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Governance, Regulation and Bank Stability

Edited by Ted Lindblom,
Stefan Sjögren and Magnus Willesson

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Governance, Regulation and Bank Stability

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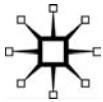

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Preface

Governance, Regulation and Bank Stability comprises a selection of chapters originally presented as papers at the annual conference of the European Association of University Teachers of Banking and Finance – Wolpertinger 2013 – which was held August 28–31, 2013 at the School of Business, Economics and Law, Gothenburg University, Sweden. Wolpertinger 2013 was open to papers in all areas of banking and finance with a special emphasis on efficiency and competition in banking, and regulation and creation of healthy financial systems. 'Leverage, systemic risk and financial system health' was also the theme for the 'Jack Revell' session, for which Professor Anjan Thakor, Olin Business School, Washington University, St. Louis, US, was the invited keynote speaker. This volume includes his contributions as well as other high-quality chapters focusing on the governance, regulation and stability of banks.

As editors, we would like to thank all the contributors to this volume for their contributions and their wonderful efforts with keeping to the schedule. We thank all the referees, who acted as reviewers to the chapters published in this volume. The blind peer review process significantly improved the quality of each contribution. We would also like to thank all the conference participants for their active discussions during seminars and for contributing to a constructive atmosphere and for introducing new perspectives of challenge to future studies in banking and finance.

Special thanks are due to Philip Molyneux (Series Editor for Studies in Banking and Financial Institutions) and to the staff at Palgrave Macmillan, especially Aimee Dibbens (Commissioning Editor, Finance), for their helpful comments and guidance.

Finally, as conference organizers, we would like to thank Dr Martin Andersson, General Director of Sweden's Financial Supervisory Authority, for giving an opening speech at the conference. We are also very grateful to the Bertil Danielsson Foundation, VINNOVA and the School of Business, Economics and Law at the University of Gothenburg for financial contribution to the conference and Ragnar Söderbergs stiftelse for research grants to Magnus Willesson.

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1

Challenges for Banks and a New Regulatory Framework

Ted Lindblom, Stefan Sjögren and Magnus Willesson

1.1 Introduction

The financial crisis revealed severe weaknesses in the governance, regulation and stability of banks. The considerable economic impact of the crisis on the businesses of many individual banks is today well documented and so is its effect on systemic risk and the increased threat to the stability of the financial system as a whole. The content of this book is mainly driven by the challenges banks and other financial institutions are facing in the aftermath of the financial crisis. A number of governance related topics, and responsibilities within and outside the financial system have been, and are, discussed alongside the re-regulation of the banking industry through a gradual implementation of the proposed and continuously updated Basel III standards. The institutions that constitute the financial system infrastructure are not only preparing for possible worst-case scenarios but also for a stable, healthy and sustainable banking industry. The title of this book – Governance, Regulation and Bank Stability – intends to capture the important challenges that lie ahead, in the search for a sounder banking industry: challenges that not only comprise the probability of default for systemically important financial institutions (SIFIs), but also promote efficiency in everyday banking operations.

In order to accomplish a sounder banking industry, banks are challenged to adopt and pursue good governance practices. This challenge relates to decisions and activities conducted by top management and other stakeholders inside the organizations of individual banks, but also, increasingly, to the collective pressures from, and evaluation measures

adopted by, outside stakeholders. The internal perspective includes management skills and actions taken by the banks, which are governed by the board's responsibilities. An evident and most important subset of challenges are of course attached to the banks' decision-making concerning the trade-off between risk and return in their businesses. It is obvious that higher exposures to risk could be critical for a bank's survival in the event of a new financial crisis, but an elimination of the risk exposures of the bank is not a solution: too few exposures to risk can also be critical for the bank's survival, as well as for its customers. The bank's decision-making is indeed a balancing act!

The development and implementation of a new regulatory framework includes the challenge of taking into account the direct and indirect effects on the business of banks, in terms of both the financing and efficiency of their operations. If the framework fails to do this, there is a clear risk of increasing costs for conducting banking activities which will inevitably affect the funding cost for the entire economy and, thereby, economic growth. A side effect of this is that it may lead to a growth of shadow banking: inviting banks to search for and exploit regulatory arbitrage opportunities.

Another challenge is linked to the long-run risk of less diversity in the banking industry. This is a likely effect of imposing a regulatory framework which is primarily aimed at large banks identified, or considered, as SIFIs, but also focuses on smaller (non-systemically important) banks. In relative terms, it will be very costly for smaller banks, such as savings banks and cooperative banks, to comply with this regulation as if they were big financial institutions. These banks operate locally and even if they are also exposed to unique risks that they have to manage, by definition they only contribute marginally – if at all – to the systemic risk in the overall economy. Nevertheless, there is a lot of empirical evidence to show that these banks seem to play an important role for the economic development in the local areas in which they operate.

There are also a set of challenges related to the risk exposures in the intermediation model of banks. Banks' dependence on limited financing opportunities or sources of revenue can make them vulnerable. The power of outside stakeholders is strengthened as a result of the development of banking regulations, but these stakeholders are also given a more central role due to technological improvements in information systems. The development and application of new IT-systems has implications for the ways banks communicate, as well as for their investments in new, and use of existing, distribution channels for financial services. Naturally, this has increased the demand for more effort to be spent on

the reputation of banks and how it is managed. Alongside the banks' management of exposures to different operational and financial risks, there is, increasingly, more attention being paid to their reputational risk management, as well.

The chapters in this book provide both theoretical analyses and an exposé of empirical evidence on the impact of governance and regulation on banks' profitability, risk exposures and operational efficiency prior to, during, and after the financial crisis. Also, methodologies for empirically researching the upcoming challenges are discussed and studied in more depth. It is easy to adhere to a regulatory framework that pays a lot of attention to avoiding financial turmoil. However, the discussions on stability in the chapters of this book should be viewed as preparations for the banking industry: a guide to preferable plans of action in the event of financial turmoil, because, after all, there is also a high risk of upcoming financial problems in banking in the future. Furthermore, different industries and customers may require different financial services organized by various types of banks. These demands are likely to change over time just as the systemically important banks are unlikely to remain systemically important forever. To deal with these and other challenges, bank stability requires banking operations to be executed in an efficient and healthy financial system. In terms of banking research, we would therefore like to promote studies that intend to give better grounds from which to predict both the onset of distress and the effects of regulation and governance.

1.2 A brief summary of the chapters

The summaries of the chapters are partly based on abstracts written by the author(s) and, thus, to some extent 'co-authored' with the author(s) concerned.

Chapter 2 contains the first contribution of this book: *'Leverage, systemic risk and financial system health: How do we develop a healthy financial system?'*, and is written by Anjan V. Thakor, who was invited to be a keynote speaker of the Jack Revell session. This chapter provides us with an extended and more in-depth discussion and analysis of the challenges faced, by banks and regulators, in order to accomplish a sounder financial system. After a brief literature-based discussion of reasons for the financial crisis and the extent to which the systemic risk was linked to excessive leverage of banks, the author gives his view on what steps should be taken to accomplish a healthy financial system in terms of a very low likelihood of a systemic financial crisis. Six major concerns and

their solutions are considered, involving the creation of: a bankruptcy code to improve business models of banking; higher capital ratios; countercyclical capital requirements; and higher capital requirements in the shadow banking system, partly by regulating institutions through their activities. In addition there is the suggestion to encourage equity-based governance to work more effectively, for instance by broader ownership permission; and finally there is an overview of the task to balance debt and equity in a way that encourages lesser reliance on leverage by banks.

In **Chapter 3**, *'Did strong boards affect bank tail risk during the financial crisis? Evidence from European countries'*, by Angela Gallo and Francesca Battaglia, the corporate governance of banks in relation to bank risk-taking is explored. More specifically, the authors test whether the board structure (board size, board independence and frequency of board meetings) has an impact on a series of measures of bank risk (individual tail-risk, systemic bank risk-taking, volatility and leverage) and control of differences between the systemically important banks (SIBs) and other banks. They find that banks with larger boards are associated with higher risk-taking, up to a point where the relation is then inverted. This result is mainly driven by the SIBs, but in both SIBs and non-SIBs the boards' independence is found to have a weakly negative relation to bank risk and is unrelated to systemic bank risk. Finally, the authors observe that a high frequency of board meetings in non-SIBs seem to have played a more proactive than reactive role during the crisis. However, in SIBs a high frequency of board meetings is not perceived to be associated with less tail, and systemic, risk. The authors point out that the understanding of the mechanisms associated with banks' board structure and risk is important both for regulators and market participants. Their analysis reveals failures in corporate governance and in board supervision during the crisis, especially in SIBs. This implies that SIBs should be regulated differently from other banks.

Chapter 4, by Gianfranco A. Vento and Pasquale La Ganga, titled *'Corporate governance of banks and financial crisis: can the post-crisis rules make banks safer?'*, adds to the discussion on the role of banks' governance after the financial crisis by analysing softer rules associated with new regulatory reforms and how the stability of individual banks is affected by their corporate governance. Focusing on the link between the importance of integrating regulation and corporate governance, the authors critically review the reforms and highlight the potential effects of the new rules on banks' management, as well as on the stability of the financial system as a whole. The chapter also comprises empirical

tests on a sample of 17 European global systemically important banks (G-SIBs) and debates whether corporate governance variables, such as board compensation and insider shares outstanding, have an effect on the banks' efficiency and profitability. These variables are indicative of, and tested against, four different dependent variables of bank performance (stock prices, ROA, non-performing assets to total assets, and efficiency ratio). The authors conclude that the relationship between the corporate governance variables and performance was limited during the financial crisis. Consequently, the interpretation of the results can bring out important reasons to take stakeholder benefits into consideration when developing the corporate governance and regulation, in addition to showing the importance of consideration from regulators and banks.

In **Chapter 5**, *'Predicting European bank distress: evidence from the recent financial crisis'*, Laura Chiaramonte and Federica Poli investigate the predictive power of the Z-score, which is a common default measurement method used in academic research to estimate the risk of distress in banks. The Z-score is acknowledged to provide early warning signals of insufficiency and is appreciated for its simplicity in analysing bank distress based on public accounting data. However, for conducting both academic research and analysing banks in practice, the form of measurement used must also be valid. In this chapter the authors discuss possibilities of predicting financial distress and they also compare the Z-score with other measurement methods which can be used, depending on data availability and the characteristics of the bank. Their main analysis of the Z-score's power to predict bank distress during the financial crisis is based on a sample of both active and non-active banks, which specialize in four different business areas: commercial banks; cooperative banks; savings banks; and real estate and mortgage banks. Their study covers 12 European countries over eleven years (2001–2011). Particular interest is also put on examining differences between the pre- and post-crisis period and a number of bank characteristics. The main results indicate that the Z-score is a key determinant of the probability of bank distress during the entire time period of the study. In addition, the authors find that complementing the Z-score with indicators of bank size and bank risk improves the model performance, especially during the crisis years.

Chapter 6, *'The Impact of deregulation and re-regulation on bank efficiency: evidence from Asia'*, by Bimei Deng, Alessandra Ferrari and Barbara Casu, examines the link between efficiency and regulation by analysing developments in Asia after the Asian financial crisis in 1997. The banking sector reforms after this crisis have been characterized by their emphasis on prudential regulation, associated with increased

financial liberalization. By studying the aftermath of the Asian financial crisis, the authors argue that it is possible to analyse the long-term effects of the impact of a regulatory reform to banks. Using a panel data set of commercial banks from eight major Asian economies over the period 2001–2010, they explore how the coexistence of liberalization and prudential regulation affects the cost characteristics of banks: this is achieved by using a stochastic frontier approach followed by the estimation of a deterministic metafrontier to provide 'true' estimates of bank cost efficiency measures. On one hand, the results show that the liberalization of bank interest rates and the increase in foreign banks' presence have had a positive and significant impact on technological progress and cost efficiency. On the other hand, the results imply that prudential regulation might adversely affect bank cost performance. This suggests a policy discussion about the designing of an optimal regulatory framework that combines policies which aim to foster financial stability without hindering financial intermediation.

In **Chapter 7**, *'Small banks in post-crisis regulatory architecture: the case of cooperative banks in Poland'*, Ewa Miklaszewska gives us an insight into how the retail banking sector in Poland is affected by the new post-crisis regulatory architecture, particularly focusing on Polish cooperative banks. The author argues that the small locally based banks in Poland have been given less priority in the post-crisis regulation, even though these banks have been both profitable and stable. Furthermore, these banks have also played an important role in the development of the regions they operate in, thereby enhancing the reputation of, and trust placed in, banks. There is now a strong risk that the sector of small and domestic banks will increase costs instead of bringing benefits. The author takes on these concerns in an analysis of the Polish cooperative banking system which uses a database provided by the Polish Supervisory Authority and her own survey. The results show advantages in the short-run, but the long-term effects include a situation where the change in strategy adopted to satisfy centralized regulatory requirements may erode this part of the banking sector.

Chapter 8, by Elisabetta Gualandri and Stefano Cosma, titled *'The Sovereign debt crisis: the impact on the intermediation model of Italian banks'*, takes on the problems with Italian banks, as identified during and after the financial crisis. The authors point out that the Italian banking system had a different and lagged development in comparison to the systems in other European countries. Italian banks suffered less than banks in many other countries during the first phase of the crisis, but thereafter the situation changed dramatically. This is partly explained by the Italian

business model, which aims for traditional and relationship-oriented banking, while relying on lending activities and retail funding, and is partly caused by the prudent and thorough supervisory framework. According to the authors, the fact that Italian banks are now facing the effects of the double-dip recession, which has significantly weakened their financial performance, is impairing the sustainability of the 'traditional' intermediation model. Italian banks must introduce strategies for significantly modifying their banking business model. In addition, there is pressure on their current business model from the increased equity requirements in Basel III, which also may have an effect on the recovery of the Italian economy. This adds to the discussion raised in this book about the balancing act between regulation and cost to society. The authors suggest that the business model needs to rely more on credit markets to overcome a deterioration of loan quality and low levels of net interest income. The authors also register pressure towards consolidation of the industry among smaller banks.

In **Chapter 9**, *'Diversification strategies and performance in the Italian banking system'*, Paola Brighi and Valeria Venturelli address the question of how banking performance is affected by product and geographical diversification associated with the benefits and costs of the strategy developed. Their study is on Italian banks, and the authors observe that a bank that increases its non-traditional diversification strategy and grows in size has a positive effect on risk-adjusted profitability. The relative effects on bank performance appear different between larger and smaller banks, suggesting different business strategies work for different banks. In line with the previous chapter, the authors also find that Italian banks have to make an effort to find alternative business strategies for the upcoming challenges. The results provide important strategic implications for bank managers and regulatory bodies.

Chapter 10, *'Intermediation model, bank size and lending to customers: is there a significant relationship? Evidence from Italy: 2008–2011'*, by Franco Tutino, Concetta Colasimone, Giorgio Carlo Brugnoni and Luca Riccetti, provides another study of the Italian bank intermediation model. The authors target customer lending with respect to bank size. They use a different research approach to the two previous chapters, by studying the intermediation of Italian banks, but they come much to the same conclusions regarding both the development of the Italian banking system and the need for a diversified intermediation model. The chapter presents an econometric analysis which pays particular attention to the development of customer loans and the size of banks,

in an attempt to look at the intermediation model in a complete and systemic way, while also including asset composition. The authors find not only the need for diversification, away from the customer activities, but also that the managerial team needs to adopt a managerial model that addresses requirements for different strategic directions. This model varies for smaller and larger banks. Understanding how the financial crisis affected banks' lending to customers, through different intermediation model features, could help to indicate the main constraints and determinant factors which effectively influence the supply of loans to customers.

In the final chapter, **Chapter 11**, *'Good news, bad news: a proposal to measure banks' reputation using Twitter'*, Vincenzo Farina, Giampaolo Gabbi and Daniele Previati present a proposal to measure banks' reputation by analysing data from hashtags published on Twitter. Reputational risk is a speculative risk and a particular issue for financial institutions, especially nowadays, due to the great pressure they are facing as a consequence of the recent financial crisis. However, in banking literature, while the concept of reputation is rather obvious, more efforts must be made to develop a measurable notion of corporate reputation and of its changes over time (i.e., reputational risk). This chapter proposes new perspectives on the analysis and measurement of reputation and reputational risk in the banking industry and directly focuses on stakeholders' opinions in order to evaluate the gains and losses made from stakeholders' influences on the reputation of banking. After some theoretical and practical reflections, the chapter presents a detailed methodology and a pilot study which considers the level and volatility of reputation, by analysing Twitter networks.

2

Leverage, System Risk and Financial System Health: How Do We Develop a Healthy Financial System?

Anjan V. Thakor

2.1 Introduction

The subprime crisis of 2007–2009 was the most devastating financial crisis since the Great Depression, cost the US economy trillions of dollars (see Atkinson, Luttrell and Rosenblum, 2013) and caused significant economic stress worldwide.[1] In response, new financial-market regulations were adopted in many countries, including the Dodd-Frank Act in the US, which is a massively complex piece of legislation that touches most financial intermediaries in significant ways and imposes a host of new proscriptions and requirements on all sorts of intermediaries. Moreover, the crisis also required unprecedented government intervention in the financial market and the real economy, with the issuance of *ex post* guarantees against failure to a multitude of *a priori* uninsured investors and institutions, in order to stave off a complete collapse of the financial system. While there is much debate over whether the regulatory interventions were the appropriate ones (see Lo (2012), and Thakor (2013b) for detailed discussions), these interventions raise concerns about potential moral hazard insofar as expectations of future bailouts may influence present behaviour, and greater political involvement in the functioning of credit markets (see Song and Thakor, 2012).

Now that the dust has settled, it is time to reflect on two important questions: (1) what caused this crisis? And (2) what does a healthy financial system – one not prone to periodic bouts of systemic crises – look like?

In this chapter, I briefly discuss my views on these two issues. Since a large number of papers and books have been written on this crisis, my response to the first question will be somewhat brief, and I will refer the reader to some review papers on the subject. On the second question, my thoughts are somewhat preliminary and are intended to provide stimulus for future research.

The rest is organized as follows. Section 2.2 addresses the question of what caused this crisis. Section 2.3 proposes some simple steps that could be taken to build a healthy financial system. Section 2.4 concludes.

2.2 What caused this crisis?

The standard view is that this crisis, like many before it, was caused by misaligned incentives at many levels. Financial intermediaries took excessive risks due to *de jure* and *de facto* safety nets (e.g., Bebchuk and Fried, 2010; Farhi and Tirole, 2012), regulators were lax and permitted this due to incentive misalignment with taxpayers (e.g., Barth, Caprio and Levine, 2012; Kane, 1990), and politicians blocked 'sensible' regulation (e.g., Stiglitz, 2010). The US government *Financial Crisis Inquiry Commission* (FCIC) report also noted that, similarly, regulators saw warning signs but chose to ignore them, and that the Federal Reserve was 'too supportive' of banking industry growth.

