other countries). The \$16 billion loss—affecting agriculture, forestry, transport, trade, industry, tourism, and other sectors—was the equivalent of 1.8 percent of Indonesia's gross domestic product. Costs reflected direct damage and losses to crops, forests, houses, and infrastructure as well as the cost of responding to the fires.

Harvard and Columbia universities have estimated that 2015's Southeast Asia fires and haze may have resulted in 100,000 fatalities in Indonesia, Malaysia, and Singapore (Jong 2016). The study focused only on "fine particulate matter" (also known as PM_{2.5}). PM_{2.5} penetrates lungs and other organs, causing respiratory disease, birth defects, premature birth and death, asthma, and lung cancer. Palm oil plantations, cooperatives, and smallholders often clear forests using fire. It was these fires that created the haze—a toxic chemical soup that can include hundreds of airborne dangerous chemicals.

Other estimates suggest that during fire seasons in El Niño years, 11 percent of Southeast Asia's population has been repeatedly exposed to pollution levels significantly above World Health Organization safety limits (Goodman and Mulik 2015). Competing figures compiled by governments in Southeast Asia are significantly lower. The differences reflect the number of deaths linked to complex estimates of the increases of potential PM_{2.5}-related illnesses versus baseline.

In response, the Government of Indonesia began prosecuting companies associated with haze. On August 15, 2016, the Government of Indonesia fined Sampoerna Agro \$81 million for 2014 forest fires on 3000 hectares on its concessions in Riau Province, Indonesia. The \$81 million fine is slightly less than Sampoerna Agro's revenue in the first six months of 2016. As of 2017, it is unclear if this fine has been paid.

Over the same period, daily emissions during Indonesia's fires in October 2015 exceeded the emissions from the entire US economy. This is equal to more than 15.95 million tons of CO₂ emissions per day (Harris et al. 2015).

11.8 CASE STUDY: IOI CORPORATION'S SUSPENSION FROM RSPO

For IOI Corporation, a large publicly traded plantation company, not meeting its buyers' procurement policies, meant income deterioration, decrease in its shareholder equity, and the loss of 27 corporate buyers. IOI sells about 750,000 metric tons of certified sustainable palm oil (CSPO) annually (Levicharova and Thoumi 2016).

During the first quarter of 2016, IOI stock price reached RM5.00 (Malaysian Ringgit). In March, the RSPO suspended IOI because it had cleared forests in violation of RSPO's policy. IOI's shares subsequently fell 18 percent to a low of RM4.12. IOI next announced it would sue RSPO over the decision. Moody's Investors Service then stated it would review IOI's corporate debt for downgrade (Moody's Investors Service 2016).

IOI faced two RSPO complaints for deforesting land that other communities owned. In 1997, IOI acquired 70 percent of IOI Pelita, a Sarawak-based plantation company, despite a lawsuit filed by Kayan and Kenyah villagers that the estate occupied their land without free, prior and informed consent (FPIC). In March 2015, Aidenvironment revived and expanded a complaint filed four years earlier, alleging that IOI's majority-owned subsidiaries in West Kalimantan did not follow RSPO standards and procedures. The complaint contended that IOI's subsidiaries, PT Berkas Nabati Sawit (PT BNS) and PT Sukses Karya Sawit (PT SKS), illegally deforested 11,750 hectares—1300 hectares inside the Manismata protected forest reserve—without having secured legally required plantation business permits. Despite earlier IOI commitments to follow legal procedures, it was found that PT BNS still occupied some land within the reserve in 2015 (Beekmans et al. 2016).

Failure to resolve these complaints in a timely fashion, among other market factors, resulted in a \$800 million loss in equity valuation and suspension of palm oil purchases from IOI by Bunge, Cargill, Unilever, and other corporate buyers. Quarter 2 results in 2016 showed a \$14.8 million net loss, compared to the \$30 million profit during the same quarter in the previous year.

After considering these market signals, IOI changed its approach. IOI withdrew its lawsuit against RSPO. Instead, it announced it would focus on improving its sustainability profile to achieve its buyers' NDPE policies. IOI also committed to meet RSPO's criteria. IOI's equity price recovered slightly, reaching RM4.31. After RSPO lifted its suspension of IOI in August, its share price rose to RM4.45—but it did not return to its 2016 high.

With suspension of RSPO certification, global CSPO supply was temporarily reduced 6 percent, from 12.5 million metric tons to 11.75 million metric tons annually. Other CSPO buyers saw their prices increase, resulting in increased global margins between CSPO and CPO. Other sellers stepped into to sell to IOI's buyers. For example, as reported by Kuala Lumpur Kepong Berhad (KLK), due to IOI's temporary suspension, KLK sold its CSPO palm oil at higher premiums, and they rose about 50 percent, from between \$20 and \$25 to between \$35 to \$40 per metric ton. KLK produces about 750,000 metric tons of CSPO annually.

11.9 CASE STUDY: FELDA GLOBAL VENTURES

In April 2016, Chain Reaction Research (Levicharova et al. 2016a) profiled the sustainability risks to the new leadership of FGV, including the potential between \$6 and \$12 million in revenue-at-risk for 2016 if the company were to be suspended by RSPO or to lose buyers due to noncompliance with their NDPE policies.

Like IOI, FGV had deforestation in its supply chain. In 2013, FGV acquired PT Temila Agro Abadi (PT TAA), a company accused of draining a significant portion of HCV forests and peatlands. PT TAA's forest conversion resulted in the potential for revenue-at-risk that could be financially material to FGV. PT TAA had been caught clearing 800 hectares of peatland using satellite imagery—against RSPO policies. In May 2016, FGV withdrew its 58 mills in Malaysia from the RSPO. It is guessed that this was in response to allegations of peatland clearing. FGV committed to spending \$8 million to \$10 million over three years to recertify its mills to RSPO.

However, by withdrawing mills from RSPO certification, FGV increased its reputational risk while putting pressure on its margins, as the company chose to temporarily exit the CSPO market. The withdrawal gave FGV time to improve its operational risk management processes to achieve RSPO policies.

Analysts were negative on the withdrawal. FGV's RSPO sales are 7 percent of its revenue. BIMB Research (Analysts negative on FGV's decision 2016) found that FGV faced potential premium sales losses from its inability to supply certified palm oil. BIMB Securities reduced FGV's fiscal year 2016 and fiscal year 2017 earnings estimates by 3 percent and 2.8 percent, respectively. Public Investment Bank (Adnan 2016) said the company might lose its \$25 per ton RSPO premium. Kenanga Research thought the move could decrease 2016 FGV revenue by \$4.2 million (Analysts negative on FGV's decision 2016). They reduced FGV's FY2016 and FY2017 earnings estimates by 7 percent and 10 percent. TA Securities Holdings Berhad also said that FGV's lack of CSPO premium sales going forward would impact its bottom line.

One of the key suggestions in the April 2016 reports (Levicharova et al. 2016a) was that FGV's management and board of directors "adopt integrated sustainability and financial risk analysis from the board of directors to the plantation manager to improve overall risk management." This recommendation was reflected in the new NDPE policy approved by FGV's board of directors on August 25, 2016 (Thoumi 2016h) further updated again by FGV's board August 24, 2017.

FGV's board appears to be now responsible for its sustainability strategy. The company committed to providing information on sustainability initiatives to its stakeholders. The new policy included:

- Pledging no conversion of HCV areas, peat soil, and/or areas with HCS, plus implementation of best management practices on existing peatland estates.
- Reporting and managing its carbon footprint, and benchmarking its emissions of greenhouse gases (GHGs) to industry peers with the intent of reducing emissions.
- Incorporating methods, where possible, to reduce the direct and indirect environmental impact of its supply chain and encouraging its partners to embrace sustainable practices.
- Applying *Guidelines for the Implementation of the ASEAN Policy on Zero Burning* (2003) and other fire protection measures ensuring no open burning and immediate response to fires.
- Providing a continuous management framework to upgrade and improve its health, safety, and environment management framework while supporting settlers as much as possible.

- Respecting the right of indigenous peoples and surrounding communities by ensuring that any development or acquisition on or near their land is not in violation of their rights based on traditional and customary practices.
- Working with the relevant buyers and suppliers and stakeholders to ensure that raw materials, specifically palm oil products, are derived from suppliers who support NDPE commitments.
- Utilizing legal channels as a means for peaceful, legitimate resolution of issues, resolutions agreeable to both parties (Thoumi 2016h).

Some matters involving FGV remain uncertain. According to Aidenvironment, peatland clearance continues in West Kalimantan (and has been reported to the RSPO Remediation and Compensation Panel). Recent satellite and drone image, published in April 2017, allegedly show FGV's subsidiary PT Temila Agro Abadi deforesting Indonesian peatlands which may be a violation of Indonesian law (Thoumi 2017d).

FGV replied stating (Felda Global Ventures Holdings Berhad 2017):

The Board of FGV wishes to clarify that FGV has procured all necessary approvals from the relevant authorities in Indonesia in respect of the development of PT TAA's land which commenced in late 2014. Further, FGV has complied with Roundtable on Sustainable Palm Oil ("RSPO") New Planting Procedure ("NPP") 2010. FGV is in the process of appointing third party assessor to conduct a verification exercise on the said articles.

Also, FGV defines "peat" as "greater than 50 centimeters of depth" instead of "regardless of depth." Additionally, FGV's new policy fails to provide for clear disclosure about the possible need to restore peatlands and biodiversity. Many competitors' NDPE policies require third-party suppliers to comply, but this is not clearly the case for FGV, per its new policy. Finally, FGV could add nonjudicial grievance mechanisms (Thoumi 2016h).

Before FGV's \$3.1 billion initial public offering (IPO) in June 2012, FGV set a goal to become the world's largest palm oil company, with a goal of a land bank of more than 1 million hectares. Its IPO prospectus required FGV to provide a certification plan in accordance with RSPO criteria (Felda Global Ventures Holdings Berhad 2012). Despite several acquisitions, FGV did not reach either goal. From the date of the announcement of intentions to better manage RSPO policies until the end of 2016, FGV's share price increased 15 percent.

11.10 CASE STUDY: SIME DARBY AND THE THIRD-LARGEST SOUTHEAST ASIAN DEAL IN 2016

Sime Darby is one of the largest palm oil companies in the world and the world's largest palm oil producer, measured by hectares of acres cultivated. Annual CPO production is 2.4 million tons, four percent of global volume. Sime Darby also has real estate, automotive, and industrial equipment divisions.

In October 2016, the company raised \$571 million in a private placement of 316.4 million shares. The private placement was oversold, with demand greater than the number of shares available. Demand was for close to \$1.5 billion in equity, or about 2.5 times greater than the capital raised. The transaction was at the time the third-largest equity capital market deal in Southeast Asia in 2016.

Sime Darby stated it would use the proceeds for debt repayment, capital expenditures, and working capital. Sime Darby stated its focus was to reduce its debt-to-equity ratio to 38 percent from 46 percent (Thoumi 2016i).

But analysts may not have accurately discounted Sime Darby's global operations. Sime Darby's Liberia concession is 22 percent of its global land bank. In 2011, Sime Darby announced intentions to develop 120,000 hectares of this concession by 2020. As of 2016, 1567 hectares had reached maturity. Only three of the estimated 55 FPIC community negotiations were underway. This land had yielded only 570 metric tons CPO. Sime Darby had also spent \$18 million financing a mill to process its CPO. To meet mill capacity, Sime Darby said they would need at least 20,000 hectares of oil palm trees (Kuepper et al. 2016b).

It was clear that analysts may not have included the discounts associated with Sime Darby's underperforming Liberian assets into their \$571 million equity private placement.

Then, in February 2017, Sime Darby announced that it would split into three companies: Plantations, Property, and Sime Darby. Shares of its property and plantation divisions were to be sold separately on the Bursa Malaysia through a direct distribution to current shareholders in 2018 (Thoumi 2017c).

This plan raised questions. Would the new Sime Darby Plantations continue financial risk management of its material risks from deforestation and human rights factors in its products it sells downstream? Will the new firm address its need to develop an outgrower model in Liberia to limit its financial risks? Will the new Sime Darby maintain its board's approved responsible agriculture charter? The charter—and its approaches to

deforestation and human rights risk mitigation—is supposed to apply to all of Sime Darby’s palm oil operations immediately, with future deadlines for palm oil supply chains and other agricultural products. Yet it is unknown whether the new Sime Darby Plantations company will maintain Sime Darby’s responsible agriculture charter and other similar sustainability commitments (Thoumi 2016f).

11.11 CASE STUDY: CORPORATE REVENUE-AT-RISK

It is clear from the evidence above and other analysis that failure by growers to meet buyers’ NDPE and other procurement policies can result in lost revenue. Noncompliance creates revenue-at-risk for firms. According to a Chain Reaction Research report (Levicharova et al. 2016b), the growers Austindo Nusantara Jaya, Sawit Sumbermas Sarana, and Provident Agro all have chosen not to achieve their buyers’ NDPE policies. As a result, each company faces buyer turnover loss and a less diverse buyer base.

Applying a Monte Carlo simulation technique to determine the companies’ 2016 quarterly revenue-at-risk demonstrated that all companies who did not achieve their buyers’ NDPE policies faced material financial risk.

Austindo Nusantara Jaya faced a 35 percent forecasted 2016 quarterly revenue-at-risk based on 2015 fourth-quarter actual revenue losses of 10 percent when it did not achieve the buyers’ NDPE policies. Provident Agro was forecast to face a 37 percent 2016 quarterly revenue-at-risk based on 2015 fourth-quarter actual revenue losses of 15 percent when it did not achieve its buyers’ NDPE policies. Sawit Sumbermas Sarana was forecasted to face a 42 percent 2016 quarterly revenue-at-risk based on 2015 fourth-quarter actual revenue losses of an estimated 5 percent when it did not achieve buyers’ NDPE policies. In fact, in Q2 2017, Unilever suspended purchasing crude palm oil from Sawit Sumbermas Sarana because they violated Unilever’s NDPE policy. In Q1 2017, 8 percent of Sawit Sumbermas Sarana's total revenue was from sales to Unilever.

11.12 CASE STUDY: TARIFFS, TAXES, AND INCENTIVES

Countries also use taxes, tariffs, and incentives to impact palm oil production, to adjust palm oil–vegetable oil spreads, and to support local production.

In 2015, India raised its import duties on crude palm and soybean oils from 7.5 percent to 12.5 percent to support local production of edible oils

as a substitute to palm oil imports. The import tariff on refined duties was also increased from 15 to 20 percent.

In 2016, France proposed a “Nutella Tax” on palm oil imports to support biodiversity conservation. France imports about 150,000 metric tons of Indonesian CPO annually. The proposed tax schedule started at €300 per ton increasing to €900 per ton in 2020. The current CPO tax was €104 per ton against €190 per ton for olive oil (Thoumi 2016a).

At the same time, Russia proposed a 30 percent excise tax on CPO imports to raise US\$150 million in tax revenue.

11.13 CASE STUDY: CONTESTED LAND RIGHTS IMPACT INVESTMENT DECISIONS

In October 2016, KLK withdrew all interest in two customary lands in Collingwood Bay, Papua New Guinea, highly biodiverse areas mostly covered with HCS forest. Before KLK’s entry, the Collingwood Bay indigenous peoples’ communities had secured a court order that prohibited all natural resource-related national government agencies from entering the bay without landowners’ prior consent.

Four years earlier, in December 2012, KLK had purchased a 51 percent equity stake in Collingwood Plantations Pte. for \$8.7 million. At the time, according to AmInvestment Bank, the assumed production costs from clearing to palm oil production for the new plantation were \$6000 per hectare. KLK stated that it would develop 30,000 hectares of oil palm estates in Collingwood Bay (Ling 2012).

Two years later, in 2014, Collingwood Bay’s indigenous peoples’ communities contested KLK’s plantation plans in the Papua New Guinea courts. The courts declared KLK’s two main leases null and void in May 2014 (Thoumi 2016n).

At the end of 2016, KLK had not clarified its overall plans for the Collingwood Plantations Pte., its total land bank of 44,342 hectares in the region, or its 37,000-hectare plantation deal in Sepik Province, Papua New Guinea. The Sepik Province plantation deal is on land that has been found unsuitable for tree crops. Some of these concessions may become stranded land due to poor environmental, social, and governance due diligence by KLK, leading to financial write-offs by KLK management (Thoumi 2016n).

At the same time, in October 2016, KLK launched a US\$441 million hostile takeover of MP Evans. In response, MP Evans’ shares rose 45 percent to a 2016 high of 624.50 UK pence. The Malaysian ringgit had appreciated

16 percent against the pound since the June 23, 2016, UK Brexit vote. This appreciation may have made the deal more attractive to KLK. MP Evans had a 26,600-hectare majority-owned palm oil plantations land bank. Its plantations' average age was 7.9 years, and oil extraction rates for some of MP Evans' estates were above average, at 23.6 percent in North Sumatra and 26 percent in Kalimantan. MP Evans is a RSPO member, so some analysts suggested that KLK was attempting to buy a CSPO provider, without changing all its practices to conform to industry best practices (Thoumi 2016k).

MP Evans shareholders rejected KLK's hostile bid, as independent analysts suggested that MP Evans was worth more than the KLK bid (Khong & Jaafar Sdn. Bhd. 2016). Finally, in December 2016, MP Evans announced a sale of its interest in its 7200-hectare joint venture for \$100 million to the Sipef Group (Lin 2016).

Finally, concurrently in September 2016, KLK announced that through its subsidiary KLK Agro Plantations (KLK Agro), it had approved a \$30 million loan to Liberian Palm Developments. KLK Agro Plantations and Equatorial Palm Oil each own 50 percent of Liberian Palm Developments Limited. KLK Agro is a subsidiary of Kuala Lumpur Kepong Berhad. Separately, at this time, KLK also owned 68.86 percent in Equatorial Palm Oil PLC.

The loan proceeds were ring-fenced to be used for construction of a 60-metric-ton palm oil mill to be built on the Palm Bay Estate, Liberia. Palm oil from this new mill will be exported through the port of Buchanan, Liberia, via the Equatorial Palm Oil subsidiary LIBINC Oil Palm.

The \$30 million unsecured loan is due on January 25, 2020, at that rate of three-month LIBOR plus 5 percent (RNS, London Stock Exchange 2016). This is the second KLK loan. The previous \$20.5 million loan had been fully drawn down. But Equatorial Palm Oil PLC is not profitable. In FY2015, its comprehensive income was negative \$1.5 million. Nonetheless, Equatorial Palm Oil has committed to using HCS methodologies on its land bank in Liberia. Previously, Equatorial Palm Oil and local Liberian stakeholders had reached an agreement concerning social conflict on its estate (Thoumi 2016c).

11.14 CASE STUDY: GOVERNMENT PROCUREMENT POLICIES

In 2016, the Government of Norway announced a ban on public procurement of products, services, and goods that directly cause tropical deforestation. The policy affects an estimated \$60 billion in annual procurement by

Norway's government. The Norwegian Parliament's Standing Committee on Energy and Environment recommended the ban.

Norway's announcement supported the New York Declaration on Forests, which was launched during the 2014 Climate Week in New York City. The declaration was the first global commitment for ending deforestation, with a timeline. It was supported by developing and developed nations, businesses, and nongovernmental organizations (Thoumi 2016c).

Similarly, the government of the United Kingdom recently completed a four-year initiative to achieve 100 percent sourcing of CSPO. CSPO volumes purchased in the United Kingdom have almost tripled, representing a nearly 60 percent increase since 2012. The UK biofuel target achieved 100 percent CSPO sourcing by 2015.

As a signatory to the landmark Amsterdam Declaration, the UK government will continue to collaborate on this industry- and NGO-led initiative to incentivize purchases of CSPOs to decrease carbon emissions. The declaration aims to achieve sustainable and deforestation-free agricultural commodity supply chains in Europe by 2020, including in government procurement. Denmark, France, Germany, the Netherlands, and Norway are also signatories.

11.15 CASE STUDY: DIVESTMENT OCCURS

In 2016, the Government Pension Fund of Norway, with assets under management of close to \$850 billion, divested from Indofood Agri Resources' parent company, First Pacific.

Next, in September 2016, BlackRock, the world's largest asset manager with more than \$5 trillion assets under management, published *Adapting Portfolios to Climate Change* (BlackRock Investment Institute 2016). In its report, BlackRock noted that companies in specific sectors that failed to address deforestation risks in supply chains face possible financial risks from climate change. BlackRock asserted that climate factors are underappreciated and underpriced because they are "less visible" to investors. Dimensional continued to hold shares in these and other palm oil companies in its other funds.

Then, in December 2016, Bloomberg reported that Dimensional Fund Advisors, a US asset manager with \$445 billion of assets under management, had divested two of its portfolios of palm oil plantation companies (Chasan 2016). Dimensional's was the first US top 10 fund manager to exclude palm oil explicitly. Enterprises divested included Wilmar International, Olam

International, Sipef SA, and Indofood Agri Resources. In other portfolios, Dimensional continued to hold shares in these and other palm oil companies.