However, many doubt the validity of this viewpoint. In his excellent review of 21 books written on the crisis, Lo (2012:173) writes:

> There are several observations to be made from the number and variety of narratives that the authors in this review have proffered. The most obvious is that there is still significant disagreement as to what the underlying causes of the crisis were, and even less agreement as to what to do about it. But what may be more disconcerting for most economists is the fact that we can't even agree on all the facts. Did CEOs take too much risk, or were they acting as they were incentivized to act? Was there too much leverage in the system? Did regulators do their jobs or was forbearance a significant factor? Was the Fed's low interest-rate policy responsible for the housing bubble, or did other factors cause housing prices to skyrocket? Was liquidity the issue with respect to the run on the repo market, or was it more of a solvency issue among a handful of 'problem' banks?

In a recent paper (Thakor, 2013a), I argue that, while there is quite a bit of empirical evidence that misaligned incentives had a role to

play (see, e.g., Keys et al., 2010; Purnanandam, 2011), that cannot be the whole story. My point is that this crisis had at least as much to do with distorted *beliefs* as it did with distorted incentives. The basic argument is as follows: imagine a world in which there is *a priori* uncertainty about the abilities of bankers to manage risks and there is also 'model uncertainty' in the sense that economic agents believe that loan performance and the pay-offs of banks are either (largely) dependent on the skills of bankers or may be driven solely by exogenous factors. In such a world, rational Bayesian learning dictates that the longer things go well, the higher the confidence that all economic agents (creditors, bankers, regulators, etc.) develop in the ability of bankers to manage risks. This encourages banks to invest in riskier, more profitable assets, and makes risk appear to be 'underpriced'. As long as all economic agents attach a sufficiently high probability to the view that outcomes are determined by the skills of bankers, learning-based posterior beliefs about the skills of bankers continue to rise as long as banks continue to keep performing well. As these posterior beliefs about bankers' skills rise, so does the level of risk that investors are willing to let banks take, while they continue to provide (uninsured) financing to these banks.

Relatively unforeseeable economic shocks – such as unexpectedly large defaults on securities backed by subprime mortgages – can cause beliefs about the economic model of outcome determination to shift. In particular, economic agents may assign a much higher probability to the likelihood that outcomes are determined by luck, rather than the skills of bankers, than they did before. In this case, the previous level of risk-taking is no longer considered prudent by investors, and funding may dry up altogether for banks. This can precipitate a crisis. It is a crisis that looks like a liquidity crisis, but it is in fact a solvency crisis, in that it is investors' belief about the lack of solvency on the asset side of banks' balance sheets that causes funding to evaporate.

What can cause such a dramatic shift in beliefs about the economic model of outcome determination? One possibility is that there is a behavioural bias that causes economic agents to assign a much higher (than rational) probability to events that they have personally experienced and lower (than rational) probabilities to events that exist only as statistically probable outcomes experienced by others, but not personally by the agents in question. As Benjamin Franklin once said:

> Experience keeps a dear school, but fools will learn in no other. For you can give advice, but you cannot give conduct.

Whether it is due to incentive misalignment or due to a discontinuous shift in beliefs about the skills of bankers in managing risks, or some combination of the two, one thing that is beginning to become clear is that high leverage among financial institutions – combined with high consumer leverage – was a significant contributor to the financial crisis. A number of papers have made this point in different ways. Goel, Song and Thakor (2013) develop a theory of correlated leverage, in which high consumer leverage and high bank leverage become correlated, increasing the fragility of the financial system, even in response to small shocks. The reason for this is that high consumer leverage increases the odds of these consumers defaulting on bank loans, even when hit by relatively small shocks, and high bank leverage makes banks incapable of absorbing the consequent credit losses. Farhi and Tirole (2012) present a model in which all banks become highly leveraged together and make investments with correlated prospects, given the possibility of en masse regulatory bailouts due to the regulator's inability to distinguish between illiquidity and insolvency. Acharya and Thakor (2013) present a theory in which the failure of one institution increases 'creditor pressure' – an increase in the cost of rollover funding or the cutting off of rollover funding – on other institutions because of (rational) inferences by the creditors of the other institutions. They show that this effect becomes stronger as these institutions become more highly levered, so an increase in leverage contributes to an endogenous increase in systemic risk.

These contributions highlight the fact that while institutions like the Financial Stability Oversight Council (FSOC) can help to improve the tracking of systemic risk, high bank leverage can elevate systemic risk in subtle ways that do not show up in the data until it is too late.

High bank leverage is not a new phenomenon. Capital ratios in banking have been declining since the adoption of deposit insurance (see Figure 2.1).

Interestingly, the frequency of financial crises has also gone up during this time (Reinhart and Rogoff, 2008). So any discussion of what constitutes a healthy financial system will need to incorporate an examination of bank capital and the regulations that can facilitate appropriately high levels of capital in banking.

I do not mean to suggest that excessive leverage in financial institutions was the only factor that led to the crisis, which began in the shadow banking system in the US. There were many factors that interacted with each other to create the perfect storm. These are discussed in depth in Thakor (2013b), where I provide a review of the extensive literature on this financial crisis.[2] My focus in this chapter is more on

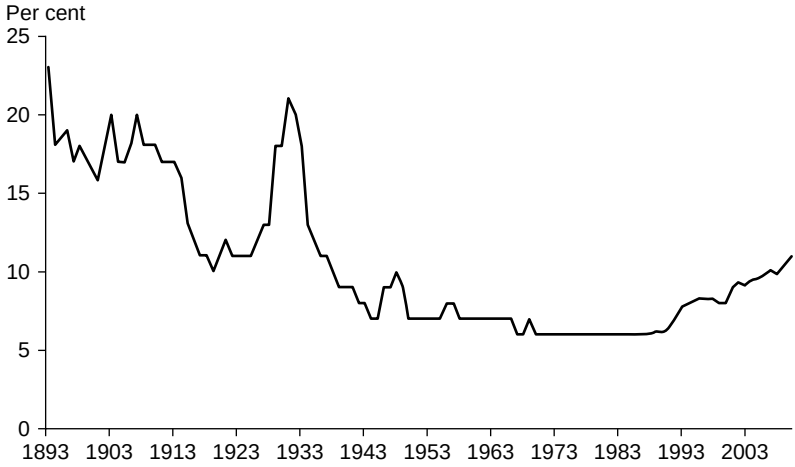

Figure 2.1 Mean book equity ratios for US banks, 1893–2010

Source: Data through 2001 are from Flannery and Rangan (2008); data since 2001 are from the Federal Reserve's Y-9C reports. Note: data since 2001 are average quarterly capital ratios for the 100 largest bank holding companies.

how we begin to think about financial system *health*, rather than what makes it sick at times.

2.3 What makes a healthy financial system and how to develop one?

A healthy financial system is *not* one that is never susceptible to a crisis. That would entail a level of risk-taking by financial institutions which would, in all likelihood, be inefficiently low. So, the idea is to have a financial system that is associated with a sufficiently low (but not zero) level of systemic risk. Indeed, I would suggest that a healthy financial system should be characterized by occasional failures of financial institutions – not systemic failures of large subsets of the financial system, but idiosyncratic failures of some banks. One reason why occasional bank failures are not only acceptable, but even desirable, for a healthy financial system is that beliefs and actions are heavily influenced by experiences, and if no failures are observed for a while, all economic agents – regulators, rating agencies, banks managers and investors – become somewhat sanguine about risk-taking, a phenomenon that can lead to high correlated risk-taking and high leverage by financial institutions (see Thakor, 2013a). The analogy here is to the human immune

system. Minor bouts of illness can help an individual develop immunity against more serious infections. Similarly, occasional failures of financial institutions are experience-based reminders of the hazards of risk-taking, and can also expose weaknesses in the financial system that can be identified and expunged before they mushroom into systemic structural flaws that make the system susceptible to debilitating crises. Thus, regulators should be circumspect when it comes to bailing out failing institutions, as the absence of failures can in itself weaken the financial system, both by precluding Darwinian extinctions of weak institutions and by shutting off the natural warning signs that can dampen the risk-taking of otherwise healthy institutions.

Another attribute of a healthy financial system is sufficiently high levels of capital in institutions – both in the commercial banking system and in the shadow banking system. There are some who argue that this may not be wise because high leverage is what makes banks valuable/special. However, as Miller (1995) noted:

> An essential message of the M&M propositions as applied to banking, in sum, is that you cannot hope to lever up a sow's ear into a silk purse. You may think you can during good times; but you'll give it all back and more when the bad times roll around.

As discussed in Thakor (forthcoming), there now seems to be widespread agreement that higher capital in banking will enhance bank stability, reduce the pursuit of tail risks, diminish the likelihood of crises, and lower the need for taxpayer bailouts that may trigger sovereign debt crises. But there is often resistance to higher capital requirements, some of which is based on fallacious reasoning.

One such argument is that capital is money that banks have to set aside and is therefore unavailable for lending, so an increase in capital requirements will reduce bank lending. This confuses capital requirements with cash asset reserve requirements. Banks can invest their equity capital in any asset permitted by their charters, so there is no mechanical hard-wiring that leads to higher capital requirements causing a drop in bank lending. Various other objections that crop up in arguments against higher capital requirements are discussed and debunked in Mehran and Thakor (2011). These include: banks must have necessarily high leverage because deposits are a factor of production in banking[3]; deposits cost less than equity, so higher capital will decrease the value of the bank by forcing it to rely on more expensive funding; and increasing equity capital in banking will reduce the values of banks. The theory as well as

the empirical evidence in Mehran and Thakor (2011) militates against these assertions.

A third attribute of a healthy financial system is active corporate governance by the bank's shareholders. One argument in favour of high bank leverage is that leverage disciplines banks (e.g., Calomiris and Kahn, 1991). However, that is because equity governance in banking has been largely overlooked in the theories of bank capital structure,[4] and has, in practical terms, not been as strong as in non-financial firms (due to regulatory restrictions on who can own banks). Strengthening equity governance in banking can make equity capital a less expensive and more attractive source of financing.

Finally, a healthy banking system would go beyond 'regulation by labels' and focus on 'regulation by economic function'. An important reason why credit default swaps (CDS) were largely unregulated before the crisis is that they were called CDS, not insurance. Regulating by economic function will reduce the attractiveness/feasibility of institutions opting for financial contracts and institutional forms with new labels, so as to escape regulatory requirements (i.e., it will reduce 'regulatory arbitrage').

So, how do we develop a healthy financial system? Based on the preceding discussion, the following steps seem worthy of serious consideration.

1. Create a better business model by creating a bankruptcy code for banks (Chapter 11) similar to that for non-financials. In the US, we have liquidation as the only failure option for a bank, if it is not bailed out. Once orderly bankruptcy is possible, regulators should feel less constrained in permitting some banks to go bankrupt (i.e., not bailing them out). Having some banks fail at times is essential for a healthy banking system.
2. Have higher capital in banking. In addition to higher risk-weighted capital ratios, regulators should use much higher ratios of equity capital as a percentage of total assets, including off-balance sheet items. Acharya et al. (2013) discuss a novel approach that relies on two types of equity capital requirements which are designed to ensure that the governance discipline of both bank debt and equity can be preserved while higher capital requirements are implemented.
3. Make capital requirements countercyclical by increasing them through phased-in dividend restrictions (hence building capital through retained earnings) during good times, as discussed in Acharya et al. (2013).
4. Impose higher capital requirements in the shadow banking system (repos, money market funds, investment banks, insurance companies,

etc.), regulate *products* by their *economic functions*, *not* by their labels (e.g., CDS), and regulate institutions by their activities rather than by what they call themselves.
5. Permit broader ownership of banks in order to allow equity-based governance to work more effectively.
6. Consider some variant of the Belgian experiment of 'levelling the tax playing field' between debt and equity by allowing tax deductibility either of dividends or of a notional return on the book value of equity. This may encourage a lesser reliance on leverage by banks. There is some empirical evidence in support of this. For example, Schepens (2013) documents an increase in bank capital ratios in Belgium after the tax code was changed (inclusive of banks) to subtract from pre-tax income a hypothetical return on book equity capital.

2.4 Conclusion

In this chapter, I have discussed the 2007–2009 subprime crisis and identified four essential attributes of a healthy financial system. These are:

- The system experiences periodic idiosyncratic failures of a few financial institutions that are *not* bailed out by the government, but has a very low probability of experiencing large systemic crises.
- Depository institutions, as well as institutions in the shadow banking system, are well-capitalized.
- Corporate governance by bank shareholders is active and effective.
- Regulation of financial institutions is by economic function, not by the labels attached to contracts and institutions.

With the above attributes as a basis, I have outlined the regulatory changes that are needed. In a nutshell, these include: creating a bankruptcy code for depository institutions in which banks are allowed to go bankrupt; having higher and countercyclical capital requirements in both the commercial and shadow banking sectors; permitting broader ownership of banks; and changing the tax code to diminish the tax disadvantage of equity relative to debt.

I would like to emphasize two points in closing. First, we will never have a perfect regulatory system in which all 'regulatory arbitrage' can be eliminated. There will always be innovations made by institutions to enable them to lighten their regulatory burden, no matter what the system of regulations we put in place. But that should not be used as a 'deal breaker' when considering regulatory reform. After all, people

often drive faster than the speed limit in their cars, and sometimes evade income taxes. We do not use these to argue that speed limits ought to be abandoned and the tax code should be abolished. So, in contemplating regulations that call for higher capital requirements, while it is useful to consider ways in which regulatory arbitrage – involving activities shifting to the shadow banking system where capital requirements may be non-existent or lighter – can be minimized, it is not plausible to suggest that we should avoid higher capital requirements simply because institutions will evade them anyway by shifting more activities to the shadow banking sector. Second, an important goal of regulatory reform in a healthy financial system should be simplicity and ease of implementation. As Thakor (2013b) points out, more and more complex regulations engender more and more unpredictable responses from the regulated institutions, setting in motion a chain of events that ultimately increase uncertainty and diminish regulatory effectiveness. Regulations like the Dodd–Frank Act in the US have far too much complexity to permit an accurate assessment of their eventual effectiveness. Moreover, it makes it harder to cope with incentive problems between regulators and taxpayers (see Kane (1990)).

Notes

1. This chapter is based on my keynote address (with the title: 'Leverage, Systemic Risk and Financial System Health') at the Wolpertinger Conference in Gothenburg, Sweden, August 2013. Kupiec and Ramirez (2013) provide broader evidence on the costs of financial crises to the real sector.
2. See also Lo (2012).
3. The argument is that just as steel is a factor of production in a car, deposits are a factor of production in banking. So, just as a car has a lot of steel, a bank has a lot of leverage. But, as Acharya et al. (2012) point out, there is no reason why the bank could not acquire all the deposits it needs and then acquire as much equity on top of it, as needed, for prudential regulation. Thakor (forthcoming) discusses this in greater depth. DeAngelo and Stulz (2013) propose that increasing equity capital like this may be socially costly when deposits provide liquidity services and the bank's assets are riskless, arguing therefore that banks may need to be highly levered.
4. As pointed out by Acharya et al. (2013). That paper attempts to address this issue by developing a theory of bank capital structure in which both bank debt and equity have governance roles to play.

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3

Did Strong Boards Affect Bank Tail Risk During the Financial Crisis? Evidence from European Countries

Francesca Battaglia and Angela Gallo

3.1 Introduction

Recent initiatives by banking supervisors, central banks and other authorities have emphasized the importance of corporate governance practices in banking sectors (see, e.g., Basel Committee on Banking Supervision, 2010; Board of Governors of the Federal Reserve System, 2010; OECD, Organization for Economic Cooperation and Development, 2010). The policy makers constantly – and with considerable effort since the subprime crisis broke out – try to improve current legislation to enable better monitoring of bank activities, including their risk-taking. It is widely recognized that the recent financial crisis is to a large extent attributable to excessive risk-taking by banks and that shortcomings in bank corporate governance may have had a central role in the development of the crisis. An OECD report argues that, 'the financial crisis can be to an important extent attributed to failures and weaknesses in corporate governance arrangements' (Kirkpatrick, 2009). Moreover, the crisis revealed the potential, underestimated consequences of unregulated systemic risk-taking by banks. As suggested by de Andres and Vallelado (2008), the main aim of regulators, which is to reduce systemic risk, might come into conflict with the main purpose of shareholders, which is to improve the share value by increasing their risk-taking. More recently, the National Commission on the Causes of the Financial and Economic Crisis in the United States concluded that, 'dramatic failures of corporate governance ... at many systematically important financial institutions were a key cause of this crisis' (Beltratti and Stulz, 2011). Some academic studies also highlight that flaws in bank governance

played a key role in the performance of banks during the crisis (Diamond and Rajan, 2009; Bebchuk and Spamann, 2010).

The idea is generally that banks with poor governance engaged in excessive risk-taking, causing them to make larger losses during the crisis because they were riskier. In other words, to the extent that governance played a role, we would expect banks with better governance to have performed better. Among several corporate governance characteristics, the Basel Committee on Banking Supervision (2006) in its consultative document, 'Enhancing Corporate Governance for Banking Organizations', places the board of directors as an essential part of bank regulatory reforms. In addition, the second pillar (supervisory review process) of the 2004 Basel Accord identifies the role of the board of directors as being an integral part of risk management (Basel Committee on Banking Supervision, 2005:163–164). The board of directors is even more critical as a governance mechanism in credit institutions than in its non-bank counterparts, because the director's fiduciary responsibilities extend beyond shareholders, to depositors and regulators (Macey and O'Hara, 2003). Moreover, the bank board plays a vital role in the sound governance of complex banks: in the presence of opaque bank lending activities, the role of the bank board is more important, as other stakeholders, such as shareholders or debt holders, are not able to impose effective governance in banks (Levine, 2004). According to de Andres and Vallelado (2008), the role of boards as a mechanism for corporate governance of banks takes on special relevance in a framework of limited competition, intense regulation, and higher informational asymmetries due to the complexity of the banking business. Thus, the board becomes a key mechanism for monitoring managers' behaviour and advising them on strategy identification and implementation. Bank directors' specific knowledge of the complex banking business enables them to monitor and advise managers efficiently. A bank's board plays a vital role in achieving effective governance. According to Caprio and Levine (2002), this happens because neither dispersed shareholders/debtholders nor the market for corporate control can impose effective governance in banks. In particular, Pathan (2009) defines a 'strong board' (i.e., a small board and more independent directors), as a board that is more effective in monitoring bank managers and reflects more of bank shareholders' interests.

In this chapter, we aim to provide empirical evidence for the effect of strong bank boards on proper measures of tail and systemic bank risk-taking during the financial crisis. Academics and regulators have developed different concepts and proposals regarding ways to assess

systemic risk. We choose to focus on the measure of risk developed by Acharya et al. (2010), which is defined as the marginal expected shortfall (MES), because it is developed within the same conceptual framework as the expected shortfall (ES) (Acerbi, Nordio and Sitorio, 2001), and is a consistent measure of bank tail risk. Alongside these two measures, MES and ES, we analyse the relation between bank board structure and risk-taking by also focusing on a traditional measure of risk, volatility (VOL), which is defined as the annualized daily standard deviation of stock returns and leverage (LEV). This allows us to contribute to the existing literature by adding further evidence on the role of bank boards in bank risk-taking during the recent financial turmoil, both in terms of their individual and their systemic contributions to the stock market instability. In contrast to the previous three measures, MES explicitly incorporates bank sensitivity to the market in adverse market conditions (the left tail). To the best of our knowledge, there is no evidence to date on whether, or how, bank boards relate to this specific measure of bank risk-taking.

In the second part of our research, we extend our analysis by investigating whether the relation between board structure and bank risk changes for systemically important banks (SIBs) in Europe. As mentioned before, governance failures at many systemically important banks have been considered, in public debate, to be one of the key causes of the credit crisis, together with excessive risk-taking, prior to the onset of the crisis. However, to the best of our knowledge, no empirical evidence supports this viewpoint yet. We investigate this point with specific reference to the relationship between SIB boards' structures and measurement of bank tail risks.

By using data on 40 large publicly traded European banks, we examine whether, and how, banks with stronger boards are associated with higher systemic risk. Since the summer of 2007, the financial system has faced two severe systemic crises and European banks have been at the centre of both crises (Acharya and Steffen, 2012). Therefore, by analysing the European banking system, we should consider the years from 2007 to 2010 to be a period of financial turmoil. However, as previous literature suggests that banks' performance during the crisis was related to the risks they took before the crisis (i.e., their risk-taking behaviour in the years before the crisis), we also include the year 2006, which acts as a control for this. To identify which banks in our samples can be considered systemic, in each year of our period of investigation we refer to the top ten ranking of European systematic banks as reported in Acharya and Steffen (2012).

We focus on three corporate governance factors: (1) board size, (2) board independence, and (3) the frequency of board meetings per year, as a proxy for the board's function, measured as of December 2006. Given that the previous literature (see, e.g., Black, Jang and Woochan, 2006; Cremers and Ferrell, 2010) suggests that the corporate governance structures change slowly, as put forward by Erkens, Hung and Matos (2012), we use data for the year 2006, prior to the onset of the crisis. Hence, we assume that the strength of governance mechanisms incorporated in 2006 is reflected in bank risk-taking during 2006–2010. In addition, we allow for the bank's total asset and leverage ratio in a parsimonious version of our estimations and then we also add proxies for the bank business model, credit and funding liquidity risk's exposures. Finally, the latter model is modified to investigate whether the three corporate governance factors mentioned above affect European SIB risk differently from other European banks.

The research contributes to the empirical literature on corporate governance and bank risks in several respects. First, the time horizon under investigation allows us to shed light on the relationship between corporate governance and European banks' risk exposures during a persistent period of financial distress. In this sense, the recent financial crisis provides an opportunity to explore whether, and how, better-governed banks (in terms of strong boards) perform during the crisis, by providing a quasi-experimental setting and thus reducing any endogeneity concerns regarding explanatory variables. Second, we contribute to the extensive literature on corporate governance, which is mainly focused on US banks, by investigating whether, and how, corporate governance had a significant impact on European banks during the crisis through its influence on banks' risk-taking. Third, we contribute to the existing literature (Akhigbe and Martin, 2008; Fortin, Goldberg and Roth, 2010; Pathan and Faff, 2013; Peni and Vähämaa, 2012; Adams and Mehran, 2012) because, as far as it could be ascertained, this is the first study to employ market-based systemic and tail risk measures, with reference to corporate governance structures, in a single study. This is notably relevant, given that the recent financial turmoil has illustrated how excessive risk-taking can lead to financial instability through its contribution to an increase in the occurrence of banking crises. There is so far very little research on the main drivers of bank tail risk (the only exceptions are: De Jonghe 2010; Knaup and Wagner, 2012). Understanding these drivers is important both for regulators and market participants.

Finally, our investigation into European SIBs could have several policy implications, through recognition of SIB corporate governance as

unique in comparison with other banks and thus, eventually, suggesting the relevance of this to the on-going debate on the definition of a more adequate regulatory framework for the SIB (see the Basel Committee on Banking Supervision, 2011, revised in 2013). Moreover, the specialness of SIB corporate governance could have also driven the mixed results shown in previous literature on strong boards.

Our main finding can be summarized as follows. Overall, our results suggest that board structure plays an important impact on banks' tail and systemic risk-taking. In particular, it clearly emerges that each characteristic of board structure seems to be more effective in influencing specific types of bank risk exposure. The size of boards, and of their meetings, has an effect on tail and systemic risk exposure, while board independence is almost irrelevant. More specifically, when controlling for the systemic importance of the banks in our sample, we find that the board size is especially important for SIB, whereas larger boards are associated with greater tail and systemic risk exposure. Moreover, we find that there is no influence of board independence on systemic risk both for SIBs and non-SIBs. Finally, there are different influences regarding the number of board meetings: a positive influence on SIB risks and a negative influence on non-SIB risks.

The remainder of the chapter is organized as follows. In Section 3.2, we analyse the relevant literature on corporate governance and systemic risk. In Section 3.3, we describe the estimation framework, our sample and the model variables. In Section 3.4, we present and discuss the empirical analysis and its results and Section 3.5 concludes.

3.2 Related literature and hypotheses

Previously, extensive empirical literature has documented that banks with strong corporate governance mechanisms are generally associated with better financial performance, higher firm valuation and higher stock returns (Caprio, Leaven and Levine, 2007; Cornett, McNutt and Tehranian, 2009; de Andres and Vallelado, 2008; Hanazaki and Horiuchi 2003; Jiraporn and Chintrakarn, 2009; Laeven and Levine, 2009; Macey and O'Hara, 2003; Mishra and Nielsen, 2000; Pacini et al., 2005; Sierra, Talmor and Wallace, 2006; Webb Cooper, 2009; Pathan and Faff, 2013; Adams and Mehran, 2012). A recent stream of literature investigates the above-mentioned relationships over periods of financial turmoil. Peni and Vähämaa (2012) also find a positive and significant relationship, during the 2008 financial crisis, for large publicly traded US banks. In particular, they show that banks with stronger corporate governance

mechanisms (small boards and more independent directors) have higher profitability, higher market valuations and fewer negative stock returns amid the crisis. Beltratti and Stulz (2011) focus on banks in 31 countries and document that banks with strong boards perform worse over the period from July 2007 to December 2008 than other banks. Erkens, Hung and Matos (2012) find that banks with more independent boards and larger institutional ownership gain lower stock returns over the period from January 2007 to September 2008. Pathan and Faff (2013), using a broad panel of large US bank holding companies over the period 1997–2011, find that both board size and independent directors decrease bank performance. Moreover, they find evidence that (pre-crisis) board size and independence affect bank performance in the crisis period. In more general terms, by focusing on firm performance, Francis, Hasan and Wu (2012) show that better-governed firms performed well during the crisis.

However, this evidence on bank performance may depend on the level of bank risk-taking. Many authors extend the research on this topic to also take into account the bank risk-taking level, but these analyses lead to controversial results. Akhigbe and Martin (2008) find that the relationship between corporate governance and risk-taking is negative; in particular they show that a lower risk level is associated with banks managed by stronger boards. Conversely, Pathan (2009) and Fortin et al. (2010) suggest that banks characterized by strong governance mechanisms may take more risk. In particular, Pathan (2009) finds that a small bank board is associated with more bank risk, whereas a high number of independent directors seems to imply less risk exposure for banks. Erkens et al. (2012) find no evidence on pre-crisis risk-taking for two risk measures: the expected probability of default and the standard deviation of weekly stock returns.

Based on the previous literature, we focus on the relationship between risk-taking and the following characteristics of board structure: board size, the number of independent directors and the frequency of board meetings per year. The board of directors is an economic institution that, in theory, helps to solve the agency problems inherent in managing an organization (Hermalin and Weisbach, 2003). Hence, the role of the boards of directors in the banking industry is to monitor and advise managers. Larger boards of directors can better supervise managers and bring more human capital to advise them. However, boards with too many members lead to problems of coordination, control, and flexibility in decision-making. Large boards also give excessive control to the CEO, harming efficiency (Yermack,

1996; Eisenberg, Sundgren and Wells, 1998; Fernández, Gomez and Fernandez, 1997). Therefore, the trade-off between advantages (monitoring and advising) and disadvantages (coordination, control and decision-making problems) has to be taken into account. As the particular time horizon under investigation is characterized by financial instability, we expect coordination and control to assume considerable relevance compared to monitoring and advising and thus that small boards will be associated with less risk-taking. In particular, we expect this idea to be confirmed by our measures of tail and systemic risks, which refer to the extreme conditions of individual banks and of the market, respectively, where the flexibility in decision-making is even more valuable. To summarize, the formal specification of our first hypothesis is the following:

> Hypothesis 1 (H_1): Tail and systemic bank risk-taking are positively related to board size.

Corporate governance literature offers no conclusive evidence on the effect of independent directors on bank risk-taking (Bhagat and Black, 2002; Hermalin and Weisbach, 1991; John and Senbet, 1998; de Andres and Vallelado, 2008). Independent directors are believed to be better monitors of managers, as they value the maintaining of reputation in the directorship market, but the findings in this instance are mixed (Fama and Jensen, 1983; Bhagat and Black, 2002). Having an excessive proportion of independent directors, who are often outside directors, could damage the advisory role of boards, since it might prevent bank executives from joining the board. Inside directors are able to provide the board with valuable information that outside directors would find difficult to gather. In other words, inside directors facilitate the transfer of information between board directors and managers (Adams and Ferreira, 2007; Harris and Raviv, 2008; Coles, Naveen, and Naveen, 2008). We would expect boards with more inside directors to be perceived as more able to support the managers in the difficult decision-making processes needed in extreme market conditions. However, according to Pathan (2009), when the monitoring function is prevalent, we should expect a positive link between the presence of independent directors and bank risk-taking. Moreover, Hermalin and Weisbach (2003) point out that board independence is not important on a day-to-day basis and propose that board independence should only matter for certain board actions, 'particularly those that occur infrequently or only in a crisis situation' (Hermalin and Weisbach 2003:17). Since we

are investigating a crisis period, we could thus expect a negative relationship between the number of independent directors and the bank tail risk. Again, we formalize our hypothesis for our two proxies of bank risk in stressed market conditions. Thus, the formal specification of our second hypothesis is as follows:

> Hypothesis 2 (H_2): Tail and systemic bank risk-taking are negatively related to the number of independent directors.

We investigate the effect of the frequency of board meetings per year, as a proxy for the better functioning of the board (Vafeas, 1999). Francis et al. (2012), find that firm stock performance is positively related to the number of board meetings, which is consistent with Adams and Ferreira (2007), who, among others, argue that board meetings are important channels through which directors obtain firm-specific information and fullfill their monitoring role. De Andres and Vallelado (2008) argue that meetings provide board members with the chance to come together, to discuss and exchange ideas on how they wish to monitor managers and bank strategy. Hence, the more frequent the meetings, the closer the control over managers and the more relevant the advisory role of the board. Furthermore, the complexity of the banking business and the importance of information (for the insider directors) both increase the relevance of the board advisory role, especially during stressed market conditions. To perform its role in an effective fashion, the board needs to have a sound structure with meetings sufficiently frequent to ensure thorough and timely review of the bank strategy and risk profile, and the discussion of any remedial action that might be required. Again, given our focus on the effect of corporate governance on extreme market conditions, we expect that a higher number of meetings might be perceived as a proxy for a more timely response of the board, in the case that an extreme event occurs, and thus could be associated with a lower level of tail and systemic risks.

> Hypothesis 3 (H_3): Tail and systemic bank risk-taking are negatively related to the number of meetings of the board of directors.

Finally, we formalize a specific hypothesis to test whether the predicted relations differ between SIBs and other banks. By definition, SIBs are more complex institutions characterized by a large size and higher degree of interconnectedness with other SIFIs (Systemically Important

Financial Institution), SIBs or firms. After the credit crisis broke out in 2007, failures in corporate governance mechanism at SIFIs have been identified as one of the main issues in explaining the unexpected fragility of these institutions during the financial crisis and also associated with excessive risk-taking in the pre-crisis period. As the board of directors can be seen as the governor of all governance mechanisms, we would expect a strong board structure to have more influence on the bank tail risk-taking of SIBs compared to other banks, in light of their complexity and interconnectedness. Hence, our hypothesis about SIBs is formalized as:

> Hypothesis 4 (H_4): Compared to non-SIBs, the expected relation between strong board structure (small board size, board independence and more board meetings) and bank tail and systemic risk is more pronounced for SIBs.

3.3 Sample, variables and econometric models

In this section, first we describe our sample and the selection strategy we adopt in order to build it up, and then we describe and analyse the variables (dependent variables, key independent variables and control variables) of the models we implement. Finally, we focus on the explanation of the estimation framework.

3.3.1 Sample and selection strategy

Our initial sample consists of the largest publicly listed commercial banks, bank holdings and holding companies headquartered in the European Union over the period 2006–2010. The empirical analysis requires data on the banks' corporate governance structures, the banks' and holdings' financial information, and stock prices. In detail, information on bank board structures are hand-collected from the annual reports, the financial information and the data on stock prices and market capitalizations of banks are mostly obtained from Bankscope and from the Bloomberg database, respectively

After eliminating the banks with limited market price, financial and/or corporate governance information, we obtain a sample comprising 40 individual banks and holdings companies and 200 firm-year observations for the fiscal years 2006–2010. In particular, we adopt the following criteria to build up our sample. First, we restrict our sample to commercial banks, bank holdings and holding companies that were publicly

traded at the end of 2006 and for the overall analysed period (i.e., 2006–2010) in the European Union. This results in 123 financial firms. Second, we consider only firms with a market capitalization which was greater than 1 billion euro at the end of 2006. We do this because large financial institutions were at the centre of public attention during the financial crisis and size is one of the main factors by which to assess the systemic relevance of a financial institution. This additional limitation reduces our sample to 52 units. Third, we lose 12 firms because of a lack of corporate governance information for the end of 2006 (prior to the onset of the crisis).

The financial firms included in our sample are listed in Appendix (Table 3.A1). Despite the small number of individual banks, the amount of total assets of these banks totalled 15,565,731 million euro at the end of 2006, and therefore the sample covers a substantial proportion of the total amount of banking assets in the European Union.

3.3.2 Variables

Key independent variables: board variables

Our key independent variables are the governance variables relating to the definition of strong board. According to Pathan (2009), the effectiveness of the board of directors in monitoring and advising managers determines its power and we use the term 'strong board' to indicate a board more likely to represent firm-shareholder interest. Our proxies of strong boards are small board size, more independent directors and high frequency of board meetings. In detail, we define board size (BS) as the number of directors on the board to test our first hypothesis. Independent directors (IND) is measured by the number of the independent board directors and is used to test our second hypothesis. An independent director has only a business relationship with the bank and his or her directorship (i.e., an independent director is not an existing or former employee of the bank, or one of their immediate family members, and does not have any significant business ties with the bank). The frequency of board meetings (BM) is measured as the median of the number of the meetings held the in the years 2004, 2005, 2006 (before the crisis) and this variable allows us to test our third hypothesis. To identify which banks in our samples can be considered systemic (SIB) in each year of our period of investigation (DUMMY_SIB) we refer to the top ten annual ranking of European systematic banks as reported in Acharya and Steffen (2012). This variable is used to construct the interaction terms with BD, IND, and BM allowing us to test the fourth hypothesis.

Dependent variables: bank risk measures

We use multiple proxies of bank risk to show whether strong boards have any impact on the bank risk-taking. In particular, our four measures of bank risk-taking include volatility (VOL), leverage (LEV), expected shortfall (ES) and marginal expected shortfall (MES). All these measures are based on market or quasi-market data.

First, we adopt volatility (VOL) of banks stock returns over the period 2006–2010. According to Peni and Vähämaa (2011), bank VOL is calculated as the annualized standard deviation of its daily stock returns (R_{it}) for each fiscal year. The daily stock return is calculated as the natural logarithm of the ratio of equity return series (i.e., $R_{it} = ln\ (P_{it}/P_{it-1})$, where the stock prices are adjusted for any capital adjustment, including dividend and stock splits. VOL captures the overall variability in bank stock returns and reflects the market's perceptions about the risks inherent in the bank's assets, liabilities, and off-balance-sheet positions. Both regulators and bank managers frequently monitor this total risk measure.

As it is not straightforward to measure true leverage, as put forward by Acharya et al. (2010), we apply the standard approximation of leverage, denoted LEV:

> LEV = (quasi-market value of assets / market value of equity), where the quasi-market value of assets is equal to book assets, minus book equity, plus market value of equity.

In order to investigate the impact of strong boards on the banks' risk, which can have significant financial stability implications, we adopt the measurements of tail risk, the expected shortfall (ES) and a specific measure of systemic risk developed by Acharya et al. (2010), the marginal expected shortfall (MES). Since the expected shortfall (ES) is the expected loss conditional on the loss being greater than the VaR, we estimate it as follows:

$$ES_{\alpha} = -E\left[R \mid R \leq -Var_{\alpha}\right] \tag{3.1}$$

where we consider $\alpha = 5\%$.

Starting from the same measure, the expected shortfall, but computing it for the overall banking system, Acharya et al. (2010) and Brownlees and Engle (2010) derive the marginal expected shortfall of bank *i* as the derivative of the market expected shortfall with respect to bank *i* weight in the market index and ultimately define MES as:

$$\frac{\partial ES_{\alpha}}{\partial y_i} = -E\left(r_i \mid R \leq VaR_{\alpha}\right) \equiv MES_{\alpha}^{i} \tag{3.2}$$

where r_i is the return of the bank i, $\alpha = 5\%$ and MES^i_α is bank i's marginal expected shortfall, measuring how bank i's risk-taking adds to the bank's overall risk. In other words, MES can be measured by estimating group i's losses when the market is doing poorly.

The main rationale behind the MES with respect to the standard measures of firm-level risk, such as VaR, expected loss, or volatility, is that they have almost no explanatory power, while beta has only a modest explanatory power in detecting systemically risky banks. We recall that the difference between MES and beta arises from the fact that systemic risk is based on tail dependence rather than on average covariance. Therefore, the MES better fits the definition of systemic risk, in terms of expected losses of each financial institution, in a future systemic event in which the overall financial system is experiencing losses. Moreover, the great advantage of MES is provided by the possibility of linking the market return's dynamic properties to single equity returns behaviour, possibly using bivariate models, and without the need for large system estimation, compared to other measures of systemic risk.

Control variables

Following on from previous studies, we include in our models a set of control variables in order to account for size, business mix, for bank credit and liquidity risks and also to take into consideration differences among countries in terms of regulation.