After divesting from these positions Dimensional still had 27 other funds with \$700 million invested in 44 other palm oil plantation companies, according to publicly available data at Deforestation Free Funds (Friends of the Earth [n.d.](#)).

Finally, in early 2017, according to Chain Reaction Research (Brascamp et al. [2017b](#)), about 42 percent of Indofood Agri Resources' 549,287 hectare land bank was contested. Indofood Agri Resources controls 63 concessions, six of them allegedly involved in community conflicts and labor controversies. Another four of its plantations are on peat and forest areas, areas where Indonesian regulations may proscribe development. About 5900 hectares of peatland burned in 2015. An additional 16 of its concessions do not publish concession maps. October 2016, an RSPO complaint was recently filed, alleging numerous labor abuses by Indofood Agri Resources. Alone, its contested land bank could have a 2.5 to 20 percent negative impact on its share price. Such declines could be multiplied if financiers with ESG policies act (Brascamp et al. [2017b](#)).

As a result, by February 2017, Indofood Agri Resources issued its first NDPE policy. But as Chain Reaction Research reported (Brascamp et al. [2017b](#)), Indofood Agri Resources' new policy "does not include a statement requiring its executive directors to maintain NDPE in their outside activities—and it does not cover the side businesses of Mr. Anthoni Salim, the controlling shareholder of Indofood Agri Resources. His oil palm operations are linked to the destruction of peat forests in Sintang, West Kalimantan, and orangutan habitat in East Kutai, East Kalimantan" (Thoumi [2017b](#)).

11.16 CASE STUDY: RISK MITIGATION USING FUTURES

The most important commodities exchange for palm oil is the Bursa Malaysia. The Bursa trades:

- Crude palm oil futures (FCPO).
- USD RBD palm olein futures (FPOL).
- Crude palm kernel oil futures (FPKO).
- USD crude palm oil futures (FUPO).
- Options on crude palm oil futures (OCPO).

These uniform contracts allow for risk mitigation. Producers can lock in future prices today, and consumer goods companies can secure their palm oil supply chain. Traders can make investment decisions comparing spreads, such as a soybean oil versus palm oil spread or a palm oil versus gas oil spreads.

A futures contract is a standardized agreement between two parties to buy or sell the underlying instrument at a specific time in the future at a specific price determined today. Futures can be settled with physical delivery or by cash settlement. A trader can also settle a futures contract by unwinding the trade by taking the opposite side of the initial trade. She can sell the same number and type of futures contract she bought and vice versa.

Futures allow for price discovery, risk mitigation and shifting, hedging, market efficiency, and transparent information. All five contracts that trade on the Bursa Malaysia—FCPO, FPOL, FPKO, FUPO, and OCPO—describe in detail the required chemical characteristics of the underlying palm oil physical asset.

But currently, no RSPO-linked contracts trade on any exchange globally. This prevents institutions from using exchange-traded contracts to mitigate their material finance-related sustainability risks that are relevant in their palm oil supply chains.

11.17 CASE STUDY: BIODIESEL SPREADS IN INDONESIA AND MALAYSIA

Traders track Indonesia's and Malaysia's domestic palm oil—gas oil spread (POGO)—that is, the difference in the price of futures contracts for palm oil and those for gas oil. For example, when supplies of palm oil are expected to increase, the prices of palm oil futures contracts may decrease given equal demand. Then, if at the same time, gas oil supplies were predicted to shrink, gas oil prices would rise, and the POGO spread would widen between palm oil and gas oil.

On April 15, 2016, the POGO spread was \$380.68 per metric ton, reflecting a number of factors: the 6 percent growth in global palm oil production over the next two years forecast in May 2016 by the US Department of Agriculture (USDA), with a projected increase to 65.39 million metric tons from 61.55 million metric tons; a rebound in production in both Indonesia and Malaysia was expected as El Niño dryness diminished; and an anticipated increase in domestic demand in both countries on the basis of increasingly robust biodiesel mandates in those countries (Thoumi 2016a).

Another factor was a forecast 3.5 million metric tons of growth of domestic consumption in Indonesia between October 2016 and September 2017, from 9.62 million metric tons. Indonesia's biodiesel program is designed to drive domestic consumption, and as of 2016, the mandate for use by vehicles a blend of 20 percent palm oil biodiesel into petroleum (B20). In 2016 in Indonesia, POGO spreads were as high as \$380.68. At the same time, Malaysia had instituted a mandate for 10 percent biodiesel (B10), up by 3 percent from the previous mandate, partly to promote domestic CPO demand (Thoumi 2016d). Both Malaysia and Indonesia required a blend of palm methyl ester (PME) and petroleum diesel or gasoline.

Neither Indonesia's mandate nor Malaysia's had environmental safeguards to protect against deforestation, its associated climate change impacts, human rights abuses, and catastrophic fires.

The option of exporting to the United States was attractive. The \$1 per gallon biodiesel and renewable diesel "blender's credit" had been extended, beginning in December 2015, for two years and was being applied retroactively from January 1, 2015, to until December 31, 2016.

However, there were roadblocks to export to US markets:

- Indonesian and Malaysian firms needed to first register their production facilities with the US Environmental Protection Agency (EPA). At this time, the EPA accepted only plants that were under construction or operational before December 19, 2007. Thus, few producers qualified for the credit.
- Asian producers had to trans-esterify and distill their PME before it could be exported to the United States. The United States required that PME be ASTM D6751 compliant—in other words, there exist barriers to entry for imported palm oil.
- Chemical properties of PME may limit PME imports to product that will be used in warm weather—above 15 °C (59 °F). Specifically, compared to gas oil, PME has a higher "cloud point," the temperature below which the wax in PME turns cloudy and clogs carburetors.

In 2016, as the POGO spread widened as palm oil prices increased versus gas oil, the Government of Indonesia increased the incentives in order to finance its biodiesel mandate, using proceeds from the roughly \$50 per metric ton that the Indonesian government receives on exported CPO and its derivatives (Niazi 2016a, b). When Indonesian exports were forecast to

increase supplies (due to diminishing El Niño dryness), cheaper gas oil was expected to widen the POGO spread, pushing the Government of Indonesia to consider increasing its subsidy for domestic palm oil biodiesel consumption.

Then, the November 2016 election of Donald Trump as US president signaled possible changes to US biodiesel import policies. Ten years earlier, the 2007 Energy Independence and Security Act had mandated the implementation of the Renewable Standard Fuel program, which required blending of biofuels with transportation fuels in order to decrease greenhouse gas emissions. Accordingly, under this law, the US EPA determined the quantity of renewable fuel to be blended—that is, the so-called renewable volume obligation (RVO). From 2010 to 2016, under the Obama administration, the RVO had increased 40 percent, to 18.1 billion gallons (Upadhyay 2016) from 12.9 billion gallons, with a 2022 RVO target of 36 billion gallons.

In January 2017, after the 2016 election—with US policy uncertain—the Government of Indonesia adjusted its biodiesel policies to promote domestic demand and decrease support for exports. Meanwhile, the POGO spread narrowed considerably to around \$160.

11.18 SUMMARY

Deforestation and human rights risks are now mainstream. Firms that manage these risks have first-mover advantage over competitors that do not. These firms are often rewarded with favored procurement contracts, better financial terms from lenders, and greater market demand for their products.

Business opportunities are increasingly driven by direct environmental and human rights factors magnified by climate change. This means that executives need to align their firm's risk appetite framework from the executive and board of directors' level to the plantation manager. This way the risk culture of the firm that informs day-to-day risk management is coordinated among all levels.

Regardless of the nature of the origins of climate change, the impacts from greater variability in climatic systems are being observed in audited financial results from the companies in the palm oil sector. Catastrophic fires are at times burning oil palm plantations assets. Growth and yield equations are not performing as expected given both changing and unexpected weather

patterns (Thoumi 2016). Commodity buyers' NDPE procurement policies place a scarcity value on those growers that can achieve these commitments.

Firms are now working with regional governments to develop, produce, and protect compacts. These compacts develop jurisdictional approaches to deforestation risk management. These compacts may result in agriculture products from a region, as a whole being, possibly achieving NDPE.

The Consumer Goods Forum and Tropical Forest Alliance 2020 (TFA 2020) have initiatives that focus on reducing deforestation from the production of palm oil, soy, beef, and pulp and paper. As reported by TFA 2020, 415 companies globally have made at least one relevant commitment to eliminate deforestation from the production of these four commodities. In the palm oil supply chain, 59 percent of the companies have committed to commodity-specific policies, followed by pulp and paper with 53 percent of companies, soy with 21 percent, and beef with 12 percent (Thoumi 2017a).

These commitments have billion dollar impacts. Across the tropics, beef, soy, palm oil, and pulp and paper production is worth \$180 billion annually. \$81 billion of these commodities are exported annually (Thoumi 2017a).

For example, Unilever recently signed a three-year memorandum of understanding with regional governments in Indonesia to drive sustainable sourcing of palm oil. The pilot program will affect 600 smallholders on 1400 hectares. Smallholders contribute to 40 percent of Indonesia's overall production, yet average productivity is 32 percent lower than that of palm oil plantation companies (Thoumi 2017a).

Further on the horizon, precision agriculture is merging IT technology and tools and blockchain—that is, robotic tractors that automatically feed data real time to the cloud enabling transparency and traceability—to facilitate farm-to-fork-to-table transparency. Chain of custody can now be demonstrated using these technological tools to show whether, for example, the palm oil in instant noodles is linked to deforestation at the farm level.

With growth in understanding of deforestation risks, equity-listing standards on global financial exchanges may develop guidelines to mitigate deforestation as a requirement for listing. Lending banks are beginning to consider how to embed in syndicated loan document schedules that require that borrowers achieve NDPE to receive loan disbursements.

Executives, directors, and financial risk managers must actively observe deforestation risk as a quantitative and a qualitative risk that can be modeled, measured, and managed. Boards of directors and executives can

insert deforestation risk language into their risk and governance committees' reporting requirements at the board level. This will help protect shareholder equity from the material risks outlined in this chapter. Mitigating risk permits firms to innovate their business strategy toward long-term value creation and return enhancement.

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PART III

The Role of Regulation, Standards, and Policy

Toward a Theory of Sustainable Finance

Joakim Sandberg

12.1 INTRODUCTION

Recent years have displayed a growing discontentment in society with the functioning of financial agents and markets and an emerging consensus that the financial system is in need of reform. The crisis of 2008 and onward demonstrated with great clarity how misaligned incentives and poor regulations impose extreme and detrimental risks on both the financial system itself and society at large. But a more general problem is the seeming inability of financial markets to address the great sustainability challenges of our times, such as global poverty and the threat of climate change. These systemic flaws do not only pose a practical challenge for the world's leaders, but they also pose a theoretical challenge for contemporary researchers, namely, to rethink the role of financial markets in society. If this role no longer can be defined solely in terms of profits and economic efficiency, then how should it be defined?

In his acclaimed book on the financial crisis, Joseph Stiglitz (2010) stresses the need for a new vision for the financial system. Rather than just

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“muddling through”—that is, putting out the most immediate fires but not addressing the root of the problem—we should seize the opportunity to rethink the system from the ground up. This chapter is an attempt to do just that, to “think outside the box” of contemporary financial dogma. The chapter presents a theoretical model of a different and more sustainable role for financial agents and markets that is justified by systematic philosophical arguments and reasoning. Our main locus of interest is the aims and activities of financial agents themselves and how they may become a more positive part of society. However, the chapter also concerns the adequate place and content of financial regulations and public policy in this regard. The aim of the model is to stake out a middle ground between the dominant view of finance, focusing only on profits, and contemporary calls for either more regulation by the authorities or greater social responsibility by agents themselves. In doing so, the aim is to present a vision that is both desirable and achievable.

First a note on methodology: The chapter is normative rather than descriptive. That is, it is not concerned with how the financial system currently functions but rather with how it ought to function in the future. For this reason, we draw on concepts, theories and arguments from literature in both theoretical economics and normative philosophy. Some readers may feel that the models and suggestions under discussion are rather detached and abstract. But it should be stressed that this is not a good reason for dismissing them. Instead, the suggestions should be evaluated from how robustly and effectively they provide a sustainable alternative to the current regime. The goal is to identify a new direction for finance which the majority of commentators will recognize as both desirable and achievable. It should thus come as no surprise if, despite the abstractness of the models and reasoning, the end result is a fairly straightforward idea about how the financial system can be improved.

The chapter proceeds as follows: It first outlines the dominant view of finance and notes some of its strengths and weaknesses. Thereafter it introduces and evaluates contemporary calls for either more regulation by the authorities or greater social responsibility by agents themselves. In light of major problems with both of these suggestions, a new theory is presented which is tentatively called the two-level model of sustainable finance. Finally, the chapter closes with a discussion of what the theory implies in terms of both adequate behavior by financial agents themselves and effective regulation by the authorities. The main results are summarized at the end of the chapter.

12.2 THE DOMINANT VIEW

Contemporary textbooks on finance typically give a simple yet consistent view of the purpose or role of financial agents and markets, which we may call the dominant or neoclassical view (cf. Brigham and Ehrhardt 2014; Kidwell et al. 2012). According to this view, financial agents should always adopt the practices which further their economic bottom line as effectively as possible—that is, they should strive to maximize shareholder wealth. For example, the best investment strategy is the one that leads to the highest risk-adjusted returns on the portfolio, and a pertinent lending strategy is one which maximizes the gains due to interest payments on the loans (minus losses due to borrowers’ default). In a similar way, the appropriate level of complexity in financial products is whatever maximizes the agent’s income while controlling for costs, and the appropriate level of capital reserves is whatever minimizes the agent’s costs over the long run.

The dominant view is rooted in neoclassical economic theory; a school of economics developed in the late nineteenth and early twentieth centuries that sees markets as the result of rational behavior by self-interested utility maximizers. As such, some interpret the view as purely descriptive or predictive—that is, as a model designed merely to approximate reality (cf. Helgesson 2002). However, it is clear that the neoclassical school has normative undertones and was used, for example, to underpin the large-scale deregulations of financial markets under Margaret Thatcher and Ronald Reagan in the 1980s. Some of the most visible defenders of the normative aspects of neoclassical economics have been Milton Friedman (1962, 1970) and Michael Jensen (2000).

We cannot here review all of the arguments proposed in favor of the dominant view. Let us simply highlight what we may take as the best of these arguments, namely, an idea of a “division of moral labor”. The idea is that a society works best—or, to put it differently, we as a society best fulfill our common aspirations—if it consists of several parts with differentiated tasks. More specifically, it is argued that the task of the financial market, or private enterprise in general, should be to create wealth (to put it roughly), while it may be the task of the state or civil society to redistribute this wealth. The result is thought to be suboptimal if these tasks are intermingled, for example, if financial agents take on more substantive social responsibilities (Friedman 1970; Jensen 2000). One may visualize the argument in the form of a body (society) with at least two arms (the financial market and the

state), and the point is that the body as a whole will do best if the two arms do different things.

The argument is obviously inspired by classical work on the division of industrial labor. Early economists like Adam Smith (1776) observed that allowing factory workers to specialize in very specific tasks led to increased economic efficiency, since they became more productive in their special tasks yet required less training and therefore less pay. In a similar manner, proponents of the neoclassical view of finance suggest that societal specialization leads to increased economic efficiency. This is because the two arms of society can focus on what they do best: Financial agents can focus on making money which is their expertise, while civil servants can focus on social responsibility which is their expertise (Friedman 1970). According to Jensen (2000), the very idea of one agent having two different goals (such as making money and accepting a social responsibility) is just irrational and precludes an efficient outcome.

12.3 FLAWS OF THE DOMINANT VIEW

There is now a growing discontentment with the dominant view of finance (e.g., Krugman 2013; Malloch and Mamorsky 2013; Santoro and Strauss 2013; Stiglitz 2010). Much of this is due to the financial crisis of 2008 and onward, which has been described as the worst since the Great Depression in the 1930s. The crisis resulted in the threat of total collapse of some of the world's largest—and presumably most economically rational—banks, as well as a global economic recession which we have yet to see the end of. While some of its causes can be traced to relatively “natural” macroeconomic events, such as a housing bubble in the USA, the apparent carelessness of financial agents and markets also played a major role. Most importantly, the crisis was due to excessive lending to subprime borrowers, massive trade in obscure financial innovations such as CDOs and a general lack of adequate capital reserves to cover the very high levels of systemic risk (Barth 2009; Kolb 2010; Stiglitz 2010). All of these practices may have been rational on the individual level—that is, they may have been justified from the standpoint of the dominant view that focuses on profit-maximization by individual agents—but they had catastrophic effects on the collective level.

We may better understand this flaw of the dominant view if we return to the visualization outlined above. Proponents argued that an arm of finance that is left to function of its own accord will create a better society for all, in

harmony with an arm of the state that does its job but refrains from interfering with finance. In reality, however, it seems that unregulated financial markets and behaviors have imposed enormous costs and risks on society. This is so because there often is a disconnect, or even a direct conflict, between what maximizes the profits of financial agents and what is best for society (more on this below). The aims of the arm thus become detrimental to the interests of the body. For example, sellers of subprime loans must have been aware of the great risks that they imposed on low-income borrowers, but it was “worth it” for them in terms of profits and individual bonuses. Similarly, the big banks that employed them knew of the massive risks involved, but they simply counted on the government to bail them out if something happened (Kolb 2010; Ritholtz 2009; Shiller 2008). The classical vision of a division of moral labor thus does not seem to work very well with the reality of unregulated markets.

While the financial crisis is a vivid example and a good point of discussion, there are also more general flaws of the dominant view on finance. It is increasingly argued that the dominant view is unable to address the great sustainability challenges of our times, such as global poverty and the threat of climate change. Financial agents that aim to maximize profits just have too little to gain from caring about such things, or so they tend to think (cf. Juravle and Lewis 2008; Hawley et al. 2014). Now, many commentators challenge this belief and argue that there is money to be made also on, for example, green investments and microfinance ventures targeting poor communities (cf. Calvello 2010; Kiernan 2009; Krosinsky 2012). There may be some truth to this and certainly more truth than contemporary agents have realized. However, there is no mistaking the background conflict between financial and nonfinancial values. This conflict is perhaps best brought out by comparisons of the social effectiveness versus financial cost of various sustainability initiatives in the industry: There are strong indications that the more effective initiatives also are more costly and that so-called win-win solutions that supposedly should be good in both financial and social regards have insignificant social effects (cf. Sandberg 2008; Richardson and Cragg 2010).

The conflict between financial and nonfinancial values is not only a practical conflict for financial agents, we may note, but it is also a more fundamental conflict inherent in the dominant view. As noted, the view only measures societal welfare in terms of economic efficiency and market production. However, arguably, the society we want is not only economically efficient but also socially and environmentally sustainable, among other

things. There are then important societal values that the dominant view fails to take into account.

12.4 IS MORE REGULATION THE SOLUTION?

In response to the problems outlined above, many commentators argue that we need more and/or better regulation of financial markets (e.g., Admati and Hellwig 2013; Barth 2009; Kaufman 2009; Shiller 2008). Exactly what kind of regulation is not agreed upon. There are many ideas in the literature, and indeed many countries have imposed new regulations in the aftermath of the crisis. Some of the most popular policies related to the crisis are (1) regulations to better contain financial risks, such as mandatory “stress tests” and increased capital reserve requirements; (2) regulations of management incentives, such as limits on stock options and bonus programs and (3) increased taxation of financial agents, such as financial stability contributions (a “bank tax”) or a financial transaction tax. The point of many of these regulations is to move some of the risks or costs that financial activities have imposed on society back onto the financial agents.

A number of regulations have also been proposed in the area that concerns sustainability and social responsibility (cf. Dupré and Chenet 2012; Hawley et al. 2014; Liebreich 2013; Richardson 2008). Examples include (4) reformed formulations of the fiduciary duties of financial institutions toward their beneficiaries and society; (5) requirements that financial agents disclose and report on their work with “ESG” (environmental, social and governance) issues and (6) requirements that specific policies or governance structures are put in place to facilitate the consideration of ESG concerns. The point of many of these regulations is to make financial markets pay closer attention to sustainability issues, beyond what their bottom line requires or allows.

While it is impossible to review all of these suggestions in the present context, we will simply make some general observations. The proposed regulations of course have progressive ambitions and make a lot of sense in that way. However, as Stiglitz (2010) notes, very few proponents have developed their suggestions into a comprehensive alternative view of the role of financial markets in society. Indeed, it seems as if the majority of the suggestions—with the exception of the reformation of fiduciary duty and perhaps some other ideas—work within the worldview of the dominant theory of finance. Let us once again use the visualization above. One can see the point of the regulations as an attempt to give the arm of the state more

power over the arm of finance. Financial agents retain the same ambitions and purpose—roughly to make as much money as possible—but the state now gains power to ensure that such financial incentives lead to socially beneficial outcomes. The arm of the state basically holds the arm of finance on a leash.

While this definitely can improve the situation, it seems that the underlying problem remains, namely, that the arm of finance has no greater care for the societal body. It is not difficult to forecast that financial agents will do their best to try to evade the regulations, either through withholding crucial information, finding loopholes in the regulations or indeed by actively lobbying against them. Since the financial industry controls such vast resources in society, it seems that their power to withstand or even push back an empowered state should not be underestimated. Indeed, there are reasons to think that such lobbying by financial agents played a major role in the previous round of deregulations that lead up to the crisis (Igan et al. 2009). For this reason, it seems that few regulatory solutions are likely to be effective and sustainable over the longer term.

One may also note that at least some of the benefits of the division of moral labor are lost with heavy regulation of financial markets. While financial agents are left to focus on their own activities, regulators will have to focus on the very same activities and are likely to have a hard time trying to keep up with the industry. That is, the arm of the state will be quite busy with following the moves of the arm of finance. It is not difficult to see that this will lead to extensive bureaucracy and wasted resources (cf. Goodhart et al. 1998).

But as noted, there are some more optimistic exceptions. At least some of the suggested regulations challenge the core idea that finance is just about profits. We will return to this below.

12.5 IS SOCIAL RESPONSIBILITY THE SOLUTION?

An alternative to heavy regulation by an external force (the state) is that financial agents themselves accept a greater degree of social responsibility. This may be done in a number of ways, and there are various suggestions and real-life examples in the area (cf. Jeucken 2001; Malloch and Mamorsky 2013; Painter 2010; Santoro and Strauss 2013). Some of these concern a rather basic form of responsibility that involves, for example, the absence of fraud, while others concern a broader responsibility that accommodates ESG concerns. We will focus on the latter here. For example, many argue

that financial agents should base their investment decisions not only on financial concerns but also on social and environmental goals, such as the ambition to support progressive companies while shunning bad ones. This is known as socially responsible investment (Cowton and Sandberg 2012; Sandberg 2008). In a similar manner, social and environmental goals or constraints may be included in, for example, lending decisions, risk management, customer relations and so on.

It is difficult to evaluate these suggestions without a clearer understanding of how far-reaching or demanding the relevant social responsibilities will be. A systematic idea about this will have to rest on a philosophical theory of the social responsibility of business. Probably the most popular theory in the literature on this topic is so-called stakeholder theory, which often is taken as the natural alternative to the dominant view discussed above (cf. Donaldson and Preston 1995; Freeman 1984; Friedman and Miles 2002). The dominant view holds that financial agents should strive to maximize shareholder wealth and nothing else—that is, they only have a responsibility toward their shareholders (Friedman 1970). In contrast, stakeholder theory holds that they have similar responsibilities to all their stakeholders, that is, to all the people that either affect or are affected by the agents' decisions (Freeman et al. 2010). This means that financial agents have obligations to, for example, customers, creditors and local communities, as well as to shareholders.

Stakeholder theory can in turn be grounded in a number of more basic moral philosophies (and in this way it is quite vague as a theory). The standard interpretation is inspired by Kantian ethics (Evan and Freeman 1988), and one may say that it locates the justification of social responsibilities in a norm of cooperative or social reciprocity: Since a corporation is a venture that both affects and is affected by stakeholders, it should also be managed in the interests of those stakeholders. However, there is also a straightforward utilitarian reading of the theory, especially of the idea that the correctness of an action depends on its effects on the interests of everyone involved. The literature further suggests that there can be interpretations of stakeholder theory that are grounded in, for example, feminist theory (Wicks et al. 1994), Rawlsian liberalism (Freeman 1997) and even libertarianism (Freeman and Philips 2002).

We cannot address all aspects of stakeholder theory in the present context, but let us once again make a few general observations. It seems clear from the preceding sections that the best way forward involves financial agents themselves taking a greater responsibility for the effects of their activities on society. Stakeholder theory does a great job at bringing this

point to the fore, which is commendable. However, it seems that the resulting social responsibilities are quite demanding in practice, at least on the standard interpretations. The theory presents a plausible critique of the dominant view which we have visualized as one body with two arms and where the arm of finance is left to focus only on profits. The argument is that financial agents can be no different from other agents and that we all have social responsibilities that ultimately stem from our social relations with others. But the upshot seems to be that all agents should be equally devoted to fulfilling our social obligations toward each other and that financial agents therefore cannot specialize in financial concerns that sometimes depart from such ambitions. In essence, this means that there cannot be any separation of arms, or once again both arms should do roughly the same thing, only that this is now defined in social terms. There is very little room for finance to be finance.

This upshot is problematic for two reasons. First, a practical aspect is that it seems doubtful that many real-life financial agents will accept such demanding social responsibilities. Thus the theory risks becoming “castles in the air”; just empty aspirations with no chance of happening (cf. Gioia 1999). Second, even if they would accept the responsibilities, it is unclear whether this is desirable since the theory seems to remove the benefits of specialization noted above. That is, at least on the standard interpretations, financial agents become “surrogate regulators” burdened with the difficult task of balancing financial and social obligations in almost every decision. It is therefore likely that their ability to allocate capital efficiently will be radically diminished. So it seems that where the dominant view goes too far in one direction (agents have no social responsibilities), stakeholder theory goes too far in the other direction (agents have too demanding social responsibilities).

A possible response from stakeholder theorists here could be that it is possible to understand the theory in less extreme ways. We may take this as a cue for developing a new theory to this effect.

12.6 STAKING OUT A MIDDLE GROUND: THE TWO-LEVEL MODEL

The task that we have before us is to stake out a middle ground between the dominant view of finance and the contemporary calls for either heavy regulations or far-reaching social responsibilities. This section outlines a

position which purports to do this and which we may tentatively call the two-level model. The model seeks to realize the classical dream of a division of moral labor yet in a more sustainable way. More exactly, the model starts from the idea that society may well be divided into several parts with differentiated tasks—for example, there may be a financial industry that specializes in raising and maintaining capital—as long as there is a consensus among these parts about a common goal or a general societal good. That is, the idea is that the division of moral labor will only work to the benefit of all if there is a common understanding that this is the goal of the division of moral labor, as well as a common commitment to furthering that goal. We may henceforth speak of the “general aim” of agents, which should be to further whatever is best for society as a whole over the long run.

In order to reap the benefits of the division of moral labor, however, agents should be given plenty of leeway in their day-to-day activities to specialize in performing more specific tasks that are useful to society. We may henceforth call this the “special aims” of agents. For example, financial agents should be given leeway to focus on making a profit and creating wealth through allocating capital efficiently, among other things. The only restrictions are that (1) they must keep an eye on how their special and general aims correlate—that is, how their specialization interacts with other parts of society to produce better or worse societal outcomes—and (2) they should take appropriate action when there are considerable clashes between the two aims. Some such appropriate actions are that they refrain from practices that are systematically detrimental to society and that they take positive action in response to major societal challenges. We will look more closely on these practical aspects below.

The two-level model has theoretical affinity to so-called two-level utilitarianism developed by R. M. Hare (1981). According to this philosophy, our moral thinking and behavior should consist of two different parts: Our overall or supreme goal should be to further whatever is best for everyone over the long run, that is, the general or common good. However, rather than striving for that goal directly in our actions, we should develop and abide by a set of more specific and inelastic rules that (on average) lead to acceptable outcomes. Two-level utilitarianism is often understood as an attempt to soften the most demanding and far-reaching implications of utilitarianism and to at the same time import some elements from Kantian ethics (cf. Bykvist 2010). This conciliatory aspiration is shared by the two-level model that is outlined here. However, our theory has a slightly

broader scope in that it not only concerns individual responsibility but also the distribution of responsibilities in society.

The suggestion is that the two-level model is superior to the other models discussed above. First, we noted two flaws of the dominant view with unregulated markets: that the aims of the arm (finance) easily become detrimental to the interests of the body (society) and that the aims of both are formulated in purely economic terms. These flaws do not afflict the two-level model since it builds on the idea that agents share the common goal of a flourishing society, and it seems plausible to include here not only economic efficiency but also social and environmental sustainability. While the day-to-day aims of financial agents will concern profits and efficiency, then, there is a consensus that these practices should be socially useful—and, more importantly, there is a responsibility to take action in some way when this does not happen. The hypothesis is that this kind of safeguard, which is built into the very motivation of financial agents, will be more effective than (many of) the externally imposed regulations discussed above. The two-level model is therefore also better than the dominant view with heavy regulations, since it can include safeguards without removing the benefits of the division of moral labor. But, of course, this does not mean that there is no place at all for regulations; we will return to that issue below.

Finally, the two-level model is superior to stakeholder theory since it gives considerable leeway for specialization and profit-maximization. As noted, the day-to-day aims of financial agents will concern profits and efficiency rather than sustainability and social benefits. In this way, finance can still be finance. However, agents have a responsibility to monitor considerable clashes between their special and general aims and to take appropriate action when such clashes occur. We will now say a bit more about what such actions may be.

12.7 IMPLICATIONS FOR FINANCIAL AGENTS: TWO KINDS OF CLASHES

Judging from our discussion above, there are at least two kinds of possible clashes between the special and general aims of financial agents: the kind exemplified by the financial crisis and the kind exemplified by ESG concerns. It is here suggested that different sorts of actions are appropriate in response to these different clashes.

The kind of clash exemplified by the financial crisis chiefly concerns negative externalities caused by financial activities themselves. For example, the excessive lending to subprime borrowers imposed great economic risks on those borrowers as well as on society at large due to the disastrous effects of mass defaulting. Similarly, the trade with obscure financial innovations such as CDOs imposed a great risk of breakdown on the financial system which indirectly meant economic risks to society. It seems straightforward that financial agents with the kind of motivation outlined in the two-level model simply should refrain from engaging in such practices that are systematically detrimental to society. Because even though finance is about profits and efficiency, the consensus is that it is supposed to be socially useful at the end of the day. For this reason, it should be obvious that something is wrong when profits are made in a way that imposes such great costs or risks on others.

It does not seem unrealistic to expect a growing amount of real-world financial agents to adopt this kind of stance. There is after all a growing awareness of how financial activities can lead to negative externalities and how the surrounding society then has to pick up the tab for this which ultimately may affect all citizens negatively. In this way, we may say that there is a growing understanding of the idea of a “social license to operate” for the financial industry (Warhurst 2001).

The kind of clash exemplified by ESG concerns presents a more complicated case. The challenges of global poverty and the threat of climate change have causes that go far beyond finance, although it of course does not help that many financial agents invest in or lend economic support to companies with negative activities in this regard. One could here argue that, parallel to the previous case, a plausible response is to refrain from engaging in activities that have detrimental effects on sustainability. Financial agents may, for example, refuse to invest in or lend money to companies that use sweatshops or pollute the environment beyond a certain degree (cf. Cowton and Sandberg 2012). This is a good start, but it seems that the response is not enough in the circumstances and also disproportionate to the problem.

An important dissimilarity between the two cases is that, in the financial crisis case, there is reason to believe that the body of society will do quite fine if the arm of finance simply refrains from the practices that are systematically detrimental. Because the problem is inherent to those very practices. By contrast, in the ESG case, there is little reason to believe that society will do fine if financial agents simply refrain from supporting activities that have detrimental effects on sustainability (Haigh and Hazelton 2004; Hudson

2005; Sandberg 2008). Because the challenges of global poverty and the threat of climate change are so great that the arm of the state is not enough on its own; instead both arms of society are needed to address them. In this kind of case, then, financial agents have a responsibility to take positive action for the sake of society. They may, for example, devote considerable resources to progressive companies although there is no guarantee of a decent return, or they may donate part of their proceeds to progressive nonprofit organizations (cf. Sandberg 2008).

Unfortunately, it seems less realistic to expect a large amount of real-life financial agents to adopt this kind of stance. While there is a lot of activity with regard to ESG issues, it may be noted that most of it is reactive and symbolic rather than proactive and self-sacrificial (Richardson and Cragg 2010). But this may be an area where public policy and regulatory efforts can come in.

12.8 IMPLICATIONS FOR PUBLIC POLICY AND REGULATION

While our main focus of discussion has been the aims and activities of financial agents themselves and what their role ought to be in society, many of the ideas above have implications for the adequate place and content of financial regulations and public policy. Before closing, let us briefly expand on these issues.

Some of the main implications are negative, or at least they shift the burden of proof in that direction. We raised two worries with the contemporary calls for more regulation that fail to address the agents' motivations: They risk increasing the bureaucratic load and thereby reducing some of the benefits of the division of moral labor, and it is not clear that they will be effective over the long run since financial agents have little to no motivation to cooperate. These worries suggest that policy makers should think twice before introducing new reforms in the area, and they should especially consider the possibility of supporting greater "self-regulation" instead of external controls. The fairly trivial hypothesis here is that self-regulation by agents with (at least partially) social motivations will be both more effective and less wasteful in terms of resources. It may here be argued that external regulations cannot hurt and will make a good fallback if self-regulation fails. That may be true in some cases. But there is also a risk that increasing external regulation only will serve to perpetuate the dominant view, that is, the view that social responsibility is a task for the authorities while financial

agents can focus on profits. In this way, it seems that increased regulation actually may be detrimental to the social consensus.

Having said this, we should acknowledge that there are likely to be exceptions. For example, there will be cases in which it is almost impossible to get financial agents to engage in effective self-regulation and where the absence of external regulations would impose great risks on society. Such cases seem especially probable with regard to environmental issues. The two-level model should not be taken to rule out regulation in such cases.

Turning to a more positive implication, the two-level model highlights the centrality of one particular kind of reform of the financial system: reformation of the fiduciary duties of financial institutions toward their beneficiaries and society. Fiduciary duty is the central legal construct that defines the appropriate motivation of (institutional) financial agents. It is therefore here that the content of the social consensus between state and finance can be given a clear formulation. Under the sway of the dominant view of finance outlined above, the dominant interpretation of fiduciary duty is of course that financial agents always should adopt the practices which further their economic bottom line as effectively as possible. This formulation is now familiar to us. However, there is currently momentum in support of a reinterpretation or reformulation of fiduciary duty among policy makers, regulators, scholars as well as some influential practitioners and institutions (Hawley et al. 2014). At least some of the suggested reformulations stress the need for financial agents to accept a greater degree of social responsibility and therefore point in the direction of the two-level model (cf. Sandberg 2014).

There may also be other types of regulations or public policies that are consistent with, or even share the same goals as, the two-level model. A more systematic review of policy options in this area could highlight further possibilities.

12.9 CONCLUSIONS

This chapter has been an attempt to heed the call from Stiglitz (2010) and others for a new vision for the financial system, taking inspiration from alternative perspectives and arguments from theoretical economics and normative philosophy. The dominant view of the purpose or role of financial agents holds that they should strive to maximize shareholder wealth, since this will contribute to market efficiency and thereby to general societal well-being. However, the recent financial crisis demonstrated with great

clarity how profit-maximizing firms in unregulated markets impose extreme and detrimental risks on both the financial system itself and society at large. Furthermore, there is a growing sentiment that the dominant system is unable to address the great sustainability challenges of our times, such as global poverty and the threat of climate change.

A central question in the wake of the crisis has been whether to support external regulations—such as capital reserve requirements, bans on bonus programs or financial taxation—or more internal solutions—such as an increased focus on social responsibility and ESG (environmental, social, governance) factors in financial management. The chapter has shown that both options can be problematic without the proper balance between them. External regulations risk being ineffective and unsustainable over the long run without some level of support from the industry. At the same time, financial agents themselves cannot be expected to become “surrogate regulators”, burdened with the task of balancing financial and social obligations in almost every decision.

The suggestion is that the proper balance can be found in what we call the two-level model of sustainable finance: There can be a division of moral labor between financial markets and the state as long as there is a common consensus about and commitment to a general societal good. The model suggests that financial agents can focus on profits and efficiency in their day-to-day business but must monitor and act on considerable clashes between their private and social aims. A central job for public policy is to codify this social consensus in the formulation of the fiduciary duties of financial agents. However, there will always be a role to play for financial regulations, since there likely always will be cases where a regulatory safety net or some increased incentive is needed to secure various societal goods.

It is acknowledged that this is just a first sketch of an ambitious theory and that many aspects and details remain to be filled in. Future research may focus on, for example, what the theory implies for more specific financial practices such as investment and insurance, in what cases there is most need for fallback regulations of various sorts and how the theory fares in relation to the globalization of financial practices and policies. The hope is that we at least have taken the first few steps toward a theory of sustainable finance.

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Mobilizing Early-Stage Investments for an Innovation-Led Sustainability Transition

Friedemann Polzin, Mark Sanders, and Ulrika Stavlot

13.1 INTRODUCTION

The estimated required investments into technologies to make the transition toward a sustainable economy are enormous (IEA 2016; New Climate Economy 2014). The 2008–2014 global recession has rapidly deteriorated the financial position of the public sector and lowered the risk appetite of the private sector (Block and Sandner 2009; Cowling et al. 2016). Technologically there seem to be no barriers to address the challenge (Iyer et al. 2015). But the vast resources of the private sector must be engaged to make a timely transition (Perez 2013). Unfortunately, private investment is falling short of target levels year after year. Apparently, the business case for green tech investments is not yet profitable enough. Many have therefore argued that the transition needs significant further innovation and improvement to existing technology (Negro et al. 2012).

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In the literature it is increasingly recognized that new, small firms and, in particular, (high-impact) entrepreneurship are important drivers of transformational innovation ‘creative destruction’ processes¹ (Schumpeter 1934). This is also true for the transition to a green economy (Bocken 2015; Ghosh and Nanda 2010; Marcus et al. 2013). Green entrepreneurs face barriers related to green innovation and the nature of entrepreneurship (start-ups) in general (Foxon and Pearson 2008; Hockerts and Wüstenhagen 2010).

But innovative entrepreneurship requires investment of a particular kind. It is not the debt finance that banks and institutional investors can provide, but rather private (equity) investment that promotes early-stage ventures with the potential to transform a sector. Policies should therefore aim to leverage the public funds available to mobilize private (equity) investment on an unprecedented scale (Jefferson 2008; Mathews et al. 2010; Polzin 2017). Increasing the availability of equity for early-stage green tech experimentation will spur the transition to sustainability but will also increase the diversity of the financial sector and thereby enhance stability and increase resilience of financial markets against shocks (Migendt et al. 2017; Polzin et al. 2017a; Szabó and Jäger-Waldau 2008). Increasing equity investment in green tech venturing would therefore be both urgent and desirable.

Policy makers can choose from a variety of options to mobilize private investment in green entrepreneurship, ranging from technology-push to demand-pull mechanisms or more systemic instruments (Bürer and Wüstenhagen 2009; Olmos et al. 2012; Polzin 2017). Researchers have highlighted certain demand-pull instruments (e.g. feed-in tariffs) as suitable for the renewable energy sector (e.g. Bürer and Wüstenhagen 2009; Criscuolo and Menon 2015), whereas others stressed their shortcomings and argued for more research and development (R&D) and innovation-based policies (e.g. Hoppmann et al. 2013; Kenney and Hargadon 2012). Where these papers develop strong arguments for specific policy interventions, however, the perspective of the agents these interventions aim to influence is often ignored or neglected (Georgallis and Durand 2017). Hence this chapter aims at understanding policy making from an investor and entrepreneur perspective, which is crucial for any policy that hopes to effectively leverage public funds and mobilize private capital to accelerate a transition to sustainability (Criscuolo and Menon 2015; Mazzucato 2013a; Polzin 2017; Polzin et al. 2016).

The remainder of the chapter is organized as follows: In Sect. 13.2 we depict policy measures to address challenges of early-stage green tech ventures. In Sect. 13.3 we present our empirical approach including research context and methods. In Sect. 13.4 we discuss from the investors’

and entrepreneurs' point of view how informed policy design might overcome the problems we have identified. Section 13.5 concludes.

13.2 PREVIOUS RESEARCH: POLICY MEASURES FOR PROMOTING GREEN VENTURING

Barriers to green tech entrepreneurship relate first to the nature of the underlying technologies such as increased technological uncertainty. Second, these innovations face a high regulatory dependency. Third, these early-stage technologies typically have an inferior cost position due to the liabilities of smallness and newness (Foxon and Pearson 2008; Polzin et al. 2016). All this causes especially financial constraints limiting the diffusion of untried and untested products, missing track record and facing high risk of bankruptcy (Bocken 2015; Shepherd and Patzelt 2011). Hence, small, experimental ventures are mostly not bankable (O'Sullivan 2006). Specialized equity investors can deal with this high risk/return profile. However there are only few, their business model is not easily scalable, and it only fits the rapidly growing ventures (Dosi 1990; Mazzucato 2013b; Perez 2002). In addition, regulatory responses to reduce risk appetite in the financial industry in the aftermath of the financial crisis of 2008 hit early-stage equity investors hard (Demirel and Parris 2015; Migendt et al. 2017). Consequently, finance streams for risky green tech ventures have dried up.