A first group of control variables measures differences in bank business structure. One of these control variables is bank size (SIZE), which we measure by the natural log of total bank assets (Pathan, 2009; Peni and Vähämaa, 2012) at the book value. The variable LEV is used as a control variable when MES, ES and VOL are specified as dependent variables. The variable MES is used as control variables when LEV is specified as a dependent variable, as put forward by Acharya et al. (2010), who consider MES and LEV as the main determinants of systemic exposure. The variable LOANSTA measures differences in banking business models, and it is constructed as the ratio of loans to total assets at book value (de Andres and Vallelado, 2008). It allows us to control for the potential differences between commercial and holding banks. We expect a negative for this variable consistent with the evidence from Knaup and Wagner (2012) that traditional banking activities (such as lending) are associated with lower perceived tail risk, while several non-traditional activities, on the other hand, are perceived to contribute to tail risk. They also find no relation between tail risk and leverage.

Our second group of control variables accounts for differences among countries in terms of regulation. We construct our control variable for 'country' as follows: we use dummy variables that take the value of one for each of the countries from which the analysed banks come from, and zero otherwise (de Andres and Vallelado, 2008). However, the country variable does not take into account that there are similarities among the countries in legal and institutional terms or in investors' protection rights.

Finally, a third group of control variables accounts for banks' risk-taking in terms of credit and liquidity risks. In particular, our proxy for the banks' liquidity risk is the liquidity ratio (LIQUID) measured by the ratio of liquid assets to customer and short term funding (LIQUID), that here has to be considered as an inverse measure of the liquidity risk. The impaired loans ratio (IMP, impaired loans/gross loans) takes into account the banks' credit risk, as it can be considered as a proxy of portfolio quality (Casu et al., 2011).

The detailed construction of the models' variables and their expected signs are presented in Table 3.1, in which we do not include the country and the year dummies.

Table 3.2 presents the descriptive statistics for the data used in the regressions.

The board structure variables in Panel A show that the mean BS is 13.45, with a minimum of 4 and a maximum of 31 units. As to the number of independent directors, IND varies from 0 to 20, with a mean of 5.925. The mean of the board meetings is 10.425, with a minimum of 1 and a maximum of 36.

For brevity, the descriptive statistics of control variables presented in Panel B are omitted. Turning to the descriptive statistics of the bank risk measures, Panel C shows that the annualized stock return (VOL) has a mean of 44.13 per cent during the sample period. Not surprisingly, Table 3.2 demonstrates that the volatility of bank stocks was extremely high during the crisis. The mean of MES, ES and LEV respectively of 4.46, 6.33 and 32.32 per cent are comparable to the ones reported by Acharya and Steffen (2012). However, we are analysing the 2006–2010 period, while their research focuses on the period from June 2006 to June 2007.

Table 3.A2 presents the Pearson's pairwise correlation matrix between the independent variables. Multicollinearity among the regressors should not be a concern as the maximum value of the correlation coefficient is -0.4286, which is between liquidity ratio (LIQUID) and bank size (LOANSTA).

Table 3.1 Definition of models' variables

Variable	Definition	Construction	Expected sign
MES	Marginal Expected Shortfall	$\frac{\partial ES_\alpha}{\partial y_i} = -E\left(r_i \mid R \le VaR_\alpha\right) \equiv MES_\alpha^i$	Dependent variable
ES	Expected Shortfall	$ES_\alpha = -E[R \mid R \le -Var_\alpha]$	Dependent variable
LEV	Quasi-Leverage	Quasi-market value of assets / Market value of equity	Dependent variable Positive (control variable)
VOL	Standard deviation of banks return	Annualized standard deviation of its daily stock returns	Dependent variable
BS	Board size	Number of directors on the board	Positive (Hypothesis 1)
BM	Frequency of board meetings	Number of meetings held during the fiscal year	Negative (Hypothesis 3)
IND	Independent directors	Number of independent board directors	Negative (Hypothesis 2)
SIZE	Bank size	Ln of total assets	Positive
LOANSTA	Bank business activity	Loans/ Total assets	Negative
LIQUID	Bank liquidity position	Liquid assets/Customer and short term funding	Negative
IMP	Bank credit risk	Impaired loans/ Gross loans	Positive
DUMMY_SIB	Systemically Important Banks	European top ten ranking based on SES by Acharya and Steffen (2012)	To construct interaction terms (Hypothesis 4)

Notes: This table presents definition, construction, and expected signs for the variables used for the regressions. The expected sign for LEV refers to that variable when considering it as a control variable. The expected sign for *LIQUID* refers to the liquidity ratio, so the expected sign is positive when considering the liquidity risk.

3.3.3 Econometric models

The primary estimation method is the generalized least square (GLS) random effect (RE) technique (Baltagi and Wu, 1999). This technique is robust to first-order autoregressive disturbances (if any) within unbalanced-panels and cross-sectional correlation and/or heteroskedasticity across panels. In the presence of unobserved bank fixed-effect, panel 'Fixed-Effect' (FE) estimation is commonly suggested (Wooldridge, 2002).

Table 3.2 Descriptive statistics

Variables	Obs.	Mean	St.Dev.	Min	Max
Panel A: board variables					
BS (No)	200	13.45	5.252	4	31
BM (No)	200	10.425	6.288	1	36
IND (No)	200	5.925	4.440	0	20
Panel B: control variables					
SIZE	200	12.012	1.688	7.135	14.765
LOANSTA	193	52.743	18.200	0.033	92.277
LEV	200	32.317	48.551	1.790	435.453
IMP	178	3.2997	2.612	0.19	12.94
LIQUID	196	47.026	47.721	6.78	441.82
Panel C: dependent variables					
MES	200	0.044	0.028	0.000	0.176
ES	200	0.063	0.042	0.015	0.267
VOL	200	0.441	0.270	0.117	1.717
LEV	200	32.317	48.551	1.790	435.453

Notes: This table reports the descriptive statistics of the board variables (Panel A), the control variables (Panel B) and the dependent variables (Panel C). See Table 3.1 for variables definitions.

However, such FE estimation is not suitable for our study for several reasons. First, time-invariant variables like IND, BS and BM cannot be estimated with FE regression, as they would be absorbed or wiped out in the 'within transformation' or 'time-demeaning' process of the variables in FE. Second, for large '*N*' (i.e., 40) and fixed small '*T*' (i.e., 5), which is the case with this study's panel data set (40 financial firms over 5 years), FE estimation is inconsistent (Baltagi, 2005:13). Furthermore, in the case of a large *N*, FE estimation would lead to an enormous loss of degrees of freedom (Baltagi, 2005:14). Thus, an alternative to FE, (i.e., RE), is proposed here.

Referring to the endogeneity concern, we underline that it is a common issue in governance studies and makes interpretation of the results difficult. As pointed out by Hermalin and Weisbach (2003), the relation between board characteristics and firm performance may be spurious because a firm's governance structure and performance are endogenously determined. This issue is less likely to be problematic in our setting because the financial crisis is largely an exogenous macroeconomic shock and also because we relate corporate governance variables as at 2006 to bank risk-taking measures in the years from 2006

to 2010. As argued by Pathan and Faff (2013), the financial crisis is an exogenous shock to a firm's investment choices and thus it provides an opportunity (albeit one-dimensional) to explore the first-order relation between board structure and bank performance during the crisis in a 'quasi-experimental' setting (Francis et al., 2012). Studying the relation between governance in the pre-crisis period and performance during the crisis period would be robust to any endogeneity concerns on the explanatory variables.

First, we employ three different measures of bank risk-taking: marginal expected shortfall (MES), expected shortfall (ES), volatility (VOL); second, for each risk measure, we estimate two baseline equations: Model 3.1 and Model 3.2. We specify that Model 3.1 is a parsimonious version of Model 3.2, which includes only two control variables (SIZE and LEV), year and country effects. The control variables of Model 3.2 are SIZE, LEV, LOANSTA, IMP, LIQUID, year and country effects. Third, as proposed by de Andres and Vallelado (2008), we introduce in both models the board size squared (BS_SQ). In particular, we find that there is an inverted U-shaped relation between board size and bank risk-taking (for further comments, see Section 3.4). In detail:

Model (3.1)

$$y_{it} = \alpha + \beta_1 IND_{i,2006} + \beta_2 BS_{i,2006} + \beta_3 BS\_SQ_{i,2006} + \beta_4 BM_{i,2006} + \gamma_1 SIZE_{i,t} + \gamma_2 LEV_{i,t} + \delta_1 D\_YEAR + \delta_2 D\_COUNTRY + \eta_i + \upsilon_{i,t}$$

Model (3.2)

$$y_{it} = \alpha + \beta_1 IND_{i,2006} + \beta_2 BS_{i,2006} + \beta_3 BS\_SQ_{i,2006} + \beta_3 BM_{i,2006} + \gamma_1 SIZE_{i,t} + \gamma_2 LEV_{i,t} + \gamma_3 LOANSTA_{i,t} + \gamma_4 IMP_{i,t} + \gamma_5 LIQUID_{i,t} + \delta_1 D\_YEAR + \delta_2 D\_COUNTRY + \eta_i + \upsilon_{i,t}$$

where y_{it} is our dependent variable (i.e., MES, ES, VOL); the β, γ and δ parameters are the estimated coefficients respectively for the key independent variables (board variables), the control variables and the year and country dummies. We split the error term in our estimations into two components: n individual effects (η_i) to control for unobservable heterogeneity and stochastic disturbance ($\upsilon_{i,t}$).

Next to these models, we also specify a different model with LEV as dependent variable, which includes MES as independent variable regardless of LEV.

3.4 Results

3.4.1 The impact of board structure on bank risk

Tables 3.3 and 3.4 present the results of RE estimates of Model 3.1 and Model 3.2 regressions, respectively, when considering MES, ES, and VOL and LEV as our dependent variables. As mentioned in the previous section, Model 3.1 is a parsimonious version of Model 3.2, which includes only two control variables (SIZE and LEV), year and country effects (D_YEAR and D_COUNTRY). In comparison to the other risk measures, the estimates for LEV include as control variables SIZE and MES. Given this different specification of the model, the evidence has a different interpretation for our key independent variables, but we draw our conclusions of the results across all the bank risk measures.

The regression for Model 3.1 is well-suited to an overall R-squared of 59, 62, 31 and 63 per cent for MES, ES, LEV and VOL respectively, while the regressions for Model 3.2 have an overall R-squared of 64, 68, 39 and 70 per cent for MES, ES, LEV and VOL respectively. For both models, we compute the Wald Chi-square statistics and find them statistically significant (unreported).

With regards to bank board variables, we find that the coefficient on BS is positive and statistically significant across all measures of risk, confirming our first hypothesis. This illustrates that, after controlling for bank characteristics, a small bank board is associated with less bank risk-taking, both in terms of tail, systemic risk and stock return volatility.

Table 3.3 Random effects (RE) – GLS estimates of Model 3.1

MODEL 3.1	**Dependent variables**			
RE GLS regression	**MES**	**ES**	**VOL**	**LEV**
Board variables				
IND	–0.00024	–0.0010159	–0.0067	–3.2758**
BS	0.00206*	0.0032241*	0.0204*	4.0153
BS_SQ	–0.00007**	–0.00009**	–0.0006**	–0.0843
BM	–0.0006***	–0.0007***	–0.0052***	0.4080
Control variables				
SIZE	0.00375***	0.00073	0.0045	3.5788*
LEV	0.00012**	0.00033***	0.0021***	55.65***
CONS	–0.02784*	0.00823	0.1007	–63.6433
R-Square (overall)	0.5882	0.6229	0.6346	0.3134
Number of banks	40	40	40	40

See Table 3.1 for variables definitions.
Estimates based on robust standard errors; time and country effects are included in all estimates. *Significant at 10%. **Significant at 5%. ***Significant at 1%.

Table 3.4 Random effects (RE) – GLS estimates of Model 3.2

MODEL 3.2 RE GLS regression	Dependent variables			
	MES	**ES**	**VOL**	**LEV**
Board variables				
IND	–0.00067	–0.00197***	–0.0128***	–4.6808**
BS	0.00272**	0.005068***	0.0321***	7.6905
BS_SQ	–0.00008**	–0.00014***	–0.0008***	–0.17996
BM	–0.0005**	–0.000704***	–0.0046***	0.19460
Control variables				
SIZE	0.00387***	0.00057	0.0025	–4.7094
LEV	0.00007	0.00026***	0.0016***	36.2604**
LOANSTA	–0.00039*	–0.00051*	–0.0041**	–1.4831**
IMP	0.00159*	0.00367***	0.0232***	7.8717
LIQUID	–0.00027**	–0.00038**	–0.0028**	–0.5751*
CONS	–0.00437	0.0376018	0.10074	111.8853
R-Square (overall)	0.6459	0.6863	0.7001	–4.6808**
Number of banks	40	40	40	7.6905

See Table 3.1 for variables definitions. Estimates based on robust standard errors; time and country effects are included in all estimates. *Significant at 10%. **Significant at 5%. ***Significant at 1%.

The latter evidence for the dependent variable VOL, the only variable we have in common with previous studies, is in contrast with the results of Pathan (2009) for the US market (though for a pre-crisis period), but generally in line with Akhigbe and Martin (2008). This result is consistent with our first hypothesis (H_1) based on the argument that the market might perceive a smaller board to have a greater ability to coordinate and control the managers and in the decision-making process within extreme market conditions.

The positive relationship we find suggests that banks with larger boards have higher stock-market volatility but, more importantly, they suffer higher losses during the crisis at an individual level and also in terms of contribution to the market's losses. A possible explanation is that larger boards have more difficulties in supervising managers and overcoming conflicts of interest among directors and between directors and managers. Moreover, managers could have an incentive to focus on 'usual' risk, which could be associated with market poor performance in case of extreme events, by increasing their systemic risk, to hide their true performance during the crisis.

Our results show an inverted U-shaped relation between board size (BS) and our risk measures. This suggests that the addition of new directors is positively related to bank's risk-taking, although the increase

in risk shows a diminishing marginal growth. Thus, the negative and significant coefficient of BS_SQ shows that there is a point at which adding a new director reduces a bank's risk-taking, in line with the main evidence in the literature. According to de Andres and Vallelado (2008), boards with many directors are able to assign more people to supervise and advise on managers' decisions. Having more supervisors and advisors either reduces managers' discretionary power or at least makes it easier to detect managers' opportunistic behaviour.

With regards to the number of independent directors, we find an interesting result. The coefficient on IND is negative across all measures of risk and statistically significant, except for MES: banks with more independent directors are perceived as less risky during the crisis. This result is only partially consistent with our second hypothesis (H_2). In particular, it illustrates that the role of independent directors might be more valuable in a crisis event that is specifically related to the bank (as bank-specific tail – ES), than in the case of a systemic crisis (market tail – MES). However, it is surprising to note the absence of any influence of board independence on systemic risk.

We also observe that the LEV only has a negative and statistically significant relationship with the number of independent directors, while all the other governance variables are statistically insignificant. This result might be useful in supporting the recommendation, usually included in the codes of good practice, to increase board independence, as it suggests that the excessive leverage of banks revealed by the financial crisis could be mitigated by the advisory and monitoring role of the independent directors.

Moreover, we find a negative relation between the number of board meetings (BM) and bank risk-taking (hypothesis H_3). The coefficient of BM is negative and statistically significant for our measures of tail, systemic and total risk. This result supports our third hypothesis that a high frequency of bank board meetings is perceived to result in a more proactive than reactive role during the crisis, and can therefore be associated with less tail and systemic risk.

The coefficients on the other bank characteristic variables all have the expected signs and offer some significant insights. For instance, we observe that the SIZE is positively associated with MES, with a significant coefficient, but not to ES, which is in turn associated with LEV (as in Acharya and Steffen, 2012). This is consistent with the idea of considering size as one of the main conditions used to identify systemically important risky banks and leverage as the major concern of the risk management at individual banklevel. We also find a negative and significant coefficient for LOANSTA, for all four measures of risk. This

illustrates that banks more involved in credit activities than trading activities are associated with less tail and systemic risk. Finally, we find coherent signs and significant coefficients for our credit risk and (funding) liquidity risk proxies: IMP and LIQUID. As expected, in both cases, we find that the bank exposures on these two risks were among the main drivers of bank risk-taking during the financial crisis.[1]

To test our fourth hypothesis (H_4), we include a dummy variable (DUMMY_SIB) in Model 3.2, which takes a value equal to 1 for the systemically important banks from the top ten ranking in Acharya and Steffen (2012) for each year, and 0 otherwise. Second, next to the dummy, we include three interaction terms progressively for each corporate governance factor under investigation: INT_DUMMY_SIB_IND, INT_DUMMY_SIB_BS and INT_DUMMY_SIB_BM, respectively.

Tables 3.5 to 3.7 report our results.

Table 3.5 RE estimates of bank risk on board structure: the effect of board independence

Variables	MES (1)	ES (2)	VOL (3)	LEV (4)
DUMMY_SIB	0.750	0.582	0.678*	0.834
INT_DUMMY_SIB_IND	0.170	–0.104	–0.134	0.246
IND	–0.039	–0.124*	–0.117*	–0.341*
BS	0.361	0.515**	0.499**	0.633
BS_SQ	–0.398*	–0.454***	–0.453***	–0.470
BM	–0.106*	–0.08*	–0.086*	0.053
SIZE	0.210**	–0.001	–0.018	–0.177
LEV	0.077	0.239**	0.227***	
LOANSTA	0.035	0.078	0.062	–0.347***
IMP	0.095	0.169**	0.166**	0.340
LIQUID	–0.314*	–0.150	–0.200	–0.714***
MES				0.126
CONS	–0.824***	–0.680***	–0.735***	–0.161
R-Square (overall)	0.684	0.7158	0.738	0.376
Wald $\chi 2$ test	335.6	358.34	407.92	139.64
Number of banks	36	36	36	36

Dependent variables: MES, ES, VOL and LEV

Notes: The table reports the RE estimates for Model 3.2. The dependent variables are shown in columns 1, 2, 3 and 4, respectively. See Table 3.1 for variables definitions. *Significant at 10%. **Significant at 5%. ***Significant at 1%.

$$y_{it} = \alpha + \beta_1 IND_{i,2006} + \beta_2 BS_{i,2006} + \beta_3 BS\_SQ_{i,2006} + \beta_3 BM_{i,2006} + \beta_4 DUMMY\_SIB_{i,t} + \beta_5 INT\_DUMMY\_SIB_{i,t} - IND_{i,2006} + \gamma_1 SIZE_{i,t} + \gamma_2 LEV_{i,t} + \gamma_3 LOANSTA_{i,t} + \gamma_4 IMP_{i,t} + \gamma_5 LIQUID_{i,t} + \delta_1 D\_YEAR + \delta_2 D\_COUNTRY + \eta_i + \upsilon_{i,t}$$

After adding the interaction term INT_DUMMY_SIB_IND, we find that (see Table 3.5) the relationship between the number of independent directors (IND) and bank risk is confirmed across all measures of risk, except MES, as in the previous results (negative and significant at 5 per cent). Moreover, there is no evidence of a different relation for SIBs and non-SIBs. The role of independent directors is important because it is associated with lower tail risk, but not more important for SIBs. It is valuable to notice that board independence, one of the main recommendations in governance debate, is unrelated to bank systemic risk exposure and neutral to bank systemic relevance.