The suboptimal allocation of entrepreneurial capital has been discussed by Lerner (2009, 2010) among others and requires policy makers to act. Achieving an innovation-led sustainability transition based on green technologies in due time justifies policy intervention on a larger scale (Bocken 2015; Bürer and Wüstenhagen 2009; Mazzucato 2013b). This strand of research stresses the need for a holistic view on how market actors behave when policy makers are attempting to facilitate the entrepreneurial and venture capital sector (Lerner 2009). According to Lerner (2010), a frequent shortcoming of public initiatives aimed at supporting venture capital markets has been impatience, as innovation needs a more long-term perspective. Mazzucato (2013b) and others (e.g. Criscuolo and Menon 2015) argue that the emergence of (green) innovative ventures and technologies requires policies directed at companies as well as at the investors and the entrepreneurs to be successful. Finally, policy makers should take a portfolio approach and exercise a high level of tolerance for failures that is not very natural to them (Weber and Rohrer 2012).

Still the literature to date remains rather vague on how exactly the more patient and risk-tolerant policy maker could then help investors and

Table 13.1 Policies to mobilize early-stage finance

| <i>Policy approach</i> | <i>Category</i> | <i>Examples</i> | <i>Sources</i> |
|-------------------------------------|---------------------------------|---|--|
| Innovation policy (technology push) | Fiscal and financial incentives | R&D subsidies | Olmos et al. (2012), Veugelers (2012) |
| | | R&D tax credits | Acemoglu et al. (2012), Olmos et al. (2012) |
| Innovation policy (market pull) | Systemic instruments | Research infrastructure and incubators | Kenney and Hargadon (2012, 2014) |
| | Market-based incentives | GHG emission trading system | Acemoglu et al. (2012) |
| Framework conditions for VC/PE | Fiscal and financial incentives | Cash rebates and subsidies | Bürer and Wüstenhagen (2009) |
| | | Direct investments (into complementary assets) | Henriot (2013) |
| | Systemic instruments | Co-investing (into companies) | Mazzucato and Penna (2016) |
| | | Loans and loan guarantees | Olmos et al. (2012) |
| | Regulatory measures | Tax incentives | Barradale (2010) |
| | | Feed-in tariffs | Criscuolo and Menon (2015), Haley and Schuler (2011) |
| | | Public procurement | Edquist and Zabala-Iturriagagoitia (2012) |
| | | Networking and conferences | Gompers and Lerner (2001) |
| | Regulation | Product standards and regulation | Bürer and Wüstenhagen (2009), Polzin et al. (2015) |
| | | Capital market development (exit possibilities) | Bottazzi and Rin (2002), Da Rin et al. (2006), Lerner (2010) |
| Fiscal and financial incentives | Tax policy | Keuschnigg and Nielsen (2003, 2006) | |
| Systemic instruments | Bankruptcy legislation | Cumming (2011), Lerner (2002) | |
| | Labor-market regulation | Lerner and Tåg (2013) | |

entrepreneurs come together more successfully. In general, policy makers can take three approaches to addressing the early-stage financing problem for green tech (Migendt et al. 2017) (see Table 13.1). First, to address the underinvestment in the very uncertain early stages of the innovation cycle,

policy makers could support firms with R&D grants and prizes to reduce the need for external capital provided by investors in this stage (Olmos et al. 2012; Veugelers 2012). Similarly, directed tax credits reduce the tax burden on profit for early-stage investors (Acemoglu et al. 2012; Olmos et al. 2012). To complement these efforts and push technology from invention to commercialization and market introduction, scholars have suggested making public investments in research infrastructure dedicated to research on green technologies (Kenney and Hargadon 2012, 2014). But of course, these interventions all weigh heavily on an already strained government budget.

Second, there is the demand-pull perspective. Under the efficient capital markets hypothesis, all that is needed to promote investment is to remove barriers to free capital market flows. Then investors will automatically allocate their funds to profitable green tech ventures. Environmental, energy and climate economists therefore argue that market prices should drive the innovation process as a first-best solution. But then market prices need to be adjusted to incorporate both innovation-related and sustainability-related externalities (Acemoglu et al. 2012). This is complicated. One could internalize environmental externalities, for example, by establishing a greenhouse gas emission tax or trading system (Fischer and Newell 2008), but these instruments are not suited for internalizing the positive innovation externalities also. However, as a global and effective emission trading system is not (yet) put in place, second-best solutions from the environmental externalities perspective could target specific characteristics of green tech innovations to support their invention, commercialization and diffusion (Foxon and Pearson 2008; Polzin 2017; Polzin et al. 2016).

To bring technologies from invention into market diffusion, policy makers also have a range of instruments at their disposal (Bürer and Wüstenhagen 2009; Hoppmann et al. 2013; Polzin 2017; Veugelers 2012). Consumers could be incentivized to buy green tech products such as electric vehicles through, for example, cash or tax rebates and subsidies. That increases sales and market growth for the producer—a focal point for the early-stage investor (Bürer and Wüstenhagen 2009). More directly, governments could also follow a mission-oriented public procurement strategy, hence increasing market demand and reducing costs for novel green tech products (Edquist and Zabala-Iturriagoitia 2012). Other instruments include public loans or loan guarantees for growing ventures (Olmos et al. 2012), although these received criticism for allowing small ventures to be overfunded (Kenney and Hargadon 2012, 2014).

Reducing risks for the private investor associated with the commercialization and scale-up phases (i.e. establishing a production line and delivering

the product at high quality and in large quantities) is one way of augmenting specialized equity funding. Fiscal incentives such as the production tax credit prove to be effective (Barradale 2010). More directly, co-investing from public sources such as state investment banks into green tech companies (Mazzucato and Penna 2016) and public investments into complementary assets such as electric vehicle charging infrastructure or transmission grids also overcome financial barriers (Henriot 2013).

Especially relating to the electricity sector, feed-in tariffs and renewable portfolio standards (an obligatory share of renewable in total production) are also argued to have a positive influence on early-stage investments. Whereas the former are more conducive to less mature technologies as they provide for stable cash flows, the latter favor mature technologies due to the element of competition to supply the renewable energy capacity at the lowest price (Bürer and Wüstenhagen 2009; Criscuolo and Menon 2015; Haley and Schuler 2011).

Third, policy makers can also try to increase the supply of funding. For example, they may change the framework conditions for early-stage VC/PE investments in general. Increasing the functioning of equity capital markets will allow investors to sell the companies they have successfully grown. That improvement of the 'exit' proves very conducive to mobilizing early-stage finance (Bottazzi and Rin 2002; Da Rin et al. 2006). Framework conditions relevant to this process include most notably the tax regime. For example, a favorable capital gains tax tied to specific kinds of innovation will allow early-stage investors to reduce their tax burden (Keuschnigg and Nielsen 2003, 2006). An entrepreneur-friendly bankruptcy legislation would create technology push by encouraging more (or rather deter less) potential entrepreneurs to enter the highly uncertain green tech sector (Cumming 2011; Lerner 2002). If you wish to promote experimentation, you must reduce the penalties on failure. The balance should thus be moved from protecting creditors to protecting those that take the risks that society needs to take on. In a similar vein, flexible labor-market legislation for start-ups will increase their flexibility and chances of survival (Cumming 2011), perhaps at the expense of previously well-protected workers. Flexibility, however, is an important criterion for early-stage investors.

Lerner (2002, 2009, 2010) provides more specific guidelines that emphasize public venture programs. These should be market-driven and flexible in terms of location, type of securities used and the evolution of firms. A steady hand in policy making is of equal importance, as is reflexivity in assessing program outcomes. This is to assure flexibility as well as ensure

continuous success based on creativity (Wüstenhagen and Menichetti 2012). Finally, soft policies—such as education and training of market actors, networking, creating clusters of entrepreneurs and syndication opportunities for investors, information diffusion—lower the transaction costs, build trust and could create a more efficient market for matching ventures to investors (Bertoni et al. 2015; Franke et al. 2006; Gompers and Lerner 2001; Nightingale et al. 2009).

In order to effectively shape and create markets that are attractive to early-stage investors such as business angels and venture capitalists, scholars have suggested a combination of both policy approaches in a mix (Mazzucato 2013b, 2016; Rogge and Reichardt 2016). Rather than focusing exclusively on the supply of private finance or the demand from innovative companies, an effective policy mix will combine interventions that increase the supply of funds with policies that increase the demand for new, green products and services. We will argue below that in addition, interventions to improve the matching of investors and entrepreneurs may help make such a policy mix more effective.

13.3 RESEARCH CONTEXT AND METHODS

In this section, we will briefly present the existing policy framework for green tech innovation in the Netherlands and Sweden and elaborate on methodological choices. Taking two comparable but different countries has the advantage that one can compare the institutional (and policy) context in which decisions are made.

13.3.1 Policies for Green Tech Innovation and Entrepreneurship in the Netherlands

The Dutch Government (see, e.g. ‘Energierapport 2011’ and ‘Nationaal Energie Akkoord 2013’) aims to balance the desire to promote growth and remain competitive with the transition to a carbon-poor energy system while keeping supply secure. Energy policy is typically approached as an economic policy. The Dutch policies have a strong focus on corporate R&D, creating a level playing field, strengthening existing competitive strengths and promoting efficiency.

The Netherlands has adopted the EU energy-efficiency directive, aiming for efficiency improvement of 1.5% annually between 2014 and 2020. To achieve that aim it levies an energy tax and participates in the EU emission

trading system. Under the ‘Energie Investerings Aftrek (EIA)’ there is a tax deduction of energy-efficiency investments by firms. Policies also cover energy-efficient production means under the ‘Milieu Investerings Aftrek’ (tax deductibility of environmentally friendly investments) and ‘Versnelde Afschrijving Milieuinvesteringen’ (allowance for faster write-off of environmental investments) programs. In addition to these generic policies, the Government runs some programs that specifically address sustainability issues. Notably, specific programs address the split incentive problem in rented real estate and the lack of information and knowledge in small- and medium-sized businesses. The European Directive on Energy Services is implemented in the ‘Energiebesparingswet’ (law on energy savings) in the Netherlands. That law details the monitoring standards for energy efficiency, information about energy consumption, energy-efficiency standards and smart metering.

The Dutch Government supports innovation and R&D in a variety of ways. Around €2 billion of government funds annually are spent on innovation and R&D. These programs are highly relevant, because green tech ventures are typically innovative and R&D intensive. The main program is the ‘Wet bevordering speur- en ontwikkelingswerk (WBSO)’, a generic program that subsidizes R&D wage costs (at €700 million in 2013). In addition, the ‘Research en Development Aftrek (RDA)’ allows firms to deduct expenditures on materials and other costs in R&D. In 2013 the RDA program was worth €375 million and applied to about €2 billion worth of private sector R&D expenditure. Finally, profits based on new intellectual property are generally treated very favorably in the Dutch tax system.² In more targeted programs, the Government provides guarantees and loans, particularly facilitating innovative SMEs in obtaining bank credit and other funding. Increasingly, the Dutch Government also tries to provide information and business services to innovative and growth-oriented SMEs. It is beyond the scope of this chapter to list and discuss all policies currently in place in that area.

In addition to the R&D and energy-efficiency efforts, the Dutch Government will spend €2.4 billion in 2017 (rising to €3.8 billion in 2020) in the so-called Stimuleren Duurzame Energieproductie (SDE) policy. The SDE program is a subsidy scheme that offers a feed-in tariff for renewable electricity production. The program sets a price per technology based on industry averages (base price). Suppliers using that technology are then compensated for the difference between the relevant market energy price and this base price in a competitive bidding procedure. The subsidy is

limited in time, depending on the technology (e.g. ranging from 5 years for some forms of biomass up to 15 years for solar and wind).

Most Dutch programs aim to improve the net present value and reduce price risks of investments in green projects. Finally, to accommodate and smooth out more volatile renewable (wind) energy production and deal with fluctuating demand for gas and electricity, the Dutch transmission system operator invests in integrating the grid with the northwestern European energy markets and provides guaranteed access to the grid for renewable producers (including offshore wind parks).

In conclusion, Dutch policy makers take a rather straightforward approach to energy policy in the sense that they strongly rely on financial incentives and expect these to get the transition going. As a consequence, to date there is little targeted investment in promising, yet unproven, technologies—and policies aim to reach rather modest targets with minimal means.

13.3.2 Policies for Green Tech Innovation and Entrepreneurship in Sweden

Sweden also adopted the goal of no net emissions of greenhouse gases to the atmosphere by 2050. Sweden's policies include measures to improve excellence in research but also stimulate the commercialization and the development of new technologies. To address climate change, Sweden has implemented the highest carbon tax in Europe for all sectors not covered by the EU emission trading scheme. In addition, an energy tax is levied on electric power and fossil fuels to induce energy efficiency. Renewable fuels are exempted from energy and carbon taxation, though EU regulation does not permit Sweden (or any other member state) to overcompensate renewable fuels, meaning that the main biofuels (biodiesel and ethanol) are now taxed, albeit at a lower level than their fossil equivalents. Compliance with tight environmental standards entitles the user to a tax exemption for new passenger cars, and buyers of the most efficient cars get a bonus of €4000. To support renewable energy production, Sweden has introduced a renewable energy certificate (REC) for each MWh produced. Electric power distributors are forced to buy RECs up to a certain proportion of the power distributed. Swedish tax law also allows wind power investments to be depreciated at an accelerated rate.

The National Environmental Technology Strategy had a total budget of €48 million during the period 2011–2014. With this money, the Swedish Government supported firms to meet sustainability challenges while

promoting new business and employment. The program comprises a broad range of short- and long-term initiatives and targets innovation and exports. At the end of 2013 Sweden introduced tax benefits for private investors investing in unlisted companies.

Public-owned incubators, such as Almi and Innovationsbron, play a big role in enabling growth of small- and medium-sized enterprises in Sweden. To increase the supply of private capital for early-stage companies, Sweden has also set up a public fund to invest in new and current private VC funds. Public VCs ‘Fouriertransform AB’ and ‘Inlandsinnovation AB’ are examples of Sweden’s efforts to increase the flow of private capital to (green tech) innovations.

The Swedish Energy Agency aims to facilitate the connection of actors in green tech and thus increase cooperation between them. Finally, Swedish innovation agency VINNOVA has allocated funding to bridge the ‘valley of death’, that is, the perceived gap between public-financed research and privately financed diffusion processes. Their activities include method development, standardizing, certification and the development of infrastructure for innovative efforts and/or firms.

In conclusion, Swedish policy making is much more decentralized in its governance; not in a regional sense, but institutions are more independent and more government agencies take responsibility for a wider range of programs. Less is spent on subsidies and more effort is put into developing networks and exchanging knowledge.

13.3.3 Policy Summary

There are policies targeting innovative SMEs in both countries, whereas policies targeting investors are less common. In Sweden, policies aim to increase the inflow of venture capital and increase awareness through the supply of information. In the Netherlands, initiatives aim at increasing the supply of information but also include fiscal and financial incentives such as tax breaks and specifically for green tech, feed-in tariffs.

Energy policies are governed very differently in the two countries. In the Netherlands, it is usually ‘AgentschapNL’, an agency of the Ministry of Economic Affairs, that implements and manages the policies. In Sweden, by contrast, different agencies in different ministries implement a more varied range of policies. The governance of the policy instruments has a clear impact on the way the policies are set up and implemented. In the Netherlands the focus on cost-effectiveness and fair competition is perhaps

stronger, whereas in Sweden more attention is paid to networking and information provision. The underlying assumptions on human and more specifically entrepreneurial and investor behavior differ somewhat.

The policies to promote the supply of venture capital and entrepreneurship in the green tech sector are directed toward the provision of information to overcome information asymmetries in Sweden. Policies in the Netherlands use more traditional economic policy instruments, improving the return on ventures and investments themselves and relying on rational private agents to then respond to financial incentives.

13.3.4 Data Collection and Analysis

To shed light on the effectiveness of public policy initiatives for mobilizing private early-stage investments, this research combines an archival document analysis (Adenfelt et al. 2013) with a series of 30 in-depth interviews (Adenfelt et al. 2014) and a structured online survey of 74 Dutch and Swedish investors and entrepreneurs (Polzin et al. 2017b). In the survey we implemented a few open questions eliciting respondents' views on appropriate policies to promote early-stage investment in (green tech) ventures. We therefore collected and evaluated entrepreneurs' and investors' views on policies targeting early-stage green tech investments using three different data collection methods. Desk research, interviews and survey methods were combined as they complement each other and result in a more comprehensive understanding of the phenomena studied (Creswell and Clark 2010; Jick 1979). Both sets of study subjects (investors and entrepreneurs) represented typical cases (Seawright and Gerring 2008). The combination of three data sources and mixed research methods allows for triangulation (Moran-Ellis et al. 2006).

We asked broad open questions, leaving as much room as possible for the interviewees and survey respondents to express their views (Patton 2002). In the interviews people were asked about general characteristics of the firm or investment fund and their role in that organization. Other questions revolved around the funding process from an investor's perspective and the firm foundation process from an entrepreneur's perspective. Finally, we asked both investors and entrepreneurs in the interviews and the survey about the policy environment and their preferred political intervention in the Netherlands and Sweden.

Table 13.2 Investors' and entrepreneurs' perspective on policies to mobilize early-stage finance

| <i>Category</i> | <i>Policy measure</i> | <i>Effectiveness (investors)</i> | <i>Effectiveness (entrepreneurs)</i> |
|---|---|----------------------------------|--------------------------------------|
| Fiscal and financial incentives (R&D support) | R&D subsidies | + | |
| | R&D tax credits | + | + |
| Systemic instruments (R&D support) | Research infrastructure and incubators | ++ | + |
| Market-based incentives | GHG emission trading system | | |
| Fiscal and financial incentives | Cash rebates and subsidies | - | +/- |
| | Direct investments (into complementary assets) | +/- | |
| | Co-investing (into companies) | ++ | ++/- |
| | Loans and loan guarantees | ++ | + |
| | Tax incentives | ++ | ++ |
| Regulatory measures | Feed-in tariffs | +/- | + |
| | Product standards and regulation | -- | |
| Systemic instruments | Information, networking and conferences | + | |
| | Public procurement | + | + |
| Framework conditions | Capital market development (exit possibilities) | + | |
| | Tax policy | + | |
| | Bankruptcy legislation | | |
| | Labor-market regulation | + | + |
| | Intellectual property | | + |
| | Institutional investors | + | |

Some interviewees highlighted the measure as positive (+) or negative (-); many of the interviewees highlighted the measure as positive (++) or negative (--)

13.4 FINDINGS AND DISCUSSION

Having established the research context and discussed the policy landscape in both countries, this section presents the entrepreneurs' and investors' perspective on policy measures to mobilize private finance for green tech ventures based on the interviews and the survey. Hence we firstly elaborate on specific views about green tech investments in Sect. 13.4.1. Section 13.4.2 presents and discusses the policy perspective of entrepreneurs. Then we turn to the investors in Sect. 13.4.3. A summary and comparison of the findings can be drawn from Table 13.2.

13.4.1 *Entrepreneurs' and Investors' View on Green Tech Investments*

Entrepreneurs do not perceive the green tech market as being efficient or even rational. The investors are described as being guided by feelings and behavioral heuristics when making the investment decision.

If you look at angels, i.e. small private investors, they invest to a great deal, how to say this, with the heart and with regards to knowing people. (Swedish Entrepreneur)

Entrepreneurs also assert herding behavior to investors and portray them as running in parallel or as following a lead investor.

2007 Al Gore was in the news and all this. Everything was green tech. And there were all these investors that I know and it was like – high-five – and everyone had switched over to be green tech investors. (Swedish Entrepreneur)

On the other hand, some investors view green tech entrepreneurs as highly technically skilled but lacking business and finance skills, even more so than entrepreneurs in other sectors.

Green tech entrepreneurs are different. Less degree of professionalism and more Gyro Gearloose. (Swedish Investor)

This observation is consistent with the view held by investors and entrepreneur alike that Swedish green tech investments are still being suppressed by a previous market bust. Many respondents expressed that the early green tech hype lacked foundation in reality and when the bubble burst, many investors shied away from the market and still are.

Green tech jumped up a few years ago and was very hot. Then the people that invested got burned but this has been coming and going. So you have felt a bit of a head wind but also a gigantic interest. (Swedish Investor)

The Dutch green tech market did not experience the same boom and bust as the Swedish, and consequently the importance of market track records is not as articulated in the Dutch responses.

The actual match on the market, the fit between the wishes of the venture capital firm and the green tech model seem to be a major concern on both sides of the market (see also Bertoni et al. 2015; Franke et al. 2006;

Polzin et al. 2017b). The closed-end funds, the stringent mandates, the large investments and the required returns are fundamental constraints for closing the deal with green tech firms that often has large capital requirements and long-term horizons as well as substantial risk.

This type of rigorous behaviour I often see with investors. They follow their rules and are in general not very flexible. [...] The impact globally is huge, but rules seem more important. (Dutch Entrepreneur)

Difficult to make money in this equity gap if you are a closed end fund. There is not enough time to build a company. [...] Green tech is difficult. Since the time horizon is long most business models do not fit. (Swedish Investor)

A large concern of investors is the prevalence of policy failure and policy risk which many investors have experienced as a major obstacle for investing in green tech. Thus elaborating on their perceptions about the policy environment is pivotal to inform policy makers and other stakeholders.

13.4.2 *Entrepreneurs' View on Public Policy to Mobilize Green Tech Investments*

13.4.2.1 *R&D Support*

Generic or specific R&D support to address the largest uncertainties in the innovation cycle relieves early-stage financial pressures, the so-called valley of death, for highly innovative start-ups. Such innovation life cycle policies, however, are mentioned less frequently than the more traditional financial measures. Still, entrepreneurs seem aware that the financial implications of supporting R&D could be significant.

There is a policy that reduces tax for people that are doing R&D [...] If that policy changes and we have to pay more taxes, that will be another 2000 euros per month. (Dutch Entrepreneur)

Conventional economic wisdom points out the usefulness of continuous and directed R&D support for the general advancement of green technologies and other high-impact innovation on the knowledge markets. However, such support only plays a subordinate role when referring to early-stage investments (Acemoglu et al. 2012; Olmos et al. 2012; Veugelers 2012). The research infrastructure and the possibility to generate

intellectual property seem more important for green tech venturing (Kenney and Hargadon 2012, 2014). Apparently, the obvious policies, stronger intellectual property protection, tax reductions and subsidies for R&D are typically not top of mind for the entrepreneurs. The interviews also show that entrepreneurs evaluate such policies mostly from a rather narrow micro perspective. That is, they do not consider more radical reforms or policies, such as open-source innovation or publicly funded basic R&D, where impacts are likely to result at the macro level (Jaffe and Lerner 2011). On the one hand, we can conclude that a policy focused exclusively on the opinion of entrepreneurs will typically miss important elements of an effective transition policy package. On the other hand, the overall positive views do suggest that generic and specific support for green tech basic R&D and a strong knowledge infrastructure are useful.

13.4.2.2 *Fiscal and Financial Incentives*

Financial incentives are the type of policy most frequently mentioned by entrepreneurs in the survey and interviews. However, the views on existing policies are not entirely positive. Policy design was sometimes seen as misdirected or insufficient. Subsidies for technologies or firms are clearly perceived as effective in the sense of being a direct positive effect on profitability, but not always as fair and efficient.

So if you enter a market with a new solution and you have to compete with solutions that have been subsidized, then you cannot compete. Why are these subsidies there and what is being subsidized? (Dutch Entrepreneur)

The issues of unfair competition and uncertain long-term commitment make subsidies unpopular. Notwithstanding, few entrepreneurs mention more stable support systems, such as a feed-in tariff, where the government guarantees a certain price for electricity produced from renewable energy sources, or a market for electricity certificates, where producers receive tradable certificates for each KWh renewable electricity produced. Here, too, the design and distribution of benefits is decisive for entrepreneurs to build their business model on such a mechanism.

These policies need to be understood. . . for instance, if you do want some policies, let's say feed-in tariffs, then it depends on who it benefits. Does it benefit the people that invested their capital initially? [...] This needs to be well understood as a system. (Dutch Entrepreneur)

This quote shows that entrepreneurs do reflect upon the implications of policies for their investors. In addition, directed tax incentives (for investors) targeting companies with a sustainable product, service or business model may also be beneficial for attracting early-stage investments. Many entrepreneurs mention these instruments spontaneously. But here also, the design and bureaucracy involved in proving eligibility for these tax breaks were mentioned as issues that significantly reduce their effectiveness.

If you want to support us as a company you could do one of those investor grants but [...] it was like a whole week of work and difficulties with getting your head around if you could use it or not. And this limits the value to us. If you had made it a bit more liberal – so, for example, it could be applied to institutional investors – it would have helped us for fundraising. (Swedish Entrepreneur)

When asked about policies they would propose, entrepreneurs most frequently suggest that the government could do more in terms of increasing the flow of (public) funds to early-stage venturing in the green tech sector. On the one hand, government officials sometimes see private sector co-investing as critical due to vested interests and missing competencies. On the other hand, entrepreneurs argue that some companies should be ‘earmarked’ for impact investments as a form of mission-driven governmental co-investment. But typically, such argumentations are to some extent self-interested.

As an alternative to equity investments, a few entrepreneurs mention governmental loans or revenue stakes.

Somebody must take this risk and EU/the government has the possibility to support early-stage investments via VCs. (Swedish Entrepreneur)

Beyond the direct (impact) investments by governmental agencies, entrepreneurs do not see or appreciate the need to combine government funds with private co-financing. To entrepreneurs, this restriction seems a useless complication, whereas for policy makers it is a way to justify and be accountable for the choices being made.

Well, there is almost only one thing and it is to remove the demand of co-financing from the government funds. (Swedish Entrepreneur)

These results in general fit the discussion about the usefulness of subsidies for green technologies. Entrepreneurs are split over these questions (Bürer and Wüstenhagen 2009). Design and stability of support systems to build a business model are important from an entrepreneur's point of view (Criscuolo and Menon 2015; Haley and Schuler 2011). Regarding tax incentives, instead of focusing directly on the firm—for example, through a production tax credit (Barradale 2010)—entrepreneurs interestingly mention tax breaks for investors as one key element of attracting private finance. The importance of governmental co-financing and risk taking of innovative green tech firms is emphasized by many entrepreneurs, although caveats regarding bureaucratic requirements and increased complexity in the relationship between public and private investors are raised (Olmos et al. 2012). Finally, it is interesting to note that none of the entrepreneurs spontaneously mentioned the type of broad economic policy measures, such as carbon taxes or emission trading systems, which economists tend to recommend as the preferred policy instrument. We may conclude from our data that entrepreneurs will typically mention the obvious policies and policy instruments. Governmental co-investing and tax breaks are what entrepreneurs first think about when policy questions are raised. Our results also suggest the entrepreneurs are keenly aware that the design of such policies matters a great deal and may in fact result in blocking, rather than promoting green entrepreneurship. It is also clear that entrepreneurs (like investors below) will evaluate policies exclusively from their perspective. An important lesson for policy makers is that optimal policies in the eyes of entrepreneurs, even very successful ones, do not necessarily represent the societal optimum. Sometimes it remains opaque how the selection for co-investments occur and this sits uncomfortably with the requirements of democratic accountability and legitimization.

13.4.2.3 Regulatory Instruments

Market regulations such as industry standards or renewable portfolio standards to promote capital and product markets were only mentioned by one of the participating entrepreneurs. This illustrates that more direct interventions such as financial and fiscal incentives are more visible yet not more important than functioning markets. The role of environmental standards and regulation as a source of new competitive advantage has been proposed by Michael Porter (Porter 1991; Porter and van der Linde 1995). More recent empirical work also highlighted their perceived usefulness for

investors (Bürer and Wüstenhagen 2009). It is interesting to note that the entrepreneurs in our sample do not see a role for regulation and standards to promote their business. At least, they do not mention them spontaneously.

13.4.2.4 *Systemic Instruments*

Besides the main determinants of functioning markets for green tech innovation, only a few entrepreneurs mention policies aimed at diffusing information and creating networks, such as incubators, fairs or platforms.

Do a lot more things like they do in Delft or Amsterdam, providing locations, stimulating get-togethers, stimulating platforms for people to become vocal and where they can express themselves, ensuring media pays a lot of attention to it. (Dutch Entrepreneur)

They recognize what incubators aim to do but also feel their usefulness is yet to be proven.

Incubators can provide entrepreneurs with the right tools and right education to make the ideas ready and provide a higher hit rate for investors, making them more willing to invest their capital. (Swedish Entrepreneur)

Rather than creating networks with private equity investors, some entrepreneurs propose initiatives to match start-ups with large corporations to open up for corporate innovation.

I would propose an early match with an existing firm or organization which is in need of a service that match the start up. The start-up can adapt too specific requirements and then have the flexibility to scale up the production. (Swedish Entrepreneur)

The positive view on establishing channels for contact between entrepreneurs and investors (Bertoni et al. 2015; Gompers and Lerner 2001) is not broadly shared by the entrepreneurs in our sample. They do see that the incubators and fairs can be useful but do not seem to consider the flow of information and building of networks to be very conducive to green tech business development. Entrepreneurs perhaps underestimate the importance of building social networks and establishing relationships (Polzin et al. 2017b). Policies that promote such network building are not top of their minds but perhaps serve a more important function than they would

recognize. It seems only logical that entrepreneurs would attribute success in attracting investors and customers more to the quality of their product and team than to the quality of the network in which they find their matches (Franke et al. 2006; Ruef et al. 2003).

13.4.2.5 *Framework Conditions*

Apart from measures specifically targeting the green tech sector, entrepreneurs highlight general framework conditions for entrepreneurship as important for their activities. Such framework conditions include legal issues and bureaucracy relating to the start-up process, as well as labor-market regulations for small firms. Both interviewees and survey participants agree that policies should focus on the start-up process itself, regardless of the sector. In that respect, entrepreneurs naturally complain about bureaucratic ‘red tape’.

Governmental support is quite good in Sweden, but lower taxes, fewer regulations, less influence by unions for these companies would help. Less money would be needed and more companies could grow with the money already available. (Swedish Entrepreneur)

Especially labor and wage regulation including tax laws often is perceived to hinder start-ups and innovative firms.

Remove the required minimum salary for directors for start-ups (e.g. below a certain amount of revenue or time in business). (Dutch Entrepreneur)

For Sweden, adopt the British SEIS regulations, and stop the so called 3:12 tax regulations [dividends up to a threshold amount taxed as capital, while dividends above that amount is taxed as earned income]. (Swedish Entrepreneur)

In addition, a few entrepreneurs mention specifically the importance of intellectual property rights and how the government can support this process.

I know that they have had something like this in the US, where the government or the local authorities have financed the development of intellectual property and I think this is important. (Swedish Entrepreneur)

The view of the interviewed entrepreneurs is very much in line with what Lerner and colleagues state about designing effective venture capital support programs (Lerner 2002, 2009, 2010). They call for an understanding of the details of the early-stage investment process (including its legal and institutional environment) in order to effectively engage private investors. More specifically this implies in the contexts of Sweden and the Netherlands that labor regulation and protection should be simplified and perhaps reduced for small and young firms. Such reforms would not only increase flexibility and reduce the risk of illiquidity and bankruptcy but also increase the pool of talent that entrepreneurs could draw on (Cumming 2011; Lerner and Tåg 2013). The lower tax and social security burdens that such reforms would imply could increase the profitability and potential for self-financed growth of young firms. Again, the entrepreneurs very much take their own perspective and do not consider the impacts this may have on the labor market at large and the position of workers in the economy.

Taking together all the results, on the one hand, entrepreneurs tend to take a micro perspective on policy making. This leads them to push for governmental co-investment and risk taking, stronger intellectual property protection, less restrictive labor-market regulations and R&D tax breaks for start-ups. On the other hand, they neglect the importance of finding a matching investor through structured initiatives like incubators or conferences. Hence, to develop an effective policy mix we also need to consider the perspective of investors and combine that into a policy mix that serves the interest of society (through the diffusion of green technologies), not specific stakeholder groups.

13.4.3 Investors' View on Public Policy to Mobilize Green Tech Investments

13.4.3.1 R&D Support

Generic R&D support not interfering with the commercialization process and scale-up of start-ups is generally seen as a positive measure by investors. It reduces technological uncertainty and risk across the board, if information is shared and available.

R&D support that facilitates clustering etc. has a big effect when it comes to capital/VC. (Swedish Investor)

It also relieves innovative start-ups and their investors of financial constraints relating to R&D expenses.

In fact, two of our portfolio companies – one in the UK and one here in the Netherlands – are getting a decent chunk of their R&D money back, which is great. (Dutch Investor)

Investors generally perceive R&D support as helpful since it does not intervene in the phase where early-stage investors engage (Acemoglu et al. 2012; Olmos et al. 2012; Veugelers 2012). It is, however, typically considered a ‘nice to have’ and helpful environmental factor that is not deemed crucial in promoting private investment in green tech start-ups. Investors do not seem to consider the general lack of technical knowledge a major barrier to investments. This might be the result of them operating in highly developed and high-tech economies like Sweden and the Netherlands. They may take for granted the general high levels of public and private R&D (Mazzucato 2013a).

13.4.3.2 Fiscal and Financial Incentives

Investors also mainly mention financial incentives and economic instruments in response to an open question on preferred policies to promote green tech investments.

Clean energy subsidies, or guarantees or feed-ins or anything like that, matters a lot. (Dutch Investor)

However, as the entrepreneurs, investors do not consider all instruments to be useful. Some investors are even outright negative about subsidies, because they destroy or misalign the incentives for entrepreneurs.

But you see now with subsidies, in fact subsidies are a bad system. Because it’s free money. And you know that subsidies are misused – almost by definition. (Dutch Investor)

Moreover, even in countries with reliable governments such as Sweden and the Netherlands, investors consider business models that rely heavily on subsidies an undesirable risk.

This is such a large risk so if there exist one, we are not getting involved. It is important that subsidies and the subsidy system is constructed such that the subsidy levels are secured from day one. (Swedish Investor)

More comprehensive support schemes, such as feed-in tariffs, could be seen as positive, especially for less mature and more risky technologies, if the commitment of the government is credible.

We look at the stability of the feed-in tariffs, this is really important concerning tidal energy projects. Tidal energy is really in its early stages and you look if there is a certain feed-in tariff we have to know for how many years to take the risks into account. (Dutch Investor)

Whereas many investors propose access to risky loans, loan guarantees are also evaluated differently, depending on the conditions the government sets.

Many investors, especially business angels but also governmental VCs, also emphasize directed tax incentives, such as investor tax credits, to stimulate green tech industry emergence.

Of course, the terms of our co-investors and their ability to make tax deductions on their investments. For us that is a very important issue. [...] What can they do? How complicated is it for them? (Swedish Investor)

A few investors even suggested that, *[t]here should be special tax incentives for social impact investments (Swedish Investor)*.

Many investors, and business angels in particular, highlighted governmental co-financing or promoting policies for co-investors, as a way of improving green tech investments. Such co-financing was mentioned as a way to leverage the available private capital.

Yes, for instance if we as angel investor could co-finance together with the government, that the government can match our investment, that is one of those things. (Swedish Investor)

Regional investment funds could be helpful if there is matching private capital. (Dutch Investor)

Overall, investors point out slightly different aspects in the design as entrepreneurs. For example, investors refer to the design of the subsidy

scheme in terms of predictability as decision determinant, whereas entrepreneurs care more about equal access and fair competition. These findings seem to confirm the usefulness of comprehensible fiscal and financial incentives for mobilizing private early-stage investments, especially for infant technologies (Bürer and Wüstenhagen 2009; Criscuolo and Menon 2015; Haley and Schuler 2011). Loan guarantees could allow new and small companies to scale up. However, these should first and foremost fit the capital needs of the entrepreneur (Kenney and Hargadon 2012, 2014). But there are also investors that avoid subsidy driven business models or companies indicating too much policy risk. In the Netherlands and Sweden such considerations play a major role. They will therefore be even more relevant in countries with less stable fiscal and public policies and political systems.

Interestingly, co-investment with public partners is positively evaluated even though investors then must deal with a public shareholder. This contradicts earlier findings (Migendt et al. 2017). Investors, in contrast to entrepreneurs, like the government to co-invest. But they do not want their investments to be dependent on long-term government support. This probably goes back to the fact that in co-investment, the government is automatically committed up front and political commitment beyond the investment decision is not required. It is much easier to cancel a subsidy scheme than it is to reclaim investments once they have been made. This lends support to the idea that mission-driven public investments by state investment banks to accelerate green innovation could work (Mazzucato and Penna 2016). Lastly, it could be noted that just like the entrepreneurs the investors do not spontaneously mention the broad type of economic policy measures, such as carbon taxes or emission trading systems, recommended by economists.

We conclude from the interviews and survey of investors that government financial interventions need to be first and foremost credible to be effective. And investors do not trust the government to honor long-term commitments without some sort of credible commitment device. Direct co-investment, grants and tax credits work. Subsidies and fickle feed-in tariffs are much less effective as their credibility is more in doubt.

13.4.3.3 Regulatory Instruments

The importance of stability and long-term commitment is also apparent in the interviews when it comes to regulation. Consistent market rules reduce risks and create predictability and stability in the market. The policy risk is

still considered the most prominent risk and hardest to manage in the green tech business.

Sectors that are heavy regulated [...] are also very difficult to invest in. We cannot handle policy risk. We do not understand it and we will never lobby in Brussels. (Swedish Investor)

Hence investors shy away from artificially created markets and complexly regulated environments.

Regulation does create markets, but like artificial market creation, so for us, although it is generally not true for a lot of investment platforms, we do not make our decisions based on that, naturally we shy away from areas where the markets have been artificially supported, and because that creates bubbles, and you know, as soon as that sparks it collapses those markets. (Dutch Investor)

Regulations that create a level playing field between fossil-fuel-based companies and green firms are less easily retracted, and hence investors prefer them over policies that support renewables (Bürer and Wüstenhagen 2009; Polzin et al. 2015). Market creation for green tech through these measures is perceived as critical by academics (Mazzucato 2016). The message we take home from our interviews and surveys, however, is a different one. Investors stress, in many ways, the need for a stable business environment. They cannot manage and do not want to engage policy risk. The underlying intuition of the ‘Porter hypothesis’ (Porter and van der Linde 1995) is being rejected by the investors in the sense that not strict but rather long-term stable policies can fulfill the role of creating new competitive advantages for firms.

13.4.3.4 *Systemic Instruments*

Beyond fiscal and financial support and regulation of markets, investors see incubators, diffusion of information such as market intelligence and education for early-stage investors, as positive and encouraging for their investments. They feel the government could take a more active role in promoting such events and activities.

We usually like companies that come out of incubators. (Swedish Investor)

Educate private investors in professional angel investing, train for better due diligence, make it easy to organize syndicates of investors, and help investors get cashflow while still continuing to invest in early stages. Lack of liquidity is a big problem, and so lack of diversified portfolios. [Business angels are] undercapitalized, underprofessionalized and underorganized. (Swedish investor)

Some investors favor direct government involvement in the form of systemic and mission-oriented procurement to stimulate initial demand for green tech products and services to decrease costs. Being a launching customer is also a commitment that need not be long term and typically does not span multiple election cycles. A more activist, innovation-oriented procurement policy is certainly appreciated by investors.

Government, municipality and regional public agencies can go in and say: 'Yes, we would like to do a procurement but a share of it must be for these smaller firms'. (Swedish Investor)

Our analysis shows that soft measures such as the creation of incubators are also deemed sensible (Bertoni et al. 2015; Gompers and Lerner 2001). Direct government involvement in the form of public procurement and indirect government involvement through long-term planning and developing networks and information exchange in incubators reduces investor risk and hence mobilizes private finance (Edquist and Zabala-Iturriagoitia 2012; Wüstenhagen and Menichetti 2012). It is interesting to note, however, that investors typically evaluate such policies more important than entrepreneurs. Moreover, they even consider these policies more important than entrepreneurs think they do. That is, there seems to be a mismatch in the perception on this point (see also Polzin et al. 2017b).

13.4.3.5 *Framework Conditions*

Beyond supporting green tech markets, a functioning equity market to successfully exit their investments is a prerequisite for mobilizing more early-stage investments. Hence, to complement initiatives directly aimed at the green tech sector, framework conditions for VC/PE matter as well. Here, most investors see barriers for their engagement.

For venture capital in Europe [...] there are a lot of great companies, a lot of great deals, but for the companies to become really large and for good exit opportunities, more money needs to be around. We see a lot of great companies,

we cannot invest in all of them. At the moment, it is great for us, we get to be really picky about our deals. (Dutch Investor)

More specifically, a few investors also stress the importance of legal protection of the product. They care about the imitability of the technology and see intellectual property as an effective way to secure returns.

Intellectual property becomes increasingly important (to us and others). The best idea in the world is not worth so much if you do not (or cannot) lock it in with an appropriate intellectual property portfolio. (Swedish Investor)

As the entrepreneurs, investors clearly evaluate this issue from the current situation. Intellectual property is considered valuable because it increases the profitability of firms that have patented their technology. The fact that patent protection may inhibit diffusion and imitation is considered a good thing from the perspective of the investor. On a societal level, however, stricter patent protection may also lead to less competition and innovation.

Some investors further state that pension funds should be given more possibilities to allocate private capital into green tech. Their mandate and new regulation requires them to reduce risks. That is, move out of venture capital and even out of the general stock market (important as an exit channel for VCs to sell their shares) and invest their funds into more secure and liquid government assets.

I would use my power to force Dutch pension funds to make their money available to Dutch industry and Dutch society. (Dutch Investor)

Pension funds and institutional investors [should also] decide to allocate a larger part of their capital to a green tech fund. (Dutch Investor)

With over 1000 billion in assets under management (Tan 2016), pension funds are looked at by investors, especially in the Netherlands. The micro perspective the investors take, however, makes them rather insensitive to the fact that these pension funds have investment policies that preclude high-risk VC, also in green tech investments, to protect pension fund beneficiaries from losses. On the other hand, unleashing (a share of) these resources for investments in the sustainability transition is societally beneficial.

Finally, investors also highlight high taxes on firm profits, payroll or incentives systems as decreasing private investment in green tech venturing.

Labor-market regulation is mentioned as a deterrent for green tech entrepreneurship as flexibility is a key factor in the early stages of the company life cycle.