In Table 3.6 we find, after adding the interaction term INT_DUMMY_SIB_BS to the Model 3.2, that the significance for the BS variables shown in the previous results disappears, while we have positive and significant (1 per cent) coefficients of the interaction terms for MES, ES and VOL.

Table 3.6 RE estimates of bank risk on board structure: the effect of board size

Variables	**MES (1)**	**ES (2)**	**VOL (3)**	**LEV (4)**
DUMMY_SIB	0.628**	0.651***	0.725***	0.688*
INT_DUMMY_SIB_BS	0.647**	0.835***	0.851***	0.487
BS	0.095	0.140	0.118	0.447
BS_SQ	–0.207	–0.18	–0.176	–0.343
IND	–0.012	–0.105	–0.103	–0.31*
BM	–0.133**	–0.123***	–0.128***	0.031
SIZE	0.263***	0.077	0.067	–0.135
LEV	0.052	0.202**	0.191**	
LOANSTA	–0.028	0.030	0.013	–0.402***
IMP	0.073	0.147*	0.145**	0.321
LIQUID	–0.444***	–0.340*	–0.385**	–0.809***
MES				0.089
CONS	–0.800***	–0.654***	–0.653***	–0.172
R-Square (overall)	0.695	0.733	0.738	0.3855
Wald χ2 test	339.17	402.99	407.92	138.54
Number of banks	36	36	36	36

Dependent variables: MES, ES, VOL and LEV

Notes: The table reports the RE estimates for Model 3.2. The dependent variables are shown in columns 1, 2, 3 and 4, respectively. See Table 3.1 for variables definitions. *Significant at 10%. **Significant at 5%. ***Significant at 1%.

$$y_{it} = \alpha + \beta_1 IND_{i,2006} + \beta_2 BS_{i,2006} + \beta_3 BS\_SQ_{i,2006} + \beta_3 BM_{i,2006} + \beta_4 DUMMY\_SIB_{i,t} + \beta_5 INT\_DUMMY\_SIB_{i,t} - IND_{i,2006} + \gamma_1 SIZE_{i,t} + \gamma_2 LEV_{i,t} + \gamma_3 LOANSTA_{i,t} + \gamma_4 IMP_{i,t} + \gamma_5 LIQUID_{i,t} + \delta_1 D\_YEAR + \delta_2 D\_COUNTRY + \eta_i + \upsilon_{i,t}$$

This suggests that the presence of SIBs in the sample mainly drives the previous results. For the SIBs a larger board size before the crisis implies a higher risk exposure during the crisis (H_4).

Finally, in Table 3.7 we report our estimations after adding the interaction term INT_DUMMY_SIB_BM. These results confirm the previous finding for the relation between frequency of board meetings and bank risks (BM – negative and significant coefficient (1 per cent)) for the non-SIBs across our measures of tail, systemic and total risk. However, we find an interesting result for the relation between the number of board meetings and SIBs' risks. The effect of board meetings on SIBs risk is positive and significant at 1 per cent. This result suggests that SIBs with greater tail and systemic risks during the crisis are associated with a higher number of meetings before the crisis.

Table 3.7 RE estimates of bank risk on board structure: the effect of board meetings

Variables	MES (1)	ES (2)	VOL (3)	LEV (4)
DUMMY_SIB	0.862***	0.833***	0.949***	0.834
INT_DUMMY_ SIB_BM	0.897***	0.901***	0.919***	0.535
BM	–0.133***	–0.117***	–0.120***	0.037
BS	0.175	0.302	0.280	0.541
BS_SQ	–0.267	–0.300*	–0.294*	–0.410
IND	–0.018	–0.120*	–0.114*	–0.319*
SIZE	0.242***	0.048	0.036	–0.161
LEV	0.064	0.230**	0.216**	
LOANSTA	–0.042	0.016	0.007	–0.406***
IMP	0.082	0.163**	0.158**	0.332
LIQUID	–0.486***	–0.352*	–0.398**	–0.809***
MES				0.104
CONS	–0.798***	–0.643***	–0.699***	–0.166
R-Square (overall)	0.689	0.720	0.742	0.3864
Wald χ2 test	326.36	373.24	418.79	137.96
Number of banks	36	36	36	36

Dependent variables: MES, ES, VOL and LEV

Notes: The table reports the RE estimates for Model 3.2. The dependent variables are shown in columns 1, 2, 3 and 4, respectively. See Table 3.1 for variables definitions. *Significant at 10%. **Significant at 5%. ***Significant at 1%.

$$y_{it} = \alpha + \beta_1 IND_{i,2006} + \beta_2 BS_{i,2006} + \beta_3 BS\_SQ_{i,2006} + \beta_3 BM_{i,2006} + \beta_4 DUMMY\_SIB_{i,t} + \beta_5 INT\_DUMMY\_SIB_{i,t} - IND_{i,2006} + \gamma_1 SIZE_{i,t} + \gamma_2 LEV_{i,t} + \gamma_3 LOANSTA_{i,t} + \gamma_4 IMP_{i,t} + \gamma_5 LIQUID_{i,t} + \delta_1 D\_YEAR + \delta_2 D\_COUNTRY + \eta_i + \upsilon_{i,t}$$

Overall, our results have two relevant implications. First, by revealing the uniqueness of SIBs in terms of corporate governance, we suggest that when testing for the impact of corporate governance on bank risk-taking, it is important to distinguish between systemically important banks and other banks, in order to avoid biased results. Moreover, this aspect could also have potentially affected the previous literature, which could explain their mixed evidence. Second, a strong relationship between the number of independent directors and bank tail risk clearly emerges, which is consistent with their special role in specific corporate actions, such as an idiosyncratic crisis event. However, it is surprising that board independence (before the crisis) is unrelated to both the systemic risk and systemic relevance of a bank (during the crisis). This suggests that the role of independent directors was ineffective in advising managers against assuming systemic risk, while their role was more valuable in leverage decisions.

3.5 Conclusions

We provide empirical evidence on how corporate governance mechanisms before the crisis affected the risk of European banks during the financial crisis.

We find that banks with larger boards and a lower number of board meetings per year are associated with higher tail risk, but also that they contributed more to the losses of the banking system as a whole. After controlling for the systemic relevance of banks in our sample, we find that board size is more important for SIBs than for other banks, whereas larger boards are associated with greater tail and systemic risk exposure. As to board independence, we have no evidence that the number of independent directors has any impact on bank systemic risk and only weak evidence for ES and VOL. This holds both for SIBs and non-SIBs. Finally, frequency of board meetings reduces risk for non-SIBs and increases risk for SIBs.

Overall, our results confirm the uniqueness of SIBs' corporate governance and shed light on how board characteristics relate to the systemic risk exposure and relevance of those institutions. In particular, in light of our results, both regulators and policy makers should consider prompt action towards improving the effectiveness of independent directors' actions in order to avoid managers and shareholders engaging in more systemic risk because of an implicit too-big-to-fail guarantee.

Appendix

Table 3.A1 List of European banks in our sample

1. Aareal Bank AG
2. Allied Irish Banks plc
3. Azimut Holding SpA
4. Banca Carige SpA
5. Banca Monte dei Paschi di Siena SpA-Gruppo Monte dei Paschi di Siena
6. Banco Bilbao Vizcaya Argentaria SA
7. Banco BPI SA
8. Banco de Sabadell SA
9. Banco Espanol de Crédito SA, BANESTO
10. Banco Espirito Santo SA
11. Banco Santander SA
12. Bank of Ireland-Governor and Company of the Bank of Ireland
13. Bankinter SA
14. Barclays Plc
15. BNP Paribas
16. Commerzbank AG
17. Crédit Industriel et Commercial – CIC
18. Credito Emiliano SpA-CREDEM
19. Danske Bank A/S
20. Deutsche Bank AG
21. Erste Group Bank AG
22. HSBC Holdings Plc
23. ING Groep NV
24. Intesa Sanpaolo
25. Jyske Bank A/S (Group)
26. Lloyds Banking Group Plc
27. National Bank of Greece SA
28. Natixis
29. Nordea Bank AB
30. Paragon Group of Companies Plc
31. Pohjola Bank plc-Pohjola Pankki Oyj
32. Raiffeisen Bank International AG
33. Royal Bank of Scotland Group Plc
34. Sampo Plc
35. Schroders Plc
36. Skandinaviska Enskilda Banken
37. Standard Chartered Plc
38. Svenska Handelsbanken
39. Sydbank A/S
40. UniCredit SpA

Table 3.A2 Correlation matrix

	LEV	IND	BS	BM	SIZE	LOANSTA	IMP	LIQUID
LEV	1.00							
IND	–0.19	1.00						
BS	0.04	0.37	1.00					
BM	0.01	0.04	–0.07	1.00				
SIZE	0.23	0.17	0.22	0.10	1.00			
LOANSTA	–0.06	0.07	0.08	0.06	–0.28	1.00		
IMP	0.27	0.20	0.02	0.14	0.17	0.01	1.00	
LIQUID	–0.10	–0.15	–0.14	–0.04	–0.21	–0.43	–0.14	1.00

Notes: The table shows Pearson pairwise correlations for the variables used in the empirical analysis. See Table 3.1 for variables definitions. Bold texts indicate statistically significant at 5 per cent level.

Note

1. We implement several robustness checks. In terms of the independent variables, we rerun all calculations adopting the number of independent directors by board size. All estimations are available upon request. As regards the estimation method, we use a random effect probit model. We also perform Glejser's (1969). The estimates with the Glejser procedure are robust to within and across bank correlations of residuals. In all cases our results remain qualitatively unchanged. The tables are available upon request.

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4

Corporate Governance of Banks and Financial Crisis: Can the Post-crisis Rules Make Banks Safer?

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4.1 Introduction[1]

The recent financial crisis demonstrated the crucial importance of corporate governance for the safety and stability of financial systems. The introduction of very complex and sophisticated prudential rules – Basel II above all – in the years before the crisis was unable to prevent the fact that banks could assume a volume of risks that they were incapable of managing in conditions of stability.

The drivers of the crisis were many and they involved a large number of microeconomic and macroeconomic factors as well as a certain superficiality of the supervisory authorities in those countries most affected by the turmoil. However, there is an increasing convergence of opinions among regulators and academics about the fact that, while very complex and articulated prudential rules are surely useful in order to better link the operational scope of banks with capital and risk management apparatus, they are not able to prevent the excessive risk appetite of bank managers whenever banks' corporate governance is weak.

The recent awareness about the importance of corporate governance for a safe and sound banking system stimulated several international and domestic supervisory authorities to introduce a new set of rules designed to impose stricter corporate constraints and controls on banks. On the one hand, there is Basel III which, by increasing the quantity and improving the quality of regulatory capital, contributes to align the goals of managers with those of shareholders, so reducing the excessive risk appetite of the management and, more generally, the typical agency problems that usually arise between banks' managers and shareholders;

in fact, if banks are better capitalized, other things being equal, their managers should be more interested in maximizing medium-term performance rather than generating higher profits in the short-run due to high-risk assumption and having a more volatile performance in the medium- and long-term. On the other hand, specific rules on the remuneration of the management according to long-term performance – already implemented in many jurisdictions after the crisis – are supposed to reduce the incentives to assume too much risk in order to rapidly improve the performance in the short-term.

This chapter critically reviews the most significant changes that have occurred in corporate governance rules since the beginning of the recent financial crisis – Basel III and reforms on remuneration policies, above all – in order to verify whether these regulatory reforms, which are supposed to contribute towards making the global financial system safer, and ultimately to prevent another turmoil in the future, are adequately perceived by the market and the different stakeholders. Although heterogeneous country-specific reforms have been implemented in different jurisdictions since the beginning of the crisis, in order to strengthen corporate governance of banks, it is indubitable that Basel III and the regulation of Global Systemically Important Financial Institutions (G-SIFIs) represent the two most relevant changes that have affected banks' governance in the last few years. In fact, Basel III – by increasing the quantity of regulatory capital and improving its quality – tends to align the goals of managers with those of shareholders, whereas the additional capital requirements on G-SIFIs contribute towards a convergence of the goals of different stakeholders, including public authorities, which have often been involved in the bailout of large banks considered too-big-to-fail.

In order to test the impact of the above-mentioned reform, we study the European Global Systemic Banks (G-SIBs) and try to verify whether the corporate governance of these banks in a post-crisis environment is able to somehow affect the performance and the stability of these banks. Therefore, an empirical analysis has been carried out on a sample of 17 Global Systemically Important Banks registered in Europe, in order to verify whether the post-crisis supervisory initiatives may impact on banks' corporate governance and contribute to an increase in their performances. To this purpose, we investigated the impact of some corporate governance variables and capital ratios on bank efficiency and performances. The corporate governance variables employed in our study are supposed to mirror remuneration practices and internal governance structure. Although there are objective difficulties to isolating the role of

corporate governance on banks' performance, in line with the previous studies performed in other parts of the world, preliminary results confirm what has been previously demonstrated by other authors. This study makes a significant contribution to research by proving once again the growing importance of corporate governance, combined with tougher prudential capital and enhanced liquidity requirements, in the banking and financial system.

The chapter is structured as follows. Section 4.2 critically analyses the most relevant literature on corporate governance in banking and its role in the financial crisis. Section 4.3 focuses more deeply on the new regulatory frameworks affecting banks' corporate governance, trying to link the changes that occurred with the events of the financial turmoil. In Section 4.4 we perform an empirical analysis on the most likely effects of such reforms, while Section 4.5 draws the main conclusions.

4.2 Literature review

The literature on banks' corporate governance is very rich and broad and it has analysed many issues, from many different perspectives. For the purposes of this examination, we have classified the relevant literature on corporate governance into three subsets of contributions:

1. scientific works which stress the peculiarities of banks and, consequently, the importance of the role of governance;
2. more recent research, which investigates the connection between weaknesses in corporate governance and the financial crisis;
3. studies which try to figure out the relationship between corporate governance and other key strategic aspects (i.e., profitability) of the banking business.

The ultimate goal of the majority of these studies is usually similar and consists of research into more efficient and effective corporate governance solutions, to be implemented by regulators and/or to be adopted by banks.

Regarding the peculiarities of banks and the role of corporate governance, many authors point out the difficulties in keeping together the divergent goals of different stakeholders (i.e., shareholders, managers, depositors, supervisors, government) in banking and, therefore, in the inconsistencies of regulation. Due to the atypical balance sheets of banks, compared to those of industrial companies, and considering that the vast majority of the liabilities of banks are represented by demand

deposits belonging to less informed parties, many studies highlight how performance maximization goals carried out by banks' managers may determine an increase in the risk appetite and profile of banks, which in turn may affect their stability. Within this framework, it is possible to identify a clear trade-off between the goals of managers and the objectives of depositors and supervisors, who would prefer that managers perform lower risk, but safer, investments. Other trade-offs are usually highlighted by the divergent goals that exist between the effort to increase the competitiveness of the banking system and the stability of less efficient banks within the system.

However, the results on the influences of shareholders and managers in banking are not exhaustive. Among the large number of authors who approached these topics, Laeven and Levine (2009), for instance, illustrate in their paper an 'empirical assessment of theories concerning risk-taking by banks, their ownership structures, and national bank regulations' and they find that, 'banks with more powerful owners tend to take greater risks', indeed, 'equity holders have stronger incentives to increase risk than non- shareholding managers and debt holders', and 'large owners with substantial cash flows have the power and incentives to induce the bank's managers to increase risk-taking'. These conclusions have provided valid arguments for a stricter regulation aimed at trying to align the goals of large shareholders with depositors and those who just have minority interests.

Thus, in terms of the links between banks' peculiarities and their corporate governance, this study tries to verify whether the post-crisis regulatory changes may contribute to a reduction in some of the trade-offs among the different above-mentioned stakeholders.

In the traditional debate about how to improve corporate governance, Macey and O'Hara (2003) underline the central role of corporate governance and 'explain the role that corporate governance plays in corporate performance and argue that commercial banks pose unique corporate governance problems for managers and regulators, as well as for claimants on the firms' cash flows such as investors and depositors'. They also analyse the two different models of corporate governance: Anglo-American on one hand and the Franco-German model on the other hand; then, they focus their analysis on the duties and obligations of corporate officers and directors. The study, through the analysis of banks' balance sheets, 'supports the argument that bank directors should owe fiduciary duties to fixed claimants as well as to equity claimants'. As regards the analysis of the two different corporate governance models, in their opinion US banks have to go in the 'direction of the

Franco-German corporate governance model, which has long reflected the view that the responsibilities of corporate directors extend beyond the confines of the shareholder population'. Ten years later, this advice seems far from being implemented.

The second area of investigation approached by many lecturers and regulators is aimed at highlighting the role of weak corporate governance in the 2007–2009 financial crisis. Although it is obvious that the crisis was generated by a large number of factors, which go beyond corporate governance, it is also evident that incorrect corporate policies strongly contributed to maximizing short-term goals, rather than long-term profitability, thus stimulating an excessive risk appetite in banks' managers for immediate objectives and short-term returns. It is obvious that if remuneration policies encourage the maximization of short-term performance – which used to be the parameter on which bonuses were largely linked – banks' managers have a strong incentive to assume more risk in the short-term without considering the consequences, in the medium- and long-term, of their actions. Such an attitude, for instance, determined the drop in the quality of credit portfolios of many commercial banks involved in subprime lending in the United States.

In this area of study there are also many contributions. Becht, Bolton and Röell (2012) perform a review of 'the pattern of bank failures during the financial crisis' and they investigate 'whether there was a link with corporate governance'. The authors critically argue that 'bank governance is different and requires more radical departures from traditional governance for non-financial firms'; indeed, they note from their analysis, while supported by theory and the available evidence 'that boards must have responsibilities to creditors as well as shareholders', 'remuneration must be adjusted for risk' and 'internal risk controls must be strengthened'. On the other hand, Szego, De Vincenzo and Marano (2008) analyse 'the evolution of corporate governance of Italian listed banks, specifically focusing on boards', in order to emphasize the controversial impact that pre-crisis regulation had on corporate governance and, ultimately, on banks' risk profile. They look at 'how bank board rules have changed and how board size, composition and operation have evolved during the last ten years', before the beginning of the 2007 financial crisis. The authors, through an interesting analysis of both company law and banking regulation changes that occurred during the nineties as well as through an empirical analysis, conclude that, 'board size has significantly increased for bank holding companies and for large banks', whereas 'frequency of board meetings has

remained stable'. This could underpin the hypothesis that although the complexity of banks increased, the risk governance role of the board used to be more formal than substantial. They also underline that, 'analyses of the recent crisis put their blame on perverse management incentives due to ill-designed remuneration schemes. Safety nets have been stretched to an unprecedented extent and the danger of moral hazard greatly increased'. Consequently, they also stress the need for 'a more precise and risk-effective design of corporate governance by banks, as well as a strict enforcement of corporate governance rules by bank supervisors'.