It is more on a macro level, making it easier to hire people. Then you can build a team and repay them with stocks. (Swedish Investor)

Also the investors highlight very clearly the general framework conditions for early-stage investments as critical barriers to stronger engagement in green tech (Bottazzi and Rin 2002). Especially, tax legislation and labor-market rules need to be reformed (Keuschnigg and Nielsen 2003, 2006; Lerner and Tåg 2013).

To summarize from the interviews and survey, most importantly, many investors mention long-term policy commitment as vital for investing in the green tech sector.

The most important thing is probably that you get some (policies) that are stable over time.[...] So that they become calculable.[...] There is too much instability around these policies. (Swedish Investor)

Just clarity on the long term [...] the biggest problem that we have is that it changes every year. (Dutch Investor)

Technologies, products and business models are still highly dependent on the policy environment. Major renewable technologies may have reached grid parity (e.g. the levelized costs of energy from renewables are as low as from fossil fuel sources), but policies can still significantly affect their respective business cases. The lack of predictability looms large in the minds of investors in Sweden and the Netherlands alike.

13.5 CONCLUSIONS

Early-stage equity capital is a small but essential component of a healthy financial ecosystem (Fricke 2016; Migendt et al. 2017; Perez 2013). A diverse financial system consisting of a multitude of actors that cover a variety of risk/return profiles and therefore finance different companies' projects and infrastructure is firstly more stable and thus more resilient to shocks—a core attribute of a sustainable financial system. Secondly it allows for innovation in green tech sectors to be financed which contributes

directly to a sustainability transition in the real economy—a central of a sustainable financial system (Bürer and Wüstenhagen 2009; Migendt et al. 2017; Polzin et al. 2017a; Wüstenhagen and Menichetti 2012). For these macro-level benefits to materialize, however, governments should try to mobilize more private funding for early-stage green tech investment.

When approaching the problem of lacking private investment in the commercialization stages of green tech products and services, an effective policy strategy should consider the most affected stakeholders (Georgallis and Durand 2017). In this chapter, we therefore interviewed and surveyed them directly to elicit their views and ideas on effective policy interventions. When comparing investor and entrepreneur suggested policies, one needs to relate the responses to the problems as perceived by the market actors in green tech markets. These inefficiencies create a role for governments. However, investors and entrepreneurs diverge on what they regard as problematic and do not necessarily agree on what they consider effective policy interventions. Entrepreneurs more often argue that green tech and impact investment in general warrant special policy treatment, whereas investors consider green tech investments to be no different to any other investment.

Both stress the need for more basic R&D and research infrastructure which often is seen as a ‘no-regret’ strategy for policy makers. However, it is expected to have little impact on entrepreneurs’ and investors’ decisions to engage in the green tech sector. Fiscal and financial incentives—in particular, government co-investing and risk taking—are advocated by both parties. Both also assessed the efficiency of such interventions to depend on the stringency, predictability and time horizon of the policy program. Increased governmental market participation could possibly improve the efficiency of the market by internalizing some of the mismatch as investors and entrepreneurs see it. Interestingly, not only investors but also entrepreneurs argue for investor tax credits to accelerate investments. Subsidies and other direct support systems are appreciated by entrepreneurs in so far as it gives positive short-term effects on profitability but is never mentioned an important driver of investments. Investors, on the other hand, express strong aversion toward this kind of support systems and regulation that can easily be rolled back. As a general rule, investors emphasize long-term commitment and a steady hand in environmental and energy policy. Systemic instruments such as public procurement are effective policy instruments mentioned by both entrepreneurs and investors. Soft policy measures, such as networking initiatives, education or information

diffusion, are not top of mind for entrepreneurs but are evaluated more positively by investors. Opinions differ also on the role of incubators and networking. Interventions to improve the matching between investors and entrepreneurs could be relatively low cost options to increase matching efficiency in the market for venture capital (Polzin et al. 2017b).

Framework conditions for early-stage investments are a clear barrier to early-stage green tech investments, highlighted by both investors and entrepreneurs. Especially, intellectual property legislation, labor-market rules and tax policy are critical barriers to more investor engagement. Both stakeholder groups share the opinion that constraints and taxes should be reduced and intellectual property plays a key role in promoting green tech innovation. Increasing labor-market flexibility is also deemed important by both entrepreneurs and investors.

Our findings suggest that a suitable public policy mix anchored in the stated preferences of both investors and entrepreneurs consists of two components. First demand generating policies, such as tax breaks for green tech entrepreneurs and government seed funding, should be combined with systemic instruments such as incubators for green tech entrepreneurs and public procurement for green technologies. Second, long-term general support for early-stage finance should be given, for example, by adjusting the mandate of pension funds to invest some of their vast resources in risky venture capital, by adapting intellectual property law to allow for more innovation and by reforming labor-market rules to increase the flow of labor to start-ups.

One should not make the mistake of taking survey and interview responses of stakeholders at face value. Well-designed policies also consider the interest of other stakeholders and society at large. But as we have argued, the mobilization of more private capital for green tech innovation has many advantages beyond the benefits that accrue to those directly involved. For one, a more diverse financial sector that channels more resources in the form of equity investments in a socially desirable and ecologically urgent transition of the energy system will arguably be more resilient and sustainable (Polzin et al. 2017a). By shifting the burden of financing the transition, budget constrained governments can stabilize financial markets, boost private economic activity and foster innovation and growth. Our results suggest that the most directly affected stakeholders are ready to act and will not object to well-designed policy interventions to promote that transition.

NOTES

1. Creative destruction (or discontinuities) refers to process by which novel combinations of inputs lead to product, process or organizational innovation that radically change industries.
2. Up to the point that other countries have accused the Netherlands of being a tax haven and allowing large corporates to channel their profits through the Netherlands largely untaxed.

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Financial Sector Sustainability Regulations and Voluntary Codes of Conduct: Do They Help to Create a More Sustainable Financial System?

Olaf Weber

14.1 INTRODUCTION

Financial sector voluntary codes of conducts, such as the Equator Principles, United Nation Environment Program Finance Initiative (UNEPFI), and the Principles for Responsible Investment, are increasingly popular. They provide sustainability guidelines for financial sector participants that should help them to integrate environmental and social issues into their business and consequently to create a more sustainable financial market. It is still unclear, however, whether these ‘soft laws’ really have a positive effect on the sustainability of their signatories.

Furthermore, there are an increasing number of countries, such as China, Brazil, Bangladesh, and Nigeria, that introduced financial sector sustainability regulations. These regulations are meant to guarantee a sustainable financial system that focuses on both financial and social and environmental sustainability. All regulations address the connection between financial

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sector activities and sustainable development, and develop guidelines for sustainable banking policies, strategies, practices, products, and services. Such a regulative approach would be a significant departure from banks' approach to rely on purely voluntary codes of conduct as it concerns the integration of sustainability issues into their business. Interestingly, most of these regulatory approaches exist in developing and emerging countries such as China, Brazil, Bangladesh, and Nigeria. However, the Chinese Green Credit Guideline has been discussed particularly intensively.

This chapter will discuss the effects of both voluntary codes of conducts and financial sector sustainability regulations on the sustainability of the financial system. Furthermore, the chapter will discuss the impact of these regulations and soft laws on sustainable development. We will start with discussing voluntary codes of conduct in the first part of the contribution and will discuss financial sector sustainability regulations in the second part. As the third part, we draw conclusions about the connection between both approaches and best practices to guarantee a positive impact on the sustainability of financial markets and on general sustainable development.

14.2 CODES OF CONDUCT IN THE FINANCIAL INDUSTRY

Several pioneering financial institutions, some with the collaboration of nongovernmental organizations, have developed key initiatives to act as guidelines to assess environmental and social risks and as roadmaps toward ensuring economic, social, and environmental sustainability. These initiatives are referred to as codes of conduct. They are voluntary because organizations are not mandated to adopt them but rather develop them as kinds of industry standards. Nonetheless, these self-regulatory codes act as soft laws (Watchman et al. 2007). Once a code has been adopted by a financial institution, the adopter must follow the rules and guidelines of the code of conduct. One of the problems of these codes, however, is that failing to obey their rules usually has no consequences because no independent governance board exists that may enforce the rules of a code of conduct.

This contribution describes the more established codes in the financial sector—the Impact Investing and Reporting Standards (IRIS), the Global Alliance for Banking on Values (GABV), the Equator Principles, the United Nations Environment Program Finance Initiative (UNEPFI), and the United Nations Principles for Responsible Investment (UNPRI). While the first two

codes of conduct focus on certain types of financial institutions, such as social banks and impact investors, the other three codes of conduct focus mainly on conventional financial institutions, such as banks, projects financiers, insurance companies, and asset managers. Table 14.1 presents an overview about the discussed voluntary codes of conduct.

14.2.1 United Nations Environment Program Finance Initiative

As the first sustainability guideline in the financial sector, UNEPFI was founded in 1992 as an association that supports sustainable finance. UNEPFI has more than 200 members, such as banks, insurance companies, and investors. The program's main missions are to increase and disseminate the knowledge about environmental challenges for the financial sector and to contribute to sustainability policies and discussions. UNEPFI has three main commitments. The first is a commitment to sustainable development that regards financial institutions as important contributors to sustainable development. Sustainable development is seen as a commitment and a fundamental of sound business practices. Finally, UNEPFI sees sustainability as a broad concept that includes climate change, development, and security challenges. The second commitment focuses on sustainability management that prevents negative impacts on the environment and society. Furthermore, UNEPFI members will work toward integrating environmental and social considerations into their operations and business decisions, particularly with regard to risk assessment and management. Other important aspects that are mentioned are the need for regular reviews and the need for the financial sector to develop products and services that promote sustainable development. The third commitment addresses public awareness and communication, such as transparent reporting and dialogue, cooperation with UNEP, and encouraging financial institutions to support UNEPFI.

The newest development put forward by UNEPFI is an approach to guarantee the financing needed to achieve the UN Sustainable Development Goals (United Nations 2015) called the Positive Impact Manifesto, as well as principles for positive impact finance. The manifesto asks for a common framework that helps to “identify, assess, and promote positive impact entities and projects” (UNEP Finance Initiative 2016, p. 3). Based on the manifesto, four principles for positive impact finance evolved. The first principle defines positive impact finance as serving “to finance positive impact business” (UNEP Finance Initiative 2017, p. 2).

Table 14.1 Financial sector voluntary codes of conduct (Sources: UNEPFI, <http://www.unepfi.org>; Equator Principles, <http://www.equator-principles.com>; UNPRI, <http://www.unpri.com>; Global Alliance for Banking on Values, <http://www.gabv.org>; The Global Impact Investing Network, <http://www.thegiin.org/iris>, accessed on January 14, 2017)

| <i>Name</i> | <i>Number of signatories</i> | <i>Industries</i> | <i>Main focus</i> |
|--|------------------------------|--|--|
| United Nations Environment Program Finance Initiative (UNEPFI) | 213 | Banks, insurance companies, investors | Promoting sustainable finance, understand environmental challenges for the financial sector, promoting financial sector integration into sustainability policies and discussions |
| Equator Principles (EP) | 88 | Public and private project financiers | Determining, assessing, and managing environmental and social risk in projects and providing a minimum standard for due diligence to support responsible risk decision making |
| United Nations Principles for Responsible Investment (UNPRI) | 1500 | Assets managers, investment managers, service providers | Understanding the investment implications of environmental, social and governance (ESG) factors and supporting its investor signatories in incorporating these factors into their investment and ownership decisions |
| Global Alliance for Banking on Values (GABV) | 38 | Social banks, credit unions, microfinance, housing financiers, and community banks | Using finance to deliver sustainable economic, social, and environmental development |
| Impact Reporting and Investment Standards | 246 | Asset owners, asset managers, service providers (members of GIIN) | Providing a catalog of generally accepted performance metrics to measure social, environmental, and financial success, evaluate deals, and grow the credibility of the impact investing industry |

The second principle focuses on frameworks, such as processes, methodologies, and tools to identify and monitor the positive impacts of activities, projects, programs, and entities to be financed (UNEP Finance Initiative 2017, p. 3). Transparent reporting and disclosure of impacts, processes, and financed projects is the topic of principle three. Finally, fourth principle addresses the assessment of positive impact finance. Though, particularly, the final principle seems to be self-evident, it differs from other assessment principles, such as the green bond principles that base their assessment on transparency, processes, and expected impacts (International Capital Market Association 2016).

Despite its large influence and wide reach, UNEPFI has some weaknesses. Becoming a signatory is relatively easy, and there are no selection criteria of any sort, other than communicating your intent to join and to pay membership fees (Weber et al. 2016). As such, even institutions who are not environmental conscious can very easily commit to the UNEPFI statement (Weber and Adeniyi 2015). Committing to a statement such as UNEPFI is good for brand management, reputation, and public relations and comes without real disadvantages. There have been several occurrences of UNEPFI members being accused to act contrary to the covenants of the Statement of Commitment (Watchman 2006).

Though transparent reporting is a part of UNEPFI's commitment, there is no proper monitoring mechanism. There are also no sanctions and punitive measures to deter institutions from towing that route. This would not be an easy task anyway because the UNEPFI principles do not prescribe any accepted or unaccepted behavior (Weber and Adeniyi 2015).

The strength of UNEPFI is its broad acceptance in the finance industry and its ability to support and engage in research and analysis in sustainable finance. One example for supporting research on sustainable finance is a report on sustainable finance and fiduciary duty that analyzed whether socially responsible investment is in line with institutional investors' fiduciary duty (Watchman 2005).

14.2.2 *Equator Principles*

The Equator Principles were installed in 2003 and revised twice in 2006 and in 2013. They are a voluntary framework providing guidelines for assessing, managing, and reporting environmental risks in project finance (The Equator Principles 2013). Their goal is to guarantee that Equator Principles Financial Institutions (EPFIs) exclusively finance projects with sound

environmental management practices (The Equator Principles 2013). The number of members increased from 10 founding members in 2003 to 88 members in 2016. These institutions are responsible for 80 percent of the global project financing activities. Therefore, the broad adoption suggests an increasing interest of project financiers in addressing social and environmental risks. The ten guidelines are based on the IFC Performance Standards on Environmental and Social Sustainability of the International Finance Corporation International Finance Corporation (2012): They suggest how projects should be categorized into three risk categories. Category A includes projects with potential significant adverse social or environmental impacts that are diverse, irreversible, or unprecedented. Category B projects have potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures. Category C comprises projects with minimal or no social or environmental impacts (The Equator Principles 2013). Furthermore, the guidelines describe how to process further project-related risk assessment procedures, such as:

- Mandatory environmental and social assessment
- Environmental and social standards
- Environmental and social management system and Equator Principles action plan
- Stakeholder engagement
- Grievance mechanisms
- Independent review
- Covenants
- Independent monitoring and reporting
- Reporting and transparency (see Weber and Acheta 2014; Weber and Feltmate 2016)

Furthermore, the Equator Principles have published reporting criteria and extended the scope to include other ways of financing projects, such as bridge loans. Additionally, since 2006 the Equator Principles include climate change in their guidelines. EPFI's report on climate based on the World Bank Group's environmental, health, and safety guidelines. EP III highlights the need for increased due diligence, and requires the analysis of alternatives for high-emitting projects in line with IFC's performance standard 3 (International Finance Corporation 2012). For projects emitting more than 100,000 tonnes of greenhouse gases (GHG) per year, the

Equator Principles also implemented the requirement to report their GHG emissions. Projects emitting at least 25,000 tonnes are encouraged, but not required, to do so (Weber and Acheta 2014).

As one of the earliest financial sector voluntary sustainability codes of conduct, one of the Equator Principles' strengths is that the main project financiers have adopted them and that they continue to attract more project financiers. Furthermore, the principles are based on guidelines of the International Finance Corporation and World Bank that are continuously updated and have global acceptance. One weakness of the principles is that many projects financed by Equator Principles Financial Institutions (EPFIs) are still criticized for breaching environmental and social standards (Lawrence and Thomas 2004; Missbach 2004; Wright and Rwabizambuga 2006). Also, the relatively recent addition of guidelines for high-GHG-emitting projects are criticized as too weak in terms of the GHG emissions threshold and because they are unclear about how alternatives should be assessed (Aboutorabifard 2016; Weber 2016a). A final critique is the lack of monitoring and enforcement mechanisms in cases of non-compliance with the Equator Principles, for instance, nondisclosure of information or project controversies (Weber et al. 2016).

14.2.3 United Nations Principles for Responsible Investment (UNPRI)

UNPRI is a network of investment managers, asset owners, and service providers who practice and promote the following six principles (Weber and Feltmate 2016) that were launched in 2006:

1. We will incorporate ESG issues into investment analysis and decision making processes.
2. We will be active owners and incorporate ESG issues into our ownership policies and practices.
3. We will seek appropriate disclosure on ESG issues by the entities in which we invest.
4. We will promote acceptance and implementation of the Principles within the investment industry.
5. We will work together to enhance our effectiveness in implementing the Principles.
6. We will each report on our activities and progress toward implementing the Principles.

The goal of UNPRI is to understand the implications of sustainability for investors as well as to support signatories to embed these issues into their investment decision making and ownership practices (Weber and Feltmate 2016). By adhering to the six principles, signatories contribute to the development of a more sustainable global financial system. Currently, UNPRI has more than 1500 signatories with about US\$45 trillion worth of assets under management according to UNPRI's 2016 annual report (Principles for Responsible Investment 2016).

With regard to strengths and weaknesses, UNPRI is criticized as being too easy to adopt and therefore carrying the risk of free-rider adoption (Richardson and Cragg 2010). Recently, however, UNPRI started activities to assess signatories' progress and made PRI reporting mandatory, and consequently delisted two signatories because of non-reporting and not participating in the assessment process. Enabling investors and asset owners to include sustainability aspects into their financial decision making is clearly a strength of UNPRI (Gond and Piani 2013). Particularly through the recent reporting and assessment standards, UNPRI also increases the level of transparency of its signatories. Finally, because of the high number of signatories, it raises awareness about responsible investment and support collaborations, knowledge sharing, and knowledge development about responsible investment (Weber and Adeniyi 2015).

14.2.4 Global Alliance for Banking on Values

The Global Alliance for Banking on Values (GABV) is a global network of 38 social banks, microfinance institutions, and credit unions that use finance to deliver sustainable economic, social, and environmental development. The members of the network serve more than 24 million customers, hold about \$110 billion assets under management, and have more than 42,000 employees (Weber 2016d).

Though the network is constantly growing and member banks have been growing in the number of clients, their loan sum, and their assets under management (Weber 2013; Weber and Feltmate 2016; Weber and Remer 2011), a weakness of the GABV is its small size. The biggest bank in the network, *Crédit Coopératif*, has a loan sum of just under \$20 billion, and there are only two banks with total assets of more than \$15 billion. Financially, however, GABV banks grew faster than conventional banks particular after the last financial crisis in 2008 (Weber 2016d). Furthermore, the association has certain criteria for financial institutions to become members.

In contrast to some broader codes of conducts, such as UNEPFI or UNPRI, the GABV uses certain criteria to accept members. The first one is to follow the triple bottom line approach at the core of the business by considering economic environmental and social aspects equally. Furthermore, members of the GABV should be grounded in communities, serving the real economy and enabling new business models to meet the needs of both, communities and the economy. The third criterion is to focus on long-term relationships with clients and a direct understanding of their economic activities and the risks involved, instead of outsourcing credit risk assessment. Fourthly, GABV banks should have long-term business goals, should be self-sustaining, and should be resilient to outside disruptions, instead of concentrating on short-term goals and risky businesses. Finally, the business of the banks should be transparent and be based on inclusive governance that integrates employees and stakeholders into business decision making (Weber 2013).

The focus on the impact of banking on communities, the environment, and sustainable development is reflected in the member banks' business focus. Sectors they are lending to are microfinance, social housing, environmental and renewable energy projects, education, community development, healthcare, organic agriculture, and arts and culture (Weber 2016d).

14.2.5 The Impact Reporting and Investment Standards

IRIS has been developed by the Global Impact Investment Network (Weber 2016b). The network promotes impact investing. IRIS is a set of standards that should help to measure the impact of investments. Impact investing is defined as investments that create financial returns and intentionally address social and environmental challenges (Bugg-Levine and Emerson 2011). IRIS, however, is less of a guideline for measuring these impacts and more of a collection of indicators that can be used to assess these impacts. Out of more than 550 indicators, users can pick those indicators that best fit their investments.

IRIS is accessible to all interested parties. Institutions do not have to sign up or adopt certain standards to use the indicators. Using the indicators, however, means following a certain standard that makes it easier to report, assess, compare, and benchmark the impact of investments and impact investors.