The crisis also demonstrated significant issues related to information asymmetries or difficulties in processing and analysing information on opaque financial products and techniques. In the effort to align the goals of different stakeholders and to reduce the existing information asymmetries among them, Mehran and Mollineaux (2012) point out the relationship between corporate governance and disclosure, stating that, 'the lack of transparency in the banking industry may be a symptom rather than the primary cause of bad governance'. They also stress the weakness of corporate governance during the recent financial crisis and propose two different approaches that regulators could adopt when 'attempting to increase market discipline and information disclosure'. First, they suggest the production of information outside of markets through increased regulatory disclosure. Second, their recommendation is to 'directly motivate potential producers of information by changing their incentives'. The authors also emphasize 'the importance of information and incentivizing market discipline through disclosure as a critical component of studying and improving the corporate governance of financial institutions. How market discipline will shape behaviour and how the information content of prices will be affected depend on who produces the information, what is disclosed, when it is disclosed, and under what economic conditions it is disclosed.' The authors reach the conclusion that, 'regulators and market participants can influence the information content of securities prices and promote market discipline'.

In the critical review of the relationships between corporate governance of banks and financial crisis some authors pushed the analysis beyond the borders of banks, trying to highlight the role that other players had in the crisis, in order to discuss how to improve the regulatory framework. According to this analysis, for instance, in her paper Marcinkowska (2012) 'presents key aspects requiring reforms: the role, constitution and accountability of board, risk management,

management remuneration, transparency'. The author suggests a series of solutions aimed at repairing and strengthening the system. She analyses the causes of the crisis related to corporate governance, stating that, 'without doubt, the greatest responsibility for the excessive risks is borne by the banks themselves – their management and supervisory directors. However, it is worth noting that other stakeholders also contributed to the crisis: supervisors and regulators, participants in financial markets (including investors), auditors and rating agencies, and clients.' As regards the causes of recent financial crisis, she also underlines the role of ethics in governance.

Also Erkens, Hung and Matos (2012) analyse the influence of corporate governance on financial firms' performance during the 2007–2008 financial crisis, by utilizing a dataset of 296 financial firms from 30 countries that were involved in the crisis. The authors achieve the interesting conclusion, based on empirical evidence, that, 'corporate governance influenced the performance of financial firms during the 2007–2008 financial crisis'. Indeed, they stress that, 'although all firms were affected by the crisis, firms with higher institutional ownership and more independent boards had worse stock returns than other firms during the crisis'. Further exploration of this finding, according to the authors, results in the fact that: '(1) firms with higher institutional ownership took more risk prior to the crisis, which resulted in larger shareholder losses during the crisis period, and (2) firms with more independent board members raised more equity capital during the crisis, which led to a wealth transfer from existing shareholders to debtholders'.

The third area of investigation is related to corporate governance and banks, for which we deepen our analyses of researches that try to focus the relationship between corporate governance and other key managerial aspects (i.e., performance or board structure). For the purposes of this chapter the review of such literature is very important because in analytically reviewing the regulations, and in suggesting changes, it is important to bear in mind the consequences that stricter rules may have on some stakeholders: for instance, reduction of profitability, migration of skilled managers elsewhere.

Tandelilin et al. (2007) developed a model called 'triangle gap' that consists of three constructs – corporate governance, risk management, and bank performance – and tried to investigate the relationships between these three components. They also include in their research: type of bank ownership as a moderating variable, and ownership structure as a key determinant of corporate governance. The results of this empirical research provide several implications. On the one hand,

they highlight that managers should know that in order to implement good corporate governance, they should be concerned about inter-relationships between the three constructs. Moreover, according to their analysis, it seems that banks that implement good corporate governance have a higher chance of increasing their performance and reducing their risk. Thus, apparently, there is not any trade-off between an effective risk management and banks' profitability, especially in a long-term perspective. Furthermore, different types of ownership have different concerns regarding implementation of good corporate governance, which implies that choices about the ownership structures should not be irrelevant and should also bear in mind the perspective of regulators and supervisors.

Another topic largely debated within this area of investigation is the relationship between board organization (i.e., a one-tier board system – which is the rule in the UK or in Spain – or a two-tier vertical system, largely adopted in Germany and in the Netherlands), performance and risk management. Also the usefulness and effectiveness of the board committees is studied and tested. Brogi (2008), among others, analyses the peculiarities of the corporate governance of financial intermediaries regarding the size of the board, performance and the role of committees in the risk acceptance process of European financial intermediaries, also considering the type of governance system in place. In particular, she studies some cases of Italian banks and she concludes that the lack of conclusive empirical evidence on the relationship between board size and performance probably means that there is no 'one size fits all model' and that the two alternative views on board functioning are complementary.

In the debate on board structure, performance and risk, de Andres and Vallelado (2008) use a sample of large international commercial banks to test hypotheses on the dual role of boards of directors. They 'use a suitable econometric model (two step system estimator) to solve the well-known endogeneity problem in corporate governance literature, and demonstrate the empirical and theoretical superiority of system estimator over OLS and within estimators'. The results of the authors' research 'show that bank board composition and size are related to directors' ability to monitor and advise management, and that larger and not excessively independent boards might prove more efficient in monitoring and advising functions, and create more value'. All the relations analysed by the authors hold after they 'control for the measure of performance, the weight of the banking industry in each country, bank ownership, and regulatory and institutional differences'.

The analysis of how corporate governance affected banks' performance during the recent crisis has been performed by Beltratti and Stulz (2011), too. In their paper the authors 'investigate the determinants of large bank stock-return performance across the world during the period from the beginning of July 2007 to the end of December 2008'. They state that, 'this period corresponds to the greatest destruction of bank wealth since the Great Depression'. The analysis finds that banks with more shareholder-friendly boards performed worse during that period. In contrast, banks with more Tier 1 capital, more deposits, and more loans performed better. Moreover, they also argue that 'banks from countries with stronger capital supervision had higher returns as well', whereas 'banks from countries with stronger regulators had worse performance, but this might result from greater intervention by these regulators during the crisis at the expense of shareholders'. The authors also find that, 'the performance of large banks during the crisis is negatively related to their performance in 2006', in fact 'the banks that the market rewarded with largest stock increases in 2006 are the banks whose stock suffered the largest losses during the crisis'.

Cornett, McNutt and Tehranian (2009) also examine 'earnings management at the largest publicly traded bank holding companies' focusing their analysis on the United States only. More specifically, they look at the 'interactions between firm performance, corporate governance mechanisms, and earnings management', by considering 'whether the various corporate governance mechanisms and earnings management tools are chosen jointly or independently from each other'. The results of their research suggest that, 'corporate governance plays at least some role in earnings and earnings management at large US banks'. They find that, 'performance, earnings management, and governance mechanisms are endogenously determined'. Furthermore they find that 'performance, board independence, and capital are negatively related to earnings management', and also that 'an independent board of directors is associated with higher levels of loan losses and fewer recorded securities gains'. The authors also underline in this work that, 'CEO pay sensitivity is positively related to earnings management'. The results therefore suggest that: 'the governance structure at bank holding companies does indeed affect the actions of bank managers. Specifically, governance mechanisms that stress CEO pay-for-performance actually encourage the CEO to manage earnings, while those that stress board independence dampen the CEO's ability to manage earnings' (Table 4.1).

Table 4.1 Key contributions to corporate governance and banks: a possible taxonomy

Investigation areas	**Analysed contributions**	**Key ideas**
Peculiarities of banks and role of corporate governance	• Laeven and Levine (2009) • Macey and O'Hara (2003)	• Corporate governance does not usually consider properly the trade-off among different stakeholders • Banks' managers should consider the interests of other stakeholders too
Weaknesses in corporate governance and financial crisis	• Becht, et al. (2012) • Szego et al. (2008) • Mehran and Mollineaux (2012) • Marcinkowska (2012) • Erkens et al. (2012)	• Board must have responsibilities to creditors and shareholders • Complexity of banks increased, but the risk governance role of the board used to be more formal than substantial • Perverse management incentives due to ill-designed remuneration schemes • Regulation should increase market discipline and information disclosure • Corporate governance influenced the performance of financial firms during the 2007–2008 financial crisis
Corporate governance and strategic aspects	• Tandelilin et al. (2007) • Brogi (2008) • De Andres and Vallelado (2008) • Beltratti and Stulz (2011) • McNutt and Tehranian (2009)	• There is a strong relationship between corporate governance, risk management, and bank performance • Relationship between board dimension and composition and performance. • Performance of large banks during the crisis is negatively related to their performance in 2006 • Performance, board independence, and capital are negatively related to earnings management

4.3 The new regulatory framework and banks' corporate governance

In the previous section, we critically analysed the many significant contributions of literature in explaining why the governance of banks differs from that of non-financial firms, as well as the role of corporate governance in the recent financial crisis. Now we examine why corporate governance regulation in the banking and financial sector has traditionally been regarded as a critical area, and then we focus our analysis on where the governance of banks failed during the crisis in order to critically review the recommendations issued by the Basel Committee (BCBS) for improving banks' governance system.

4.3.1 Why has corporate governance regulation in financial sector traditionally been regarded as a critical area?

It is possible that no other subject has been as closely examined in the past few years as corporate governance in banks and financial institutions. The bulk of this attention is almost certainly directed towards the crisis, which became a powerful reminder of the importance of the banking system. As a matter of fact, corporate governance in banks seems to be more important than other industries because the banking sector plays a crucial financial intermediary role in any economy. Banks play the role of efficient allocators of scarce resources, such as capital and liquidity, throughout the rest of the economy.

Corporate governance has the potential to identify problem spots where incentives are mismatched in a way that could lead to undesired firm behaviour or even system-wide instability (Mehran and Mollineaux, 2012). If unregulated, poor bank corporate governance practices can drive the market to lose confidence in the ability of a bank to properly manage its assets and liabilities, including deposits, which could in turn trigger a liquidity crisis and might then lead to economic crisis in a country, or pose systemic risk to the society at large (Cebenoyan and Strahan, 2001; Basel Committee on Banking Supervision, 2010; Alexander, 2006).[2]

Bank corporate governance seems to be too important to leave entirely to bank boards or market actors. They may want financial institutions that behave differently from those desired by a group of stakeholders. Most of them are dispersed, non-experts (e.g., depositors, debt holders, and the government as both insurer of deposits and residual claimant on systemic externalities) and they are also large (on average, more or less 90 per cent of the bank's balance-sheet, or more, is debt). Moreover, the

deposit insurance subsidy for banks creates incentives for shareholders to take risks and maximize leverage, at a substantial cost to other stakeholders, posing broader risk to the economy.[3]

Addtionally, the traditional approach of corporate governance in the financial sector often involved regulators and supervisors as the primary shapers of the governance structure of banks. Regulation may impact on financial risk-taking by financial intermediaries via the decision-making process. Through standards and rules they aim to devise governance standards promoting the achievement of the overriding objectives of financial regulation: safety and soundness of the financial system, consumer and investor protection (Alexander, 2004) and management practices in banks that are more accountable and efficient. Corporate governance and supervision are strictly intertwined. The latter cannot function properly if sound corporate governance (market, stakeholder, internal) is still not in place. Experience underscores the need to have appropriate levels of accountability as well as sufficient checks and balances. At the same time, an effective corporate governance framework requires a sound legal, institutional and, last but not least, regulatory foundation, upon which all market participants can rely when they enter into contractual relations.

4.3.2 Why did governance of banks fail during the crisis?

Among other deficiencies, the recent financial crisis demonstrated shortcomings in corporate governance arrangements in the financial services industry, and inappropriate and perverse incentive systems contributing to excessive risk-taking. Studies have shown that risk- management systems failed in many cases due more to poor corporate governance than the inadequacy of the mathematical models used.

Although fragile governance was not a trigger but a major underlying factor of the financial crisis, many of banks' recent failures uncovered flaws in the whole set of governance mechanisms – including the regulatory ones – which led banks to adopt very risky conduct.

Distortions in corporate governance mechanisms are rooted in the period that preceded Lehman's bankruptcy. In the years before this, the global financial landscape was turning more towards deregulation, globalization and liberalization. The gradual elimination of activity restrictions, limiting the scope of banking activities occurring at the end of the 1990s, created unprecedented opportunities for risk-taking in the banking industry and made bank business and products progressively more opaque, complex and risky. Banks expanded their international operations, moved into multiple lines of financial business. They started

dealing in very complex products (in a context of inadequate public financial education) and relying excessively on short-term funding sources, as a result increasing their riskiness. They developed complex risk management strategies that allowed them to price financial products and hedge their risk exposures in a manner that improves expected profits, but which could either generate more risk or increase liquidity problems in certain circumstances. The limited liability structure of most banks and financial firms, combined with the premium placed on shareholder profits, provided incentives for bank officers to undertake increasingly risky behaviour in order to achieve higher profits, but without a corresponding concern for the downside losses of risk.

The downfall of the Chinese wall that separates investment banking from retail banking, the proliferation of shadow banking entities, and the movements of huge amounts of assets and liabilities off-balance-sheet through structured investment vehicles were the proof of poor corporate governance practices, were significantly instrumental in exacerbating the crisis and made it tricky for regulators to keep pace with the changes and promptly analyse the implications of the expansion.[4]

Weaknesses in bank corporate governance became more and more apparent when the financial crisis was exacerbated. Although the elements of poor corporate governance that contributed to the demise of individual banks vary both in type and significance they can be summarized as: conflicts of interest; lack of independent and expert board members and senior executives; flawed remuneration package of executives and traders providing inappropriate incentives because they focused excessively on short-term performance in order to meet the short-term objectives, at the expense of long term sustainability of the firm; internal control and external audit systems that appeared weak or non-existent, or adequate on paper but not implemented in practice; transactions and organizational structures designed to reduce transparency and prevent market participants and regulators from gaining a genuine picture of the firm's condition; and, finally, insufficient understanding or failure to manage new risks,[5] which is at the origin of shareholder-value destruction across financial industries and over time.

4.3.3 Where did the regulatory and supervisory framework fail?

The financial crisis has demonstrated unsatisfactory performance either in financial institutions or in financial regulation and supervision all over the world. Improvements in supervisory governance and regulatory architecture have not been able to prevent or mitigate the crisis. The regulatory framework disclosed some gaps which stemmed from

several factors. Supervisors were not being proactive in dealing with the emerging risks and in adapting to the changing environment. Policy-makers and supervisors were finding it increasingly difficult to monitor the complicated internal operating systems of banks and financial firms. Most authors identify more or less the same flaws in supervisory guidance. For instance, Palmer and Cerutti (2009) identify weak supervisory independence and accountability, industry or political capture, incorrect incentive structures provided by the political establishment, a lack of audacity to probe or to take matters to their conclusion and to be intrusive. Other authors also point at a general lack of skills to allow for an understanding of the risks related to the new and sophisticated financial products and their underlying operations. Other analyses emphasize the adoption of behaviours such as the 'not on my watch' approach and the 'sweeping of problems under the carpet' (Masciandaro, Vega-Pasini and Quintyn, 2012).

As underlined by Sinha (2013), 'supervision was not comprehensive and even when supervisors found some anomaly, it was not taken to conclusion'. This has made the external model of regulation less effective as a supervisory technique for addressing the increasing problems that the excessive risk-taking of financial firms poses to the broader economy.

4.3.4 The regulatory initiatives

The 'Principles for enhancing corporate governance' originally published by the Basel Committee on Banking Supervision (the 'Committee') in 1999, and revised in 2006, represent one of the first systematic efforts to have comprehensive regulatory guidelines on how to have prudent and effective corporate governance in banking.[6] Starting from the last decade, relevant developments have been observed in international banking regulation regarding the corporate governance of banks and financial institutions. Regulatory rules have enhanced accountability in the financial sector by creating objective standards of conduct for senior management and directors of financial companies.

Nevertheless, the insufficient implementation of the 2006 corporate governance principles published by the Committee was a key lesson from the financial crisis. The Committee was intended to assist banking organizations in enhancing their corporate governance frameworks, and to support supervisors in assessing the quality of those frameworks. The pre-crisis principles were largely unattended and, at the same time, they allowed enough flexibility for banks to implement remuneration policies largely based on short-term performance maximization, which

dramatically increased the risk appetite of banks' managers. Starting from the crisis, throughout Europe and worldwide, the role of financial regulation in influencing the development of corporate governance principles – which has received little attention in the literature and in practice by market operators – has become an important policy issue as witnessed by the increasing and intensely policital discussions (see Senior Supervisors Group, 2008 and 2009; Walker et al., 2009; Committee of European Banking Supervisors, 2010) about the importance of corporate governance for bank stability.

To address fundamental deficiencies in bank corporate governance, in October 2010 the Committee issued a final set of principles for enhancing sound corporate governance practices at banking organizations. Drawing on the lessons learned during the crisis, the principles, which were not as prescriptive as some national legislation, related to banks and supervisors, with the aim of setting out best practices which would be widely applicable in banking organizations, independent of corporate and board structures and according to their size, complexity and risk profile (Basel Committee on Banking Supervision, 2010).[7]

Also Basel II had a significant impact on banks' corporate governance. Over the past decade, banks and banking systems globally have dealt with the challenges of implementing the New Capital Accord issued by the Basel Committee on Banking Supervision, known as the Basel II framework. Its implementation has been a key driver for the refinement and maturation of risk management frameworks in financial institutions worldwide. Furthermore, Pillar II of the New Capital Accord, the Supervisory Review Process (SRP), provides a supervisory review that allows regulators to use their discretion in applying regulatory standards.[8] The regulator may require different internal governance frameworks for banks and to set controls on ownership and asset classifications.

More recently, as a response to the financial crisis, Basel III has also set out to give some answers to the weaknesses found in different aspects of regulation (tougher prudential capital requirements, enhanced liquidity requirements, prohibitions on banks conducting certain types of business, revised accounting rules for financial instruments) and in bank's risk management practices, including corporate governance (e.g., remuneration practices and internal governance). One of the key governance aspects clearly affected by Basel III is the evidence that increased capital would contribute better to aligning the goals of different stakeholders. If banks are better capitalized, other things being equal, shareholders will be more focused on the banks' performance in the medium-term (which

usually is in conflict with short-term performance) and their managers are supposed to try to maximize longer-term performance rather than to assume high risk in the short-term. In July 2009, the Committee came out with certain measures, also called *Enhancement to Basel II* (or Basel II.5), to increase the stability of the financial markets and prevent future negative impact on the economy.[9] In December 2010, it published the Basel III documents with the goal of improving the banking sector's ability to absorb shocks arising from financial and economic stress (BCBS, 2011).[10]

With this reform package, which is due to be seamlessly implemented, the Committee aims to improve risk management and governance as well as strengthen banks' transparency and disclosure in the light of lessons learned from the recent financial crisis, especially in terms of the loss of confidence in the solvency, capital adequacy, and liquidity of banking institutions. During the next several years, banks will be required to intensify efforts to meet the requirements of Basel III, including the most recent reforms made by the Committee to the Basel Accord. Basel III represents the next phase in the Committee's ongoing efforts to strengthen global capital and liquidity rules in order to achieve a more resilient banking sector. The significance and comprehensiveness of reforms set forth by the Committee aim to incorporate lessons learned from the recent financial crisis, especially regarding the loss of confidence in the solvency, capital adequacy, and liquidity of banking institutions, which spread quickly not only throughout the financial system, but also ultimately through the economy at large, resulting in a contraction of liquidity and credit availability. The key indirect effect of Basel III is that better capitalized banks are likely to have long-term goals which should reduce the potential conflict of interest among different stakeholders (i.e., shareholders and depositors).

Another relevant post-crisis supervisory initiative affecting corporate governance is represented by the 'Guidelines on Internal Governance' from the European Banking Authority (2011), which are an update of the former 'Committee of European Banking Supervisors (CEBS) Guidelines'. Issued in September 2011, these guidelines aim at enhancing and consolidating supervisory expectations in order to improve the sound implementation of internal governance arrangements. The guidelines are consistent with European and BCBS frameworks and applicable to different European corporate and board structures, proportionate to banks' specificities. The European Banking Authority provides 30 very detailed principles which focus on banks:

corporate structure and governance, management body, risk management, internal control, systems and continuity, transparency. More recently, in June 2012, the Basel Committee on Banking Supervision (2012b) further defined the role of 'the internal audit functions in banks', stressing the key role of governance bodies for the stability and resilience of banks.

Besides the different guidelines on how to improve corporate governance published by different top international authorities, many domestic supervisors have enforced specific rules designed to advance banks' governance, to reduce conflict of interest among stakeholders and, ultimately, to improve banks' risk management capability.

Other regulatory initiatives are currently being implemented in the areas of ex ante risk adjustment, alignment of compensation with performance (including claw-back mechanisms), and the identification of material risk-takers. In August 2013 the Financial Stability Board (FSB) published their second progress report on 'Implementing the FSB principles for sound compensation practices and their implementation standards' (2013). Previously the Committee issued the final version of its report on the Range of Methodologies for Risk and Performance Alignment of Remuneration. Both of them are intended to enhance banks' and supervisors' understanding of risk-adjusted remuneration and drive banks to improve compensation structures in different jurisdictions.

4.4 Empirical analysis

The literature examined here and the guidelines developed by different regulatory authorities unanimously identify corporate governance as a key area for banks' stability. Therefore, this study tries to analytically measure to what extent, post 2007–2009 crisis, regulatory reforms that affect corporate governance are actually impacting on banks' stability. By and large, the results generated were found to be consistent with what has previously been found out by other authors and researchers. What we want to verify is if and how changes in corporate governance, after the most acute phase of the crisis, had a relevant impact on typical stability and efficiency variables on a sample of large European banks. If this could be demonstrated, we could conclude that a better corporate governance would at least make at the largest European banks more stable and efficient and, ultimately, less prone to crises.

By using Bloomberg data, we analysed the quality of corporate governance in a subset of 17 Global Systemically Important Banks (G-SIBs)[11] registered in Europe (out of 28 total G-SIBs), in order to analyse how such

variables affected the performance and the efficiency of these systemically important banks. By using regression analyses we tried to verify how corporate governance variables impacted on four key dependant variables: stock prices (S); return on assets (ROA); non-performing assets to total assets (NPA); and efficiency ratio (ER), measured as non-interest expenses divided by revenue. Thus, we performed 4 OLS regressions for each dependent variable in order to verify if and how some key explanatory variables affected stock prices, ROA, non-performing assets to total assets and efficiency ratio. Multiple regression analysis also allows us to estimate the relationship of each independent variable to the dependent variable while controlling for the effects of the other independent variables in the model.[12]

For the time interval ranging from 1 October 2007 to 23 August 2013 (1788 daily observations) the regression equation obtained is:

$$y_t = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n \tag{4.1}$$

where β_0 is a constant term y_t represents the above-mentioned dependent variables, x_t is the i-explanatory variable, β_i captures the effect on y_t of *i*-variable, ε_t are random variables (or estimated noise terms or 'errors' for each observation) independently and normally distributed (i.i.d.).[13]

We use regression analysis to test the (null) hypothesis, here below, against real-world data:

H_0: There is a (positive or negative) relationship between:
- efficiency ratio (e.g., non-interest expenses over the sum of net interest income before provision for loan losses plus non-interest income);
- 'normalized' stock price (base price equal to 100 starting from…);
- non-performing assets to total assets (e.g., the total amount of loans granted to borrowers that failed to make interest or principle payments for 90 days);
- return on assets, the ratio between net income and average total assets (this ratio tells us how many euros of earnings derive from each euro of assets);
- and some variables indicative of good corporate governance practices (see Appendix).

The period examined ranges between October 2008 and August 2013, since October 2008, just after the Lehman Brothers default can represent a 'big bang' in the historical series.

The explanatory variables (see Appendix) considered here for the regression are: total board compensation; insider shares outstanding; changes in insiders holding shares; number of insiders holding shares; total capitalization to risk based capital, plus six efficiency variables provided by Bloomberg. Some of the corporate governance variables employed in this study are provided by the Institutional Shareholder Service (ISS) Corporate Governance Quotient (CGQ).[14]

Our study deliberately does not consider other variables not related to corporate governance, which obviously have a relevant impact on efficiency, performance, portfolio quality and ROA. On the other hand, we are conscious that further corporate governance variables (e.g., board member age, presence of women) could be considered in order to assess their impact on the above-mentioned variables.

The most significant results of the analysis are summarized here (see Appendix for more details).Interpreting the regression output, we observe:

- the general irrelevance of total body compensation awarded on the above- mentioned key dependent variables (ER, S, NPA and ROA);
- the influence of the Corporate Governance Quotient provided by Bloomberg on:
  - *efficiency ratio: strong positive impact, especially for board composition;*
  - *stock price: negative impact;*
  - *non-performing assets to total assets: irrelevant impact;*
  - *return on asset: null or neutral effect;*
- the impact of capital adequacy ratio on:
  - *efficiency ratio: very strong positive impact;*
  - *stock price: positive impact;*
  - *non-performing assets to total assets: irrelevant, even if positive, impact;*
  - *return on assets: irrelevant, even if negative, impact.*

With regard to how well this fits, the high value of common statistic R^2 of each regression carried out (a measure of the extent to which the total variation of the dependent variable is explained by the regression) suggests that the all the regression models explain properly the variation in the dependent variables well.

The low P-value (< 0.05) for each of the four regressions indicates that we can reject the null hypothesis (the P-value for each term tests the null hypothesis that the coefficient is equal to zero).

To summarize, it seems that in the examined sample of systemically important banks:

- as expected the board composition is a key element affecting the ER index;
- empirical analysis shows us the irrelevance of the capital adequacy ratio for non-performing assets to total assets regardless of the more stringent regulation (see Basel III framework) on loan loss provisions and capital adequacy. Even if the results suffer as a result of different accounting policies for the determination of non-performing loans, the weak relationship shows the need for a forward-looking approach by banks towards the potential losses they could incur in the event of a worsening scenario;
- capitalization of banks is significant and has a positive relationship with efficiency ratio. On the other hand, the fact that 'insiders' are also shareholders of banks has a positive relationship with the above-mentioned efficiency indicator, even if the number of shares owned by insiders is almost insignificant;
- the impact of governance variables on the quality of credit portfolios (non-performing assets to total assets) is not very significant in the examined sample. Although the R^2 value is very high (0.95), the only significant relationship seems to be between the quality of the board and the quality of credit portfolio, whereas the remaining explanatory variables do not significantly influence the credit quality;
- finally, the statistics on ROA show misleading results, in line with similar studies previously performed, demonstrating that there is no solid evidence about relationships between corporate governance and return on assets.

4.5 Conclusions

The literature on corporate governance and banks highlights almost unanimously that weak corporate governance in banks before the 2007–2009 crisis played a crucial role in the default of many banks worldwide and, ultimately, in the financial turmoil.

The post-crisis regulatory reforms – Basel III above all – attempt to align the goals of different banks' stakeholders by increasing the quantity and improving the quality of regulatory capital, so as to reduce the excessive risk appetite of banks' managers. In fact, if banks are more capitalized, managers are supposed to pay more attention to the capability for creating value in the medium- and long-term – so advantaging

the shareholders – rather than maximizing short-term performance (i.e., by offering substandard loans) to the detriment of longer-term performance, as used to happen before the crisis. Other regulatory reforms (i.e., regulation of remuneration alignment) aim at going in the same direction by reducing the incentives that management may have to outperform in the short-run, just in order to get higher bonuses, without properly considering the risks and the costs for taxpayers in the case of a bailout. Overall, such reforms are likely to make banks more resilient by improving their corporate governance.

However, despite the awareness of regulators, academics and managers about the importance of corporate governance for a safe and sound banking system, the empirical analysis performed in this chapter suggests that not many governance variables analysed here were significantly considered after the beginning of the turmoil in the market and, therefore, they did not appreciably influence shareholders' decisions. More specifically, the negative relationship between stock prices and corporate governance variables tells us of the likelihood that the stock market still does not properly appreciate sound corporate governance or the effects of better corporate governance (i.e., reduction of managers' compensation, etc.) are evident with a certain delay only.

Nevertheless, we believe that in the current framework, characterized as it is by a general lack of confidence in banks and their crucial social role, better corporate governance may strongly contribute to reducing the usual conflict of interest that may arise between different banks' shareholders. The recent financial crisis demonstrated that well-capitalized banks may also fail if managers have divergent goals in comparison to those of other stakeholders. A combination of better non-prudential rules and firmer ethical behaviours can surely contribute to the creation of a safer banking system.

Appendix

Key statistics

1. Efficiency ratio

Regression statistics

Multiple R	0.690328094
R^2	0.476552878
Adjusted R^2	0.473310807
Standard error	25.70477028
Observations	1788

Variance analysis

	gdl	SQ	MQ	F	F Significance
Regression	11	1068338.047	97121.64	146.9902594	2,9378E.240
Residual	1776	1173465.742	660.7352		
Total	1787	2241803.789			

	Coefficients	Standard error	t Stat	Significance value	<95%	>95%	<95.0%	>95.0%
Intercept	–757.8838609	203.995279	–3.7152	0.000209321	–1157.979928	–357.788	–115,798	–357.788
TOTAL_BOD_COMPENSATION_ AWARDED	2.29214E-05	4.02231E-06	5.698571	1.41157E-08	1.50325E-05	3.08E-05	1,5E-05	3.08E-05
CGQ_INDEX_SCORE	–1.356024747	0.524827957	–2.58375	0.009852466	–2.385370144	–0.32668	–2.38537	–0.32668
CGQ_INDUSTRU_SCORE	–1.202310484	0.152996933	–7.8584	6.68781E-15	–1.502383463	–0.90224	–1.50238	–0.90224
CGQ_INDEX_BOARD_SUBSCORE	105.6851866	54.34297369	1.944781	0.051958996	–0.897721266	212.2681	–0.898772	212.2681
CGQ_INDEX_AUDIT_SUBSCORE	9.691565295	8.815495879	1.099378	0.2717520073	–7.598272222	26.9814	–7.59827	26.9814
CGQ_INDEX_COMP_SUBSCORE	8.314148337	5.70698795	1.456836	0.14533829	–2.878970657	19.50727	–2.87897	19.50727
CGQ_INDEX_TAKEOVER_SUBSCORE	2.65828936	2.445285518	1.087108	0.277136614	–2.137650637	7.454229	–2.13765	7.454229
PCT_INSIDER_SHARES_OUT	–3.84917E-05	2.89639E-05	–1.32895	0.184033608	–9.52985E.05	–1.83E-05	–9.5E-05	1.83E–05
PCT_CHG_INSIDER_HOLDINGS	–0.396446292	0.082223951	–4.82154	1.54597E-06	–0.557712178	–0.23518	–0.55771	–0.23518
NUM_INSIDERS_OWNING_SHARES	5.935809406	0.942986763	6.29469	3.87157E-10	4.086328885	7.78529	4.086329	7–78.525
BS_TOT_CAP_TO_RISK_BASE_CAP	24.16178157	2.347484562	10.29263	3.57875E-24	19.55765865	28.7659	19.55766	28.7659

2. Stock Price (normalized)

Regression statistics	
Multiple R	0.869454708
R^2	0.755951489
Adjusted R^2	0.754439928
Standard error	3.642414908
Observations	1788

Variance analysis

	gdl	SQ	MQ	F	F Significance
Regression	11	72985.99889	6635.091	500.112882	0
Residual	1776	2356.252298	13.26719		
Total	1787	9654.852187			

	Coefficients	Standard error	t Stat	Significance value	<95%	>95%	<95.0%	>95.0%
Intercept	50.84399981	28.90651958	1.758911	0.07876479	–5.85037492	107.5384	–5.85037	107.5384
TOTAL_BOD_COMPENSATION_AWARDED	1.21944E-05	5.69969E-07	21.39491	1.52912E-90	1.10766E-05	1.33E-05	1.11E-05	1.33E-05
CGQ_INDEX_SCORE	–0.226701616	0.074369121	–3.04833	0.00233513	–0.37256182	–0.08084	–0.37256	–0.08084
CGQ_INDUSTRY_SCORE	0.221830913	0.021679957	10.23207	6.46954E-24	0.17931	0.264352	0.17931	0.264352
CGQ_INDEX_BOARD_SUBSCORE	–30.79821696	7.700502878	–3.99951	6.60778E-05	–45.90121801	–15.6952	–45.9012	–15.6952
CGQ_INDEX_AUDIT_SUBSCORE	–8.043819651	1.249172557	–6.43932	1.54058E-10	–10.49382256	–5.59382	–10.4938	–5.59382
CGQ_INDEX_COMP_SUBSCORE	–3.248216104	0.808691063	–4.01663	6.14966E-05	–4.834302384	–1.66213	–4.8343	–1.66213
CGQ_INDEX_TAKEOVER_SUBSCORE	–2.475277762	0.346501615	7.14363	1.32095E-12	–3.154871594	–1.79568	–3.15487	–1.79568
PCT_INSIDER_SHARES_OUT	5.65176E.05	4.10423E-06	13.77056	4.55819E-41	4.8468E-05	6.46E-05	4.85E-05	6.46E-05
PCT_CHG_INSIDER_HOLDINGS	0.00152172	0.01165129	0.130605	0.896102393	–0.021329964	0.024373	0.02133	0.024373
NUM_INSIDERS_OWNING_SHARES	1.035603549	0.13362302	7.750188	1.53291E-14	0.773528637	1.297678	0.773529	1.297678
BS_TOT_CAP_TO_RISK_BASE_CAP	5.573640933	0.332643034	16.75562	1.28252E-58	4.921227946	6.226054	4.921228	6.226054

3. Non-performing assets to total assets

Regression statistics	
Multiple R	0.97491717
R^2	0.950463488
Adjusted R^2	0.950156674
Standard error	0.075875697
Observations	1788

Variance analysis

	gdl	SQ	MQ	F	F Significance
Regression	11	196.1816408	17.83469461	3097.8493	0
Residual	1776	10.22464767	0.005757121		
Total	1787	206.4062884			

	Coefficients	Standard error	t Start	Significance value	<95%	>95%	<95.0%	>95.0%
Intercept	–2.791942833	0.602156093	–4.636576573	3.80082E-06	–3.97295195	–1.610933716	–3.97295195	–1.610933716
TOTAL_BOD_COMPENSATION_AWARDED	–1.13634E-07	1.18731E-08	–9.57071726	3.41037E-21	–1.36921E-07	–9.03475E-08	–1.36921E-07	–9.03475E-08
CGO_INDEX_SCORE	–0.00625638	0.001549194	–4.038472822	5.60908E-05	–0.009294816	–0.003217944	–0.009294816	–0.003217944
CGO_INDUSTRY_SCORE	0.008690266	0.000451618	19.24249514	4.23221E-75	0.007804507	0.009576026	0.007804507	0.009576026
CGO_INDEX_BOARD_SUBSCORE	0.868684128	0.160410343	5.415387256	6.94952E-08	0.554071223	1.183297033	0.554071223	1.183297033
CGO_INDEX_AUDIT_SUBSCORE	–0.251107894	0.026021703	–9.649940831	1.6412E-21	–0.302144276	–0.200071512	–0.302144276	–0.200071512
CGO_INDEX_COMP_SUBSCORE	–0.087823232	0.016845966	–5.213309284	2.07157E-07	–0.120863236	–0.054783228	–0.120863236	–0.054783228
CGQ_INDEX_TAKEOVER_SUBSCORE	–0.007549941	0.007218028	–1.045983977	0.295710767	–0.021706663	0.006606781	–0.021706663	0.006606781
PCT_INSIDER_SHARES_OUT	6.90319E-07	8.54959E-08	8.074296856	1.23902E-15	5.22636E-07	8.58003E-07	5.22636E-07	8.58003E-07
PCT_CHG_INSIDER_HOLDINGS	0.002362326	0.00024271	9.73313074	7.57076E-22	0.001886299	0.002838353	0.001886299	0.002838353
NUM_INSIDERS_OWNING_SHARES	0.017126983	0.002783521	6.152991206	9.37438E-10	0.01166766	0.022586305	0.01166766	0.022586305
BS_TOT_CAP_TO_RISK_BASE_CAP	0.175890593	0.006929337	25.38346473	1.5493E-121	0,162300079	0.189481107	0.162300079	0.189481107

4. Return on assets

Regression statistics	
Multiple R	0.879058808
R^2	0.772744388
Adjusted R^2	0.771336836
Standard error	0.053731939
Observations	1788

Variance analysis

	gdl	SQ	MQ	F	F Significance
Regression	11	17.43529241	1.585027	548.9989555	0
Residual	1776	5.127527445	0.002887		
Total	1787	22.56281986			