The indicators can be grouped into the following performance categories:

- Financial performance: standard financial reporting metrics such as current assets and financial liabilities
- Operational performance: governance policies, employment practices, and social and environmental impact of day-to-day business activities
- Product performance: social and environmental benefits of the products, services, and unique processes offered by investees
- Sector performance: impact in particular social and environmental sectors, including agriculture, financial services, and healthcare
- Social and environmental objective performance: progress toward specific impact objectives

One of the major strengths of IRIS is the number of indicators provided. The list contains more than 550 indicators including explanations and guidelines for what types of impact investments they can be used. A large group of impact investors that are members of the GIIN helped developing the indicator set. Therefore, it represents a kind of standard for the impact investment community that does not only help investors to assess their impact but also facilitates reporting of investees similar to the approach used by the Global Reporting Initiative. Furthermore, the standard creates the opportunity of comparing and benchmarking impacts.

The weaknesses of the GIIN are that they do not provide clear standards about which indicators should be used for particular types of impact investments and impact investors. Furthermore, it is rather a set of indicators than a voluntary code of conduct that has to be signed and adopted by its members. Therefore, all investors can use the indicators, and consequently it is hard to distinguish between international impact investors and those that just measure non-intentional impacts. The openness of the system, however, can also be a strength because it supports the dissemination of the indicators.

14.3 FINANCIAL SECTOR SUSTAINABILITY REGULATIONS

The second part of this chapter focuses on regulatory approaches. The main drivers for these approaches are internal pressure, such as social pressure and environmental pollution; external pressure from financial (aid) institutions, such as the International Finance Corporation (IFC); and pressure from regional neighbors (Oyegunle and Weber 2015).

The integration of sustainability aspects into financial regulations, domestically and internationally, could be a strong driver for achieving a

transition to a sustainable economy in both developed and developing countries and could be able to increase financial sector stability (Weber 2016c). Financial capital is one of the main inputs needed to guarantee sustainable development. Therefore, regulations could be able to link financial capital with sustainable development.

The following sections describe financial sector sustainability regulations with regard to the drivers to implement the regulations, their main goals, their content, their strengths and weaknesses, and their state of implementation. Additionally, the following sections will group the regulations according to their differences and similarities.

Finally, we will focus on the impact of the most important financial sector sustainability regulations, such as the Chinese Green Credit Guidelines, the Nigerian Sustainable Banking Principles (NSBPs), and the Bangladesh Environmental Risk Management (ERM) Guidelines, on banks' sustainability performance.

According to the International Finance Corporation, financial sector sustainability national policies, guidelines, principles, or road maps exist in Bangladesh, Brazil, China, Colombia, Indonesia, Kenya, Mexico, Mongolia, Nigeria, Peru, South Africa, Turkey, and Vietnam (Oyegunle and Weber 2015). Furthermore, there are regulations with regard to climate change risks for pension funds in the European Union as well as national regulations, for instance, in France with regard to climate risk disclosure. Table 14.2 lists the main general financial sector sustainability regulations, their drivers, and their scope (for an overview about all financial sector sustainability regulations mentioned above, see Oyegunle 2016). All these financial sector regulations are issued in emerging market countries. Regulators in these countries try to influence the environmental and social performance of businesses through financing mechanisms. Particularly, in countries with relatively weak enforcement mechanisms, finance can be a powerful tool to influence industries to become more environmentally friendly and to address social issues. Furthermore, the regulations in Bangladesh and China also address financial sector risks. They argue that the integration of environmental and social aspects in credit risk management decreases financial risks for the banking industry. Other countries, such as Nigeria and Bangladesh, introduced sustainability guidelines to comply with sustainability criteria of development finance institutions that have sustainable banking as an obligation to be eligible for financing.

The effect of these regulations on both sustainable development and financial sector stability is hard to assess because the regulations are relatively

Table 14.2 Financial sector sustainability regulations

| <i>Country</i> | <i>Regulation</i> | <i>Scope</i> | <i>Drivers</i> |
|----------------|--|--|---|
| Bangladesh | Environmental Risk Management (ERM)—Guidelines for Banks and Financial Institutions in Bangladesh (2011) | Protection of bank funds from environmental risks and climate change impacts Streamline environmental credit risk management among financial institutions Enable banks make useful and important contributions toward local and global sustainable development | Development finance institutions (DFIs) impact Stakeholders pressure Environmental degradation and climate change Credit risk management and bank financing protection Standardization of processes and policies |
| Brazil | Resolution No. 4327 of April 25, 2014—Social and Environmental Responsibility Policy for financial institutions and other entities authorized to operate by the Central Bank | Must be adopted by financial institutions and other entities authorized to operate by the Central Bank of Brazil Aims to guide internal and external activities of financial institutions with respect to their E&S impacts Obligates institutions to manage E&S risks to avoid incurring losses arising from E&S damage | Offshoot of initiative led by stakeholders notably FEBRABAN Influence of existing environmental laws and guidelines Impact of E&S issues such as the Amazon rainforest and slave labor Standardization of processes and policy Risk control without creating liability for the bank on third-party activities |
| China | Green Credit Guidelines (2012) | Regulates Chinese policy banks, commercial banks, rural cooperative banks, and rural credit unions Promote green credit growth Using green credit to support economic growth and manage environmental risks for the financial sector Strengthen credit policies and processes to identify, | Environmental laws Environmental issues, such as pollution, emissions, and energy use Need to reduce environmental impacts of industries Guarantee financial sector stability |

(continued)

Table 14.2 (continued)

| <i>Country</i> | <i>Regulation</i> | <i>Scope</i> | <i>Drivers</i> |
|----------------|--|--|---|
| Nigeria | Nigerian Sustainable Banking Principles (2012) | <p>assess, monitor, control, or mitigate environmental risks in financial business operations</p> <p>Enhance financial sector impact on economic, social, and environmental development</p> <p>Embed environmental and social (E&S) assessment processes in the financial sector</p> <p>Create a balanced E&S management platform for the financial industry</p> <p>Attract foreign investors and meet environmental and social risk management expectations</p> | <p>Attract development finance</p> <p>Management of environmental and social risks</p> <p>Support government policies</p> |

new and their impact on sustainable development is indirect. However, an analysis of China, Bangladesh, and Nigeria could demonstrate that the sustainability regulations had an impact on the sustainability performance of banks in these countries (Weber and Oni 2015). Furthermore, Oni found that banks from these three regulated countries performed better with regard to addressing sustainability issues than banks in neighboring countries without such regulations (Oni 2016).

14.4 FINANCIAL STABILITY BOARD'S TASK FORCE ON CLIMATE-RELATED DISCLOSURES

The Financial Stability Board (FSB) was established in 2009 by the Group of Twenty (G20) countries to promote the reform of international finance regulations and to set financial market standards. Though established by a group of countries, FSB's decisions are not legally binding but rely on moral suasion and peer pressure. In December 2015, the FSB established the Task Force on Climate-Related Disclosures in order to develop a set of recommendations for disclosures helping financial market participants to

understand climate change-related financial market risks. In 2016, the Task Force published a report with recommendations for climate-related financial disclosures (Task Force on Climate-Related Disclosures 2016). The four recommendations focus on governance, strategy, risk management, and metrics and targets:

1. Governance: Organizations should disclose their governance around climate-related risks and opportunities.
 - Description of the board’s oversight of climate-related risks and opportunities
 - Description of the management’s role in assessing and managing climate-related risks and opportunities
2. Strategy: Organizations should disclose actual and potential impacts of climate-related risks on their business strategy and financial planning.
 - Description of short-, medium-, and long-term climate-related risks and opportunities
 - Description of the impact of climate-related risks and opportunities on the organization’s businesses, strategy, and financial planning
 - Description of potential impact of different climate change scenarios including a 2C scenario
3. Risk management: Organizations should disclose how they identify, assess, and manage climate-related risks.
 - Description of processes to identify and assess climate-related risks
 - Description of processes to manage climate-related risks
 - Description how these processes are integrated into the overall risk management
4. Metrics and targets: Organizations should disclose the metrics and targets used to assess and manage their climate-related risks and opportunities.
 - Metrics to assess climate-related risks and opportunities in line with strategy and risk management processes
 - Scopes 1, 2, and, if appropriate, Scope 3 GHG emissions and related risks
 - Description of targets used to manage climate-related risks and opportunities including performance

In addition to the four recommendations, the Task Force also published seven principles for effective disclosure, stating that disclosures should be

relevant, specific, and complete; clear, balanced, and understandable; consistent over time; comparable; reliable, verifiable, and objective; and be provided on a timely basis. Furthermore, they provide guidance for all sectors and for sector-specific disclosure (Task Force on Climate-Related Disclosures 2016).

The strength of the Task Force's recommendation lies in the group that has developed them. The Task Force is chaired by Michael Bloomberg and reports to the FSB's Chairman Mark Carney who emphasized the risks of climate change for the financial sector in a number of speeches and publications (see Carney 2015). Members of the group are high-level representatives from the financial industry and other industries affected by climate change. Another strength is the outreach to all G20 countries including discussions on G20 meetings. Furthermore, the recommendations are the basis for developing a clear standard for disclosing climate change risks for businesses that makes risks and opportunities for businesses comparable.

A weakness of the recommendations is that they are not mandatory and it is unsure whether other industries will adopt them. Probably, pressure from lenders and investors to disclose the recommended indicators will accelerate the adoption of the recommendations. In addition, the report does not say how the financial sector should address climate change. The group is silent about particular governance mechanisms, strategies, risk management procedures, and metrics and targets for the financial industry that reflect the indirect and complex connection between the financial industry and climate change. The connection between derivatives or other complex financial products and climate risks, for instance, is not discussed. Hence, the question on how the financial sector should address climate change issues, other than direct risks and opportunities, remains open.

14.4.1 Sustainability-Related Pension Fund and Institutional Investor Regulations

Some countries and legislations have introduced regulations addressing the disclosure of climate risks and management practices to avoid climate-related financial risks for pension funds and other institutional investors. The decarbonization of investors' portfolios is crucial in order to reduce carbon emissions. In France, for instance, the amendment to France's Energy Transition Law requires large investors to make annual disclosures on the extent to which they have integrated environmental and climate-related considerations in their investment policies. Furthermore they are

obliged to report about greenhouse gas emissions embodied in their investments and about their contribution to meeting French and international climate objectives. Finally, they have to disclose how much of a financial risk they face because of climate change (European Commission 2016). Many other countries and legislatures, such as Australia, the UK, the USA, and the EU, have mandatory reporting schemes addressing climate change for nonfinancial and financial firms. These regulations, however, make reporting mandatory and do not set any specific targets or benchmarks with regard to decarbonizing portfolios.

14.5 DO VOLUNTARY SUSTAINABILITY CODES OF CONDUCTS AND FINANCIAL SUSTAINABILITY REGULATIONS HELP TO CREATE A MORE SUSTAINABLE FINANCIAL SYSTEM?

This chapter described voluntary codes of conducts and regulations addressing sustainability from a financial sector point of view. It is obvious that both voluntary codes of conducts and regulations that address sustainability are a relatively new phenomenon. Particularly, financial regulators addressed the topic just recently, probably, because of evidence for a correlation between climate change and financial sector stability. Since the main goal of financial regulators is to address financial sector risks, performance, and stability, regulators can only address climate change-related topics if they relate to the core tasks of financial regulators. Voluntary codes of conducts addressing sustainability exist a little longer than regulations. For instance, UNEPFI has been founded in 1992 by a group of financial institutions that wanted to make progress on environmental risk management and sustainability impacts of the financial sector.

To answer the questions whether these regulations and codes of conduct help to create a more sustainable financial system, we must define our understanding of a sustainable financial system. On the one hand, a sustainable financial system is a system that works long term without disruptive shocks, such as the 2008 financial crisis. On the other hand, a sustainable financial system is a system that accepts responsibility for the broader socio-ecological system and sustainable development.

The first topic, the long-term stability of the financial sector, is addressed by newer developments, such as the Task Force on Climate-Related Disclosures (2016). The Task Force was founded based on Mark Carney's activities addressing climate-related risks for the financial sector (Carney

2015). However, though not explicitly mentioned, UNEPFI, UNPRI, and the Equator Principles focus mainly on environmental and social risk management for the financial sector. UNPRI, for instance, argues that integrating ESG indicators into financial investment decisions helps to address risks material for the financial return of the investments. In addition, the Equator Principles concentrate on assessing environmental and social risks rather than positive impacts of project finance. Though the GABV emphasizes the financial stability of value-based banks (Korslund 2012, 2013), their mission does rather focus on the second aspect of a sustainable financial system, the social-ecological impacts of finance.

Some of the financial sector sustainability regulations focus on financial sector stability as well. Particularly, the Chinese Green Credit Guidelines stress the connection between moving away from financing polluting industries and financial risk mitigation for Chinese Banks. The same is true for the regulations in Bangladesh and Brazil that should help to protect the financial sector from environmental and social risks through the integrations of these risks into financial risk assessment processes. Regulations on pension funds and institutional investors follow a similar approach. They focus on disclosing climate-related portfolio risks.

Overall, it seems that both financial sector sustainability regulations and voluntary codes of conduct address the sustainability of the financial sector. The problem, however, is that, so far, regulations only exist for few countries and with the exception of China, not for countries with big economies.¹ Maybe, based on the activities of the Financial Stability Board and its Task Force, financial regulators in other countries will introduce such regulations, particularly to mitigate the impact of physical, legal, transitional, and reputation risks of climate change for the financial sector.

Though most of the voluntary codes of conducts discussed above focus on the benefits for their issuers, the question remains whether they have an impact of the financial stability of their adopters. The reason for this is mainly that UNEPFI, UNPRI, and the Equator Principles do not have any mechanisms that address how to manage social and environmental risk. Furthermore, many adopters have conducted the processes that are proposed by the codes of conduct even before they adopted the codes (Weber et al. 2016). The codes, however, may help them to better integrate environmental and social risks into financial decision making because they standardize the assessment and management of these risks and force them to consider environmental and social risks.

Both GABV and IRIS focus on the impact of their members on socio-ecological systems and sustainability rather than on their financial stability. Both, however, emphasize that impact and financial returns can go hand in hand. Furthermore, as mentioned above, studies suggest that members of the GABV also do well financially (Weber 2013, 2016d). Further studies focusing on the financial stability of participants in social finance and impact investing may be able to answer this question.

Whether the discussed regulations and codes of conduct address broader socio-ecological issues, however, is still open. Most of the regulations clearly address these issues. In addition, most of the countries with financial sector sustainability regulations try to leverage the impact of the financial sector on other industries to address environmental and social problems. Providing finance for industries or depriving them of finance can be a powerful tool to channel commercial borrowers and investees into a more sustainable, social, and environmentally friendly direction.

Time will tell whether approaches such as the FSB Task Force, climate change disclosure regulations for pension funds, and other institutional investors will have an impact on climate change. Disclosure of environmental or social risks and disclosure of strategies and processes to address these risks and opportunities are a first step in addressing socio-ecological issues. Though the proposed measures will make it easier to assess these risks and opportunities and to compare the performance of businesses with regard to these issues, it does not mean that they really improve in their socio-ecological impact. Several studies suggest that good reporting and transparent disclosure of environmental and social indicators often do not correlate with the social and environmental performance of the reporting institution (Adams 2004; Talbot and Boiral 2013; Weber 2016a). Furthermore, approaches, such as the Task Force or institutional investor regulations, mainly focus on issues that have a material impact on the financial performance of the financial industry. However, not all sustainability issues have material impacts on the business performance of the financial industry. Biodiversity, for instance, is usually not addressed. The same is valid for social sustainability issues, such as gender, health, or education. Often, businesses do not perceive as being material.

The impact of financial sector voluntary sustainability codes of conduct on socio-ecological systems is also discussed controversially. Similar to voluntary codes of conducts in other industries, many studies suggest that the impact of conducts, such as UNEPFI, UNPRI, and the Equator Principles, is relatively low. They mainly focus on reputation, the avoidance of

regulations, and other issues that are beneficial for the adopters of the codes (Bondy et al. 2008; Sethi and Emelianova 2006; Somers 2001) instead of addressing the impact of the financial industry on sustainable development (Weber 2014).

On the other side, however, sustainability codes of conducts in the financial sector help to include sustainability issues in financial and strategic decision making (Weber et al. 2016) through standardizing and mainstreaming environmental and social risk assessment. Codes, such as UNEPFI and UNPRI, with a high number of adopters, helped to mainstream environmental, social, and sustainability issues in the financial sector and even analyzed whether addressing these issues is in line with the fiduciary duty of the financial industry (Lydenberg 2013; Sandberg 2010).

In addition, more stringent codes of conduct, such as GABV and IRIS, set new standards in sustainable finance through defining how, for instance, value-based banking differs from conventional banking and by providing indicators and tools that help to assess the impact of sustainable finance (Weber and Feltmate 2016).

Finally, initiatives, such as the FSB Task Force on Climate-Related Disclosures (Task Force on Climate-Related Disclosures 2016), support the development of regulative approaches through the development of internationally accepted reporting standards. Such hybrid approaches, combining voluntary activities with disclosure regulations, may help to create a more sustainable financial system.

NOTE

1. Though countries, such as Nigeria and Indonesia, will belong to the biggest economies in the near future.

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Why Self-Commitment Is Not Enough: On a Regulated Minimum Standard for Ecologically and Socially Responsible Financial Products and Services

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15.1 INTRODUCTION

Ecologically and socially responsible financial products and services are receiving considerable attention in the context of investment management and also in the public debate. While many financial service providers claim to offer ecologically and/or socially responsible financial products and services, their actual dissemination among consumers, however, appears to be rather low (see, e.g., the report by USSIF (2014) stating that the market of SRI investments is dominated by professional institutional investors with a market share of more than 85 percent). One of the main obstacles for consumers when dealing with ecologically and socially responsible financial

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products and services is the lack of an unambiguous understanding of what ecological and social responsibility actually means and which information they actually need to decide which products to buy or sell and which services to use (see, e.g., Bassen and Senkl 2011; Dheeriyaa 2017; Sheehy 2015). In this chapter, we discuss the consequences of the lack of such unambiguous understanding and provide a suggestion how to overcome this obstacle. We address this question from the point of view of individuals as consumers in the market for financial products and services. Compared to institutional market participants, consumers as, for example, retail investors or users of a broad variety of financial services are assumed to face larger difficulties in assessing financial products and services and making appropriate financial decisions (see, e.g., Oehler 2011, 2013, 2017; Oehler and Reisch 2008; Oehler and Wendt 2017; Oehler et al. 2009). When using the term *ecologically and socially responsible* we are aware of the fact that some scientific publications and the public debate also refer to *environmentally responsible* with a meaning that we assign to the term *ecologically responsible*. As, however, the terms *ecosystem* and *environment* are often used interchangeably, this difference in terminology does not limit the implications of this chapter although some nuances in theoretic definition might exist.

Decisions to buy or sell financial products, such as shares in companies or mutual funds and bonds, or to use financial services, such as banking and insurance services, require the assessment of the alternatives available. When focusing on ecologically and socially responsible financial products and services, consumers do not only need to assess the risk and return characteristics, but also the ecological and social characteristics (see, e.g., Renneboog et al. 2008 for a discussion on the nonfinancial characteristics of investment decisions, such as social or ethical objectives, and a possible aversion of consumers to unethical corporate behavior). This requires that they do not only separately assess social, ecological, and financial characteristics; instead they need to assess all characteristics at the same time and their interdependencies in the sense of a conflation of social, environmental, and financial performance (Aras and Crowther 2010). In this context, consumers face two main challenges. First, due to limited cognitive capacity and time constraints (see, e.g., Kahneman and Tversky 1979; Selten 1990), they will not be able to gather and process all information related to all alternatives, they will not be able to double-check if all information they are provided with is actually correct, and they will not be able to monitor all financial products closely over time (see, e.g., the literature on choice overload by Baron 2000; Malhotra 1984; Miller 1956; Plous 1993).

Second, ecological and social responsibility is an ambiguously defined concept. Industry-wide, countrywide, or even international standards of how to implement the idea of ecological and social responsibility based on specific and detailed criteria barely exist. Instead, every financial service provider can define and implement these criteria according to own policy. The latter policies allow financial service providers to label mutual funds as ecologically and socially responsible although these funds hold up to, for example, 18 percent nuclear power companies, 35 percent oil and gas companies, and 13 percent military industries in their portfolio as identified by Bettzieche 2012.

We examine both challenges in detail and discuss how to address them in order to provide consumers with the opportunity to make appropriate financial decisions in the context of ecologically and socially responsible financial products and services. We provide a concept for a regulated minimum standard for ecologically and socially responsible financial products and services which tackles the main shortcomings that hamper their dissemination. When it comes to the definition of social responsibility, investors and standard setters might refer to social norms in specific countries or regions. In this chapter, however, we focus on the conceptual approach of a minimum standard of ecological and social responsibility which can be implemented on both a global and a local level. As addressed later on in this chapter, generally accepted criteria of ecological and social responsibility that need to be fulfilled to meet the minimum standard still need further discussion and clarification. Given the internationally intertwined nature of financial markets, the criteria to be embedded in a minimum standard for ecologically and socially responsible financial products and services need to be applicable in an international context. This, however, does not restrain local standard setters from implementing even stricter requirements. Given the current state of legal requirements regarding social and ecological aspects around the world, it is not sufficient that financial products and services simply fulfill these legal requirements. Instead, they need to be based on socially and ecologically responsible activity beyond complying with legal requirements (Green Paper EU 2001). Although ecological and social responsibility is typically discussed in the context of a certain spectrum of investment instruments such as mutual funds, the underlying idea should be applied to a much broader range of financial products and services, including savings accounts, loans, mortgages, and insurance contracts (e.g., Weber 2010).

Not only are the implications of requesting a regulated minimum standard for ecologically and socially responsible financial products and services important for consumers, but they are also relevant for regulators, supervisors, and financial service providers. This relates to defining and implementing the minimum standard at the regulatory level and in the policies of financial service providers as well as to subsequent supervision and monitoring and design of information documents for ecologically and socially responsible financial products and services.

We first address individuals' financial decision-making based on findings in behavioral economics and finance, and we will explain how information about financial services should be presented to individuals to facilitate their decision-making (Sect. 15.2). Subsequently, we discuss the concept of ecological and social responsibility and address why determining this concept for financial products and services and informing consumers in corresponding product information need to be based on a minimum standard (Sect. 15.3). Building on these ideas, we discuss how the minimum standard can be achieved (Sect. 15.4) and we will present final remarks and conclusions (Sect. 15.5).

15.2 INDIVIDUAL DECISION-MAKING AND THE ROLE AND DESIGN OF PRODUCT INFORMATION

Consumers will not act fully rationally when making financial decisions (here and in the following see, e.g., Oehler 2011, 2013, 2017; Oehler and Reisch 2008; Oehler and Wendt 2017; Oehler et al. 2009). Full rationality would require that consumers identify and gather all relevant information, process and interpret the information correctly, and incorporate the information in their decision-making in a way that maximizes their utility—an idea that is inherent in neoclassical financial models and that is often used as guiding principle in regulation (see, e.g., Micklitz 2003, 2004, 2013). Actual decision-making, however, is influenced by consumers' limited cognitive capacity and by emotional and motivational factors (e.g., Kahneman and Tversky 1979; Selten 1990). Moreover, individuals are not able to determine their utility in the same way as implied by neoclassical utility models.

Individuals use heuristics instead of using all relevant information about all alternatives (see, e.g., Tversky and Kahneman 1974). This means that they will use information that is available most easily or presented most

prominently, and, when comparing products, they focus on salient features (e.g., Bordalo et al. 2013). Overall, consumers will not be able to use full information when making decisions, even if it were available. When consumers are less experienced in the decision context and when information is hardly understandable, this behavior is even stronger (Kahneman 2003). This situation creates incentives for financial service providers to present benefits and expected return of financial products and services in a more prominent way than risks associated with these products.

To allow consumers to reasonably compare financial products and services, high-quality information that emphasizes the essential characteristics of a financial product and/or service is needed (see, e.g., Oehler et al. 2014). Essential characteristics generally include substantial risks, liquidity/flexibility, net return, all costs and charges, and portfolio effects. High-quality information needs to fulfill necessary and sufficient conditions. Necessary conditions focus on criteria that allow individuals to receive and understand information and to incorporate it in the decision-making process. This means that information that fulfills the necessary conditions allows consumers to make use of this information. Sufficient conditions need to be fulfilled to allow consumers not only to use the information but to make adequate decisions (here and in the following: Oehler 2017; Oehler and Wendt 2017).

Necessary conditions that information needs to fulfill include transparency, comprehensibility, and comparability. In this sense, *transparency* means that all relevant information about essential product characteristics is available and accessible for individuals. Due to bounded rationality consumers might eventually not use all relevant information; however, if relevant information is missing, they would not even get the chance to use it and they might therefore miss important characteristics. *Comprehensibility* requires that information be given in plain language to allow consumers to understand the information without having expert knowledge in finance. *Comparability* means that information for similar or closely related financial products and services is presented along the same information categories and allows consumers to compare relevant alternatives.

Sufficient conditions relate to a minimum quality level that information needs to reach in order to allow consumers to make adequate financial decisions. In this sense, sufficient conditions include clarity, fit to personal needs, and verifiability. *Clarity* requires that information about the essential product characteristics allow for unambiguous interpretation and inference of the consequences of decisions to buy or sell the product or service and should not lead to confusion. As consumers often misinterpret information

that is given as financial ratios or percentages, potential monetary consequences should be explained in amounts of money in the relevant currency (e.g., Bateman et al. 2014). *Fit to personal needs* means that information is provided about the financial need that the product is addressing and/or adequate for, such as basic financial needs (safety first, low risk), additional financial needs (income protection, retirement provisions), or for speculation purposes after both basic and additional financial needs have been taken care of. *Verifiability* means that particular third parties, such as judicial authorities, supervisors, and consumer organizations, need to be able to verify the information before a consumer's decision to enter into the financial contract and also afterwards, this means during the contract period and as long as legally defined periods of limitation have not expired. The focus on third parties when it comes to verifiability originates from consumers' bounded rationality which typically does not allow them to verify all details themselves.

15.3 ECOLOGICAL AND SOCIAL RESPONSIBILITY AND THE NEED FOR A MINIMUM STANDARD

Applying the idea of ecological and social responsibility to financial products and services means that the essential product characteristics substantial risks, liquidity/flexibility, net return, all costs and charges, and portfolio effects are complemented by the fulfillment of ecological and social criteria. It also means that the information that consumers receive about these financial products and services needs to address whether or not ecological and social criteria are fulfilled. However, there are at least two main challenges to this idea. First of all, generally accepted criteria for ecological and social responsibility do not exist. This means that relevant characteristics cannot be determined and that information will not fulfill the necessary conditions' transparency, comprehensibility, and comparability as explained above. Given the internationally intertwined nature of financial markets, the criteria to be embedded in a minimum standard for ecologically and socially responsible financial products and services need to be applicable in an international context. This, however, does not restrain local standard setters from implementing even stricter criteria that are based on socially and ecologically responsible activity beyond complying with legal requirements (Green Paper EU 2001) and incorporate social norms of specific countries or regions. Second, the sufficient conditions cannot be fulfilled as result of

the lack of meeting the necessary conditions. Specifically, inference and interpretation of the consequences of decisions to use financial products or services and the determination of the fit to personal needs are ambiguous. Moreover, verifiability of the essential characteristics is hampered. We will elaborate on these challenges in the following.

15.3.1 Inexistence of Generally Accepted Criteria of Ecological and Social Responsibility

There is an ongoing debate about how to define ecological and social responsibility in different—partially overlapping—strands of literature, for example, literature on corporate social responsibility (CSR) (see, e.g., Sheehy 2015); on environmental, social, and corporate governance (ESG) criteria (see, e.g., Bassen and Senkl 2011); and on socially responsible investments (SRI) (see, e.g., Dheeriyaa 2017). Beyond this, the concept of sustainability is widely used as a conflation of social, environmental, and financial performance (Aras and Crowther 2010). However, there is no unambiguous and generally accepted definition of *ecological and social responsibility* in the context of financial products and services.

Several initiatives have established guidelines or principles related to these areas, such as UNPRI (<https://www.unpri.org/about/the-six-principles>) and USSIF (<http://www.ussif.org/sribasics>) on ESG criteria and the European Commission on a CSR framework (European Commission 2001). These guidelines and principles appear to be very broad, but they do not provide specific criteria that would break down the concept of ecological and social responsibility to a sufficient degree that would accommodate individuals' informational needs. Instead, information provided by the initiatives can serve as starting point for interested consumers. They receive, for example, very basic information about potential investment instruments (including market overviews) and further sources that investors would need to investigate by themselves to gather more specific information, such as information provided by agencies that rate mutual funds regarding their performance on ESG issues. Basically, consumers, again, face the challenge to collect detailed information about the essential characteristics on their own. Depending on the financial products and services, this relates to characteristics of, for example, the underlying investment object such as a firm or a project (shares of stock, bonds) or a portfolio of firms (mutual funds), but also to characteristics of financial service providers.

However, reporting standards for firms' social and environmental performance are woolly, enabling firms to easily engender the impression that they act responsibly or sustainably (Norman and MacDonald 2004). The most popular example for firms' social and environmental performance reporting is *triple bottom line reporting* (see, e.g., Elkington 1994, 1998). It is based on the idea that performance can be split up into three aspects: economic, social, and environmental performance. While the focus of firms' reporting obviously always covers the economic aspects—as based on generally accepted reporting standards as required by law—the inclusion of social and environmental aspects has not yet reached a uniform standard. Instead, most firms use vague rhetoric to generate the impression that they ensure responsible or sustainable development. A closer look, however, reveals that the “concept of a Triple Bottom Line in fact turns out to be a ‘Good old-fashioned Single Bottom Line plus Vague Commitments to Social and Environmental Concerns’” (Norman and MacDonald 2004, 255).

With academic literature not yet reaching consensus about a generally accepted detailed criteria of ecological and social responsibility and policymakers deferring to establish mandatory reporting standards, the quality of information that is easily accessible for retail investors is low. Retail investors, therefore, might be tempted to rely on financial and information intermediaries to receive high-quality information about ecological and social responsibility of financial products and services.

In a situation of large information asymmetries as described above, financial service providers can largely follow their own definitions and design their own approaches to assess and construct supposedly ecologically and socially responsible financial services and products. These approaches commonly comprise positive and/or negative screenings studded with some tolerance thresholds (see, e.g., Schäfer et al. 2006; Oehler 2013). Tolerance thresholds relate to, for example, a maximum of 5 percent of activities based on nuclear power in a green energy fund or a maximum of 3 percent of production based on child labor in an allegedly socially responsible fund. Screenings commonly focus on the inclusion (positive screening) or exclusion (negative screening) of certain business segments and/or practices. Negative screening is widely used to exclude so-called sin stocks, this means stocks of the alcohol, gambling, tobacco industry, and so on; and firms with unethical business policy from the list of investible assets. In contrast, positive screening is used to include assets of companies with high ecological or social performance—based on, for example, contribution

to the renewable energy sector, engagement in social projects, or commitment to ethical initiatives—in the pool of investible assets.

As most of the criteria that are used in the screenings can be fulfilled to different degrees, financial service providers or information intermediaries typically apply scoring or ranking approaches to assess the ecological and social responsibility. Scoring or ranking might appear to allow for a more differentiated evaluation of financial products and services. Although it is—at the first glance—a favorable idea to establish supposedly more nuanced assessments of ecological and social responsibility, it is doubtful that consumers require such complex evaluation approaches and that these approaches really follow the idea of identifying ecological and social responsibility. Instead, most consumers planning to engage in ecologically and socially responsible financial products and services would need to know whether they support ethical issues or not. Therefore, it is important for them to know that a financial product or service is not in contact with unethical issues (see, e.g., Renneboog et al. 2008 for consumers' aversion to unethical corporate behavior). The complex scoring and ranking approaches, however, partially sidestep this simple requirement because they allow counterbalancing unethical behavior in regard to one criterion with ethical engagement in regard to other criteria when all criteria are accumulated to a total score and transferred into a ranking. Combining this problem with the inclusion of thresholds for unethical behavior means that scoring and ranking does not sufficiently reflect breaches of the idea of socially and ecologically responsible financial products and services. This means that any information provided by scores or ranks is neither transparent nor comprehensible for many consumers.

Consequently, consumers might decide to use financial products and services that they do not intend to use in the first place and that they are unable to intuitively understand. Consider, for example, the repercussions of different screening processes when selecting ecologically and socially responsible investments. If a fund is based solely on positive screening, fund management might include all major oil companies because they all established foundations that engage in social projects. This, however, would ignore the negative impact on global climate and pollution due to, for example, carbon dioxide emissions. In the same vein, tolerance thresholds and the aggregation of criteria to one score or rank might lead to investments in companies with unethical labor conditions, for example, if up to 2 or 5 percent of the company's products are allowed to be manufactured under bad labor conditions while the company simultaneously engages in

environmental initiatives. Analyzing the portfolios of allegedly ecologically and socially responsible mutual funds for German retail investors, Bettzieche (2012) showed that these funds hold up to 18 percent nuclear power companies, 35 percent oil and gas companies, and 13 percent military industries in their portfolio. These stock holdings were possible due to the tolerance thresholds that allowed the companies to earn (in most cases) 5 percent of their returns in the nuclear power, oil and gas, military, and genetic engineering market. Consequently, companies could earn up to 20 percent of their sales in these industries and are still labeled as ecologically and socially responsible.

The previous example further shows that comparing ecologically and socially responsible financial products with each other can be difficult because retail investors hardly can assess whether a financial service provider exhausts the tolerance thresholds or not. Besides the problem of unintended use of unethical financial products and services due to the shortcomings of scoring and rating approaches, the heterogeneity of investment approaches leads to intransparent and incomparable products when trying to compare either with other ecologically and socially responsible financial products or with “traditional” products. Specifically, consumers will hardly be able to assess and compare the outcomes of an investment fund using positive screening and a tolerance threshold of 3 percent for child labor with a second investment fund that uses negative screening and a tolerance threshold of 10 percent of fossil energy sources in the production process. Comparing products and services gets even more difficult when they are constructed with a mixture of positive and negative screening procedures.

Although some financial service providers might be willing to commit themselves to transparent and comprehensible selection processes for ecologically and socially responsible products and services, this self-commitment will not be sufficient, because consumers will not be able to unambiguously distinguish between these financial service providers and others due to informational asymmetries and bounded rationality. In addition, competition in the market for ecologically and socially responsible financial products and services is hampered in a situation where consumers are not able to fully understand and compare the information that they are given. Specifically, large financial companies with established distribution networks will be able to define some sort of mainstream industry standard, whereas newly founded financial service providers can hardly communicate to consumers how they differentiate themselves from large financial companies.

15.3.2 *Inference and Interpretation of Consequences*

Due to a missing definition of specific criteria for socially and ecologically responsible financial products and services, it is practically impossible to measure their fulfillment. Analyzing any performance impact is highly difficult and leaves room for interpretation. This can be considered as one of the main reasons why investors still underlie the myth that investing in ecologically and socially responsible financial products and services results in financial underperformance. Expected financial underperformance is typically attributed to allegedly higher costs associated with, for example, fair labor conditions compared to unethical labor conditions. The idea of (financial) underperformance due to ecologically and socially responsible behavior, however, can neither be upheld from a theoretical point of view nor based on actual empirical evidence on performance. Instead, potentially higher costs for good labor conditions or for fulfilling ecological production standards can be compensated by a higher productivity due to employees' higher job satisfaction and higher sales prices that are achievable due to enhanced product quality and consumers' willingness to pay more for products that fulfill ecological and social standards. Furthermore, ecological and social responsibility can decrease firms' systematic risk and consequently enhance their value (Albuquerque et al. 2013). Empirical studies analyzing the performance of mutual funds claiming to be socially responsible could not detect a statistically significant difference between the performance of these funds and regular mutual funds (Hamilton et al. 1993; Humphrey and Tan 2014).

As ecological and social responsibility cannot be associated with a coercive impact on financial performance, consumers still need all information about the essential characteristics including substantial risks, liquidity/flexibility, net return, all costs and charges, and portfolio effects. In addition they need meaningful information about the ecological and social characteristics. If and only if all this information is available, consumers will be able to assess the impact of responsibility on their portfolio return and risk and to engage in potentially necessary risk management activities. Even if ecologically and socially responsible financial products and services performed worse than traditional products and services—which does not find sufficient support in empirical research, quite the contrary (see, e.g., Friede et al. 2015)—and consumers yet accepted worse performance to act responsibly (see, e.g., Renneboog et al. 2008), consumers would be unable to determine the percentage of their portfolio that they want to employ for responsible

products and services if they do not have sufficient information about all characteristics.

Without clear definition of specific ecological and social criteria that must be fulfilled in order to categorize financial products and services as being responsible and without information about the performance impact, individuals are not enabled to determine the fit of ecologically and socially responsible investments to their personal needs. This also means that individuals are unable to influence the market for ecologically and socially responsible investments by their financial decision-making, that is, to buy products that fit their expectations and needs best while avoiding the remaining products. Therefore financial service providers hardly face pressure from the demand side to design products that fulfill the requirements of really ecologically and socially responsible financial products and services and high-quality information.

The lack of a standard of specific criteria for ecologically and socially responsible financial products and services also impedes third parties from verifying the quality of financial products and services that are offered as being ecologically and socially responsible. This becomes obvious in the context of, for example, financial planning when financial planners wish to provide individuals with guidance in their personal finances, but also in the context of litigation related to breach of criteria of responsibility.

To address this situation a regulated minimum standard for ecologically and socially responsible financial products and services appears the most promising solution. Such a minimum standard also helps to tackle the supremacy of large established financial companies and their distribution networks. Smaller competitors would get the chance to act on a level playing field at least when it comes to fulfilling ecological and social criteria and when it comes to requirements for high-quality information about the characteristics of financial products and service.

15.4 HOW TO ACHIEVE THE MINIMUM STANDARD

To tackle the aforementioned shortcomings a regulated minimum standard in the first place has to *comprehensibly* define the underlying concept of ecologically and socially responsible financial products and services including unambiguous and specific ecological and social criteria that need to be fulfilled (here and in the following: Oehler 2013). These criteria need to go beyond complying with legal requirements because all financial products and services need to comply with legal requirements anyway. Therefore,

consumers need transparent and comprehensible information how the minimum standard goes beyond legal requirements. For this purpose, the minimum standard needs to introduce ecological and social knockout criteria that necessarily need to be fulfilled (Boolean values: yes/no) instead of screening approaches with tolerance thresholds that can lead to, for example, greenwashed unecological investment products (see, e.g., Bettzieche 2012; Schäfer et al. 2006; Oehler 2013). In the case of nonfulfillment of one of the knockout criteria, a financial product or service can under no circumstances be labeled as being ecologically and socially responsible. To ensure *transparency*, *comprehensibility*, and *comparability*, the knockout criteria have to be measured without tolerance thresholds. Furthermore, it is necessary that knockout criteria cannot be bypassed through scoring, ranking, or rating approaches that allow offsetting the nonfulfillment of one criterion with the fulfillment of other criteria (or by overachieving another criterion).

Since retail investors hardly have the possibility to know the entire value chain that a firm (as potential investment object) or the financial service provider is embedded in, including all suppliers, customers, and subsidiaries—not to mention the possibility to evaluate the ecological and social policies along the entire value chain—the minimum standard has to ensure that the entire value chain fulfills the criteria for ecological and social responsibility. Addressing the entire value chain is a necessary step to prevent greenwashing; this means to prevent that the parent company uses subsidiaries to produce in countries with, for example, low worker protection while the parent company only sells the products under its greenwashed label.

Although some consumers might primarily think about acting ecologically and socially beneficially when they use responsible financial products and services, they still engage in, for example, risky investments. Therefore, information that is provided about responsible financial products and services also needs to fulfill necessary and sufficient conditions that apply to traditional financial products and services (*transparency*, *comprehensibility*, *comparability*, *clarity*, *fit to personal needs*, and *verifiability*). This is not only important for consumers but also for the financial intermediaries that—when following these conditions—are enabled to provide standardized and easier comparable information in their advisory process. Specifically, consumers should in a clear manner be informed about fees and costs of the financial product or service (in absolute values, not percentages), essential risks, forecasted outcome, and fulfillment of ecological and social criteria to

assess the fit of a financial product or service to the consumers' personal needs and to assess whether the consumer is capable to take the risks.

The introduction of a minimum standard as a level playing field goes hand in hand with the necessity to supervise this field. To ensure verifiability and enable consumers to evaluate the trustworthiness of a minimum standard, they need to know the issuer and the supervisor of the standard (see Oehler 2014). Furthermore, the criteria should be publicly available to ensure transparency. To obviate or at least to reveal potential agency conflicts, relationships between the issuer and supervisor of the minimum standard on the one side and financial service providers on the other side need to be made public. The minimization of agency conflicts may furthermore be beneficial for enhancing competition in the market for ecologically and socially responsible financial products and services by preventing large established financial service providers from utilizing their influence to simultaneously engage as standard setter, supervisor, and supplier while building barriers for competitors to enter the market.

15.5 CONCLUSIONS

The inexistence of generally accepted criteria to define ecologically and socially responsible financial products and services undermines suitable consumer information in this market and hampers the distribution of the products and services among consumers.

A minimum standard for ecologically and socially responsible financial products and services can help to overcome these problems. Therefore, the standard has to go beyond what is already implemented as legal requirements for firms, financial service providers, and consumer information. The minimum standard needs to define the underlying concept of ecologically and socially responsible financial products and services and use knockout criteria measured as Boolean variables while avoiding scoring or rating approaches and tolerance thresholds. Furthermore, the criteria need to apply to the entire value chain to avoid greenwashing.

The presentation of the minimum standards' underlying principles and functioning as well as the key features of the financial products and services has to follow necessary (*transparency, comprehensibleness, and comparability*) and sufficient (*clarity, fit to personal needs, and verifiability*) conditions of high-quality consumer information.

Such a minimum standard for ecologically and socially responsible financial products and services would allow consumers to understand and

compare financial products and services, and it would also provide a level playing field for intermediaries and strengthen competition in the market for financial products and services.

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