	Coefficients	Standard error	t Start	Significance value	<95%	>95%	<95.0%	>95.0%
Intercept	5.326764311	0.426421316	12.49179	2.20241E-34	4.490423921	6.163105	4.490424	6.163105
TOTAL_BOD_COMPENSATION_AWARDED	–3.12007E-07	8.40804E-09	–37.1082	1.2398E-223	–3.28497E-07	–3E-07	–3.3E-07	–3E-07
CGO_INDEX_SCORE	0.003257652	0.001097074	2.969401	0.003023798	0.001105961	0.005409	0.001106	0.005409
CGO_INDUSTRY_SCORE	–0.005482617	0.000319817	–17.143	4.41841E-61	–0.006109875	–0.00486	–0.00611	–0.00486
CGO_INDEX_BOARD_SUBSCORE	–0.985386017	0.113595778	–8.6745	9.20617E-18	–1.208181486	–0.76259	–1.20818	–0.76259
CGO_INDEX_AUDIT_SUBSCORE	0.232127902	0.018427462	12.59685	6.51382E-35	0.195986109	0.26827	0.195986	0.26827
CGO_INDEX_COMP_SUBSCORE	0.027474201	0.011929596	2.303029	0.021392306	0.004076677	0.050872	0.004077	0.050872
CGQ_INDEX_TAKEOVER_SUBSCORE	–0.050920576	0.0051115	–9.96196	8.74555E-23	–0.060945764	–0.0409	–0.06095	–0.0409
PCT_INSIDER_SHARES_OUT	3.00952E-07	6.05446E-08	4.970753	7.31166E-07	1.82206E-07	4.2E-07	1.82E-07	4.2E-07
PCT_CHG_INSIDER_HOLDINGS	0.001109457	0.000171877	6.454957	1.39288E-10	0.000772355	0.001447	0.000772	0.001447
NUM_INSIDERS_OWNING_SHARES	–0.001057216	0.001971171	–0.53634	0.591791548	–0.004923275	0.002809	–0.00492	0.002809
BS_TOT_CAP_TO_RISK_BASE_CAP	–0.080328183	0.004907062	–16.3699	3.31093E-56	–0.089952406	–0.0707	–0.08995	–0.0707

Notes

1. The chapter is the result of a joint effort of the authors. However, Sections 4.1, 4.2 and 4.5 are attributable to Gianfranco A. Vento, Section 4.3 has been prepared by Pasquale La Ganga, and Section 4.4 by both authors. The views expressed in the paper are those of the authors and do not necessarily reflect the position of the Bank of Italy. All errors remain the responsibility of the authors.
2. As underlined by Mahapatra (2012): 'Trust, which takes time to build up is an important element in the functioning of financial markets as the very nature of financial contracts requires a high level of trust'.
3. Unlike other firms in the non-financial sector, a mismanaged bank may lead to a bank run or collapse, which can cause the bank to fail on its various counterparty obligations to other financial institutions and in providing liquidity to other sectors of the economy.
4. On shadow banking all weaknesses in regulation see Vento and La Ganga (2012).
5. As underlined by Shina (2013): 'The models tried to anticipate the future based on assumptions of normality and on the basis of past data. In their exuberance, quants, however, forgot that the assumption of normality does not correspond to reality, particularly, in highly stressed situations'.
6. This guidance drew from principles of corporate governance that were published earlier that year by the Organisation for Economic Cooperation and Development (OECD) with the purpose of assisting governments in their efforts to evaluate and improve their frameworks for corporate governance and to provide guidance for financial market regulators and participants in financial markets.
7. Key areas of particular focus include: (1) the role of the board; (2) the qualifications and composition of the board; (3) the importance of an independent risk management function, including a chief risk officer or equivalent; (4) the importance of monitoring risks on an ongoing firm-wide and individual entity basis, (5) the board's oversight of the compensation systems; and (6) the board and senior management's understanding of the bank's operational structure and risks. The principles also emphasise the importance of supervisors regularly evaluating the bank's corporate governance policies and practices as well as its implementation of the Committee's principles.
8. This means, among others, that regulators have discretion to modify capital requirements depending on the risk profile of the bank in question.
9. These measures, under Pillar I, include introduction of an incremental risk charge (IRC) for specific risk or credit risk in trading book under the Internal Models Approach (IMA). Capital charge for securitization of commercial real estate was increased and that for re-securitization introduced. The Value-at-Risk (VaR)-based measure for capital charge for market risk under IMA has been substantially enhanced by including a stressed-VaR element. The overall capital requirement for the trading book is expected to rise by about 3 times. Pillar 2 has been strengthened by issuing guidance on firm-wide risk management; managing reputation risk and liquidity risk; improving valuation practices; and implementing sound stress testing practices. Appropriate additional disclosures complementing enhancements in Pillar 1 and 2 have also been introduced.

10. In December 2010 the Basel Committee on Banking Supervision published the Basel III documents 'Basel III: A global regulatory framework for more resilient banks and banking systems' (a revised version was published in June 2011) and 'Basel III: International framework for liquidity risk measurement, standards and monitoring'.
11. The Financial Stability Board identified a list of 28 Global Systemically Important Banks (G-SIBs), which are determined based on four main criteria: size, cross-jurisdiction activity, complexity, and substitutability. The list is updated annually.
12. To analyse the empirical relationship between the variables included in the regression [2] we use formal regression utility in Excel 'Analysis ToolPak' that provides statistics indicating goodness-of-fit and confidence intervals for slope and intercept coefficients.
13. In other words, the 'estimated error' for each observation is the vertical distance between the values of CAR along the estimated line.
14. The Corporate Governance Quotient (CG) is a rating tool that assists institutional investors in evaluating the quality of corporate boards and the impact their governance practices may have on performance. Ratings are calculated on the basis of eight core categories, including: 1) board of directors, 2) audit, 3) charter and bylaw provisions, 4) laws of the state of incorporation, 5) executive and director compensation, 6) qualitative factors, 7) ownership, and 8) director education. Source data is derived from public disclosure documents, press releases, and corporate websites, then reviewed and verified by ISS's corporate governance analysts.

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5

Predicting European Bank Distress: Evidence from the Recent Financial Crisis

Laura Chiaramonte and Federica Poli

5.1 Introduction

The global financial crisis has brought a large number of banks to the brink of collapse, including several European banks[1], stressing the importance of detecting early signals of bank distress in order to activate prompt corrective actions. Indeed, identifying weak banks early is crucial, especially when problems are identified late, as solving them is much more costly. So in light of this, it becomes critically important to make use of data and indicators that can help supervisors and investors to discover which financial institutions are at risk of distress.

In the empirical literature bank distress indicators can be grouped into two categories. On the one hand, there are market-based measures that rely mostly on market prices of bank equity, to estimate bank's distance-to-default (DD) (Vassalou and Xing, 2004; Hagendorff and Vallascas, 2011) such as bond spreads (Flannery and Sorescu, 1996; Flannery, 1998, 2000; Jagtiani, Kaufman and Lemiuex, 2000; Sironi, 2000; Morgan and Stiroh, 2001) and more recently credit default swap (CDS) spreads (Norden and Weber, 2010; Volz and Wedow, 2011; Chiaramonte and Casu, 2013, among others). However, market-based measures display an important limit. These indicators cannot be computed for unlisted banks and, in Europe, the great majority of banks are not listed.

On the other hand, there are accounting-based measures. One of the most popular book-based approaches is the CAMEL methodology, where CAMEL stands for capital, asset quality, management, earnings, and liquidity. However, very few recent studies supplement CAMEL indicators with the Z-score, which is a well-known accounting indicator,

widely used in literature as a proxy for individual bank stability and risk of bank default (Boyd and Graham, 1986, 1988; Boyd and Runkle, 1993; Maechler, Srobona and Worrell, 2005; Beck and Laeven, 2006; Hesse and Čihák, 2007; Ayadi et al., 2010, among others). The popularity of the Z-score originates from its simplicity and the fact that it is readily calculated using few accounting data. Until now there have only been two papers – by Poghosyan and Čihák (2011) and Vasquez and Federico (2012) – that assess the predictive power of the Z-score. Their findings are controversial and motivate further researches into the ability of this indicator to anticipate bank distress situations, whether alone or as an additional explanatory variable.

Based on a sample of active and non-active banks operating in four areas of specialization (commercial banks, cooperative banks, savings banks and real estate and mortgage banks) and belonging to 12 European countries, over the period 2001–2011, this chapter examines whether the Z-score is indeed a valuable measure for predicting bank distress. Additionally, in order to verify whether the predictive power of the Z-score varies before and during the recent crisis, the sample period is further split into two sub-periods: the pre-crisis period (2001–2007) and the crisis years (2008–2011).

The empirical analysis is conducted using a probit-model and focuses, first on the Z-score alone, then supplemented with other potential determinants, such as those relating to the bank size, macroeconomic environment, banking market structure, and major areas of bank risk.

The findings indicate that the Z-score alone is an efficient and parsimonious measure because it requires few data without losing predictive power. We always find a negative and significant coefficient for the Z-score. Overall, in the full period the model using only the Z-score correctly predicts 139 out of 185 distress events (75 per cent), and 15,979 out of 19,750 non-distress events (81 per cent) for the 1 per cent cut-off point. When the Z-score is supplemented with indicators for bank size and bank risk, this performance improves, but only for the whole period and for the crisis years. In contrast, the contribution of macro-variables is insignificant.

Section 5.2 of this chapter reviews the relevant literature on bank distress prediction. Section 5.3 describes the sample and how we identify distress events. Section 5.4 presents the empirical methodology, the variables and the descriptive statistics, while Section 5.5 summarizes the main results. Finally, Section 5.6 concludes the chapter.

5.2 Literature review on bank distress prediction

In the empirical literature, the prediction of bank failure has been primarily focused on the identification of leading indicators that help to create reliable early-warning systems. Such signals may be grouped into two broad categories: market-based measures and accounting-based measures.

The former group of indicators relies on market prices of bank equity, to estimate bank's distance-to-default, bond spreads and more recently credit default swap spreads. The adoption of market-based indicators is generally based on their superior ability to anticipate a material weakening in banks' financial conditions (Gropp, Vesala and Vulpes, 2002) and their consequent ability to supplement traditional balance sheet data in order to assess bank fragility. Studies mostly focused on US data find that banks' subordinated debenture spreads in the secondary market do reflect banks' (or bank holding companies') risks, as measured using balance-sheets, and other indicators (Flannery and Sorescu, 1996; Flannery, 1998, 2000; Jagtiani et al., 2000). Morgan and Stiroh (2001) conclude the same holds for the debenture spreads at issue. Sironi (2000) provides evidence for European banks and maintains that banks' debenture spreads at issue tend to reflect cross-sectional differences in risk.

A pocket of studies have demonstrated the ability of DD measures to predict default risk (Elton et al., 2001; Gropp, Vesala and Vulpes, 2004; Vassalou and Xing, 2004). Hagendorff and Kato (2010) use a sample of US bank holding companies to analyse the extent to which distance to default, based on market data, can be explained using accounting-based indicators of risk. They show that a larger number of bank fundamentals help to predict default for institutions that issue subordinated debt.

Gropp et al. (2002) empirically test European banks' distances-to-default and subordinated bond spreads in relation to their capability to anticipate a material weakening in banks' financial condition. They use two different econometric models: a logit-model and a proportional hazard model. They find support in favour of using both indicators as leading indicators of bank fragility, regardless of the econometric specification. The predictive performance of the distance-to-default indicator is found to be robust between 6 to 18 months in advance, its predictive properties are quite poor closer to default. In contrast, subordinated debt spreads are found to have signal value, but only close to default.

Akhigbe, Madura and Martin (2007) demonstrate the ability of default likelihood to link with specific factors in commercial banks. Specifically,

the authors give evidence that default likelihood is inversely related to the bank's level of capital, size, and growth opportunities and positively related to financial leverage and return on equity.

The more recent empirical literature concerning the ability of CDS spreads to convey information on banks' default risk has found that such markets are suited to playing an important role for banking supervisors, as CDS spreads are a good proxy for bank risk and reflect the risk captured by bank balance sheet ratios (Constantinos, 2010; Flannery, 2010; Norden and Weber, 2010; Volz and Wedow, 2011; Chiaramonte and Casu, 2013).

The usage of market data to build indicators for deteriorating bank soundness is justified by the following circumstances: they are generally available at high frequency, providing more observations and shorter lags than balance-sheet data; contrary to accounting measures of bank risk-taking which are backward-looking, market-based-indicators are forward-looking since they incorporate market participants' assessments; additionally, they are not subject to confidentiality biases as may be the case for accounting data (i.e., those reported solely to supervisory authorities), (Čihák, 2007). Indeed, whenever some relevant information is not publicly disclosed, as it is collected and held by supervisors, it appears to be superior to market-based indicators in measuring banks' financial soundness.

Nevertheless, even the reliance on market prices is subject to strong statistical assumptions and conditional to the degree of liquidity, transparency and robustness of financial markets where bank stocks, debentures and CDSs are traded. As a matter of fact, any departure from the above conditions severely affects the usefulness of market-based indicators. Finally, as market-based indicators are computable for listed banks only, their value is a decreasing function of the number of unlisted entities.

The second group of indicators for the probability of bank distress consists of balance-sheet-level indicators which are proxies for fundamental bank attributes aimed at measuring a bank's financial vulnerability. Their informative value is based on their ability to provide leading indicators of incipient crisis, detecting the symptoms of a bank's financial difficulty (Sinkey, 1979). The so-called CAMEL methodology, is a well-known tool for supervisory risk assessment and early-warning systems. The set of CAMEL indicators is used by supervisory authorities for sorting banks in terms of their financial soundness and to derive an assessment of a bank's overall soundness. In the empirical literature, there is a general agreement on the ability of CAMEL variables to grade banks in terms of their financial vulnerability and to predict bank distress (Berger, Herring and Szegö, 1995; Estrella, Park and Peristiani,

2000; Oshinsky and Olin, 2006; Kick and Koetter, 2007; Poghosyan and Čihák, 2011). In contrast to the above predictive value recognized for CAMEL grades, Rojas-Suarez (2001) proposes that the latter has some limits in predicting bank distress and needs to be supplemented by other indicators. Indeed, recent literature has dedicated growing attention to the addition of macroeconomic variables, as the use of micro data can hardly answer the question as to why different banks with similar financial data enter into distress over time. Care has been also devoted to supplementing the CAMEL variables with book-based indicators, such as a proxy for a bank's distance-to-default, like the Z-score, which has mixed predictive power for bank distress. Poghosyan and Čihák (2011), using the Z-score in the robustness tests, find that when this indicator is added to the model, the coefficient in front of the Z-score variable is insignificant, suggesting that the Z-score does not bring any additional information, on top of the baseline indicators, for predicting the probability of bank distress. Conversely, Vasquez and Federico (2012), using the Z-score as a control variable, find that the probability of failure seems to be relatively more influenced by bank risk profiles, particularly as reflected in the pre-crisis Z-score. However, none of these studies provide evidence that the Z-score alone is an effective leading indicator of bank distress. Loosely following the above-mentioned strand of literature, we study the trustworthyness of the Z-score, first considering it alone, and then together with other control variables.

5.3 Data sample and bank distress determination

5.3.1 Data description

We focus on active and non-active banks operating in four areas of specialization (commercial, cooperative, savings and real estate and mortgage banks) and belonging to 12 European Countries (Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, and the United Kingdom). We include in the sample both listed banks and non-listed banks. We carry out our analysis using data from annual consolidated financial statements and, when these are not available, unconsolidated statements. Data are collected from the BankScope Database with annual frequency. Overall 4,298 banks are in line with the characteristics mentioned previously. However, since not all the banks have the data necessary to compute our target variable, that is the Z-score, our final sample consists of 3,125 banks.

The sample period ranges from 2001 to 2011, which allows us to investigate the predictive power of the Z-score in the period before the crisis (2001–2007) and during the crisis (2008–2011).

5.3.2 Bank distress determination

We classify banks as distressed when they show at least one of the three following characteristics. First, banks change their status from active to under receivership, bankruptcy, dissolved, or in liquidation.[2] The second characteristic is related to banks that alter their status from active to dissolved by mergers and acquisitions (M&A). M&A may have strategic ends, but be also motivated by the need to rescue banks. In light of the latter, we categorize as distressed those banks dissolved by M&A, as long as their coverage ratio (defined as the ratio of total equity and loan loss reserve, minus non-performing loans, all divided by total assets, CR) is lower than 0 in the year prior the merger or acquisition. Finally, the last condition to define a bank as distressed is in case of state aids' receipt in the preceding twelve months. State aids can take different forms such as: nationalization, recapitalization, guarantee lines, and loans.[3]

Figure 5.1 shows the number of banks and distress events by country in the 12 European countries during the period of 2001–2011.[4] On the basis of the criteria described before, we identify 185 distress events for 149 banks. In addition, from the figures it emerges that the distress events

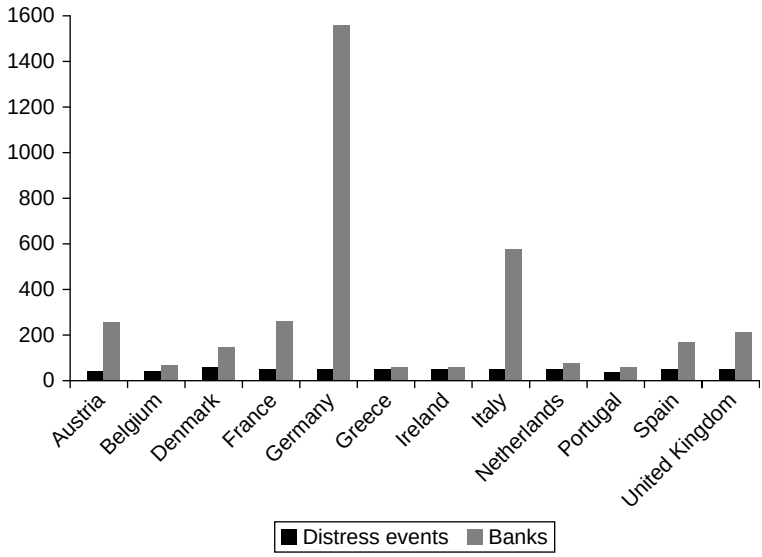

Figure 5.1 The number of banks and distress events by country, 2001–2011
Sources: BankScope Database; authors' calculations.

are not homogenously distributed across countries. Greece, Ireland and Portugal are the most affected by distress events, while Italy, France and Germany experience minor impact.

5.4 Empirical methodology, variables and descriptive statistics

5.4.1 Methodology and variables

The first step is to determine whether the Z-score is able to predict the state of bank distress. To achieve this aim, we use the following probit-model (5.1) tested, first on the whole period and then on the two sub-periods: the pre-crisis and crisis years:

$$\Pr\left(DB_{i,t}=1 \mid X_{i,t-1}\right)=\phi\left(X_{i,t-1},\beta\right) \tag{5.1}$$

where *Pr* is the probability; ϕ is the standard cumulative normal probability distribution; and β parameter is estimated by maximum likelihood. $DB_{i,t}$ is the Distressed Bank dummy variable that takes the value of 1 if the i-bank becomes distressed at time *t* (the year in progress) and 0 otherwise.[5] The vector $X_{i,t-1}$ contains the independent variables for bank *i* at time *t*–1.[6]

Our variable of interest is a well-known accounting measure: the Z-score (Boyd and Graham, 1986; Hannan and Hanweck, 1988; Boyd and Runkle, 1993; Maechler et al., 2005; Beck and Laeven, 2006; Laeven and Levine, 2006; Hesse and Čihák, 2007; Garcia-Marco and Roblez-Fernandez, 2008; and Beck, De Jonghe and Schepens, 2011). This proxy for bank stability is calculated as:

$$z\text{-}score=\frac{ROAA+ETA}{\sigma ROAA} \tag{5.2}$$

ROAA is the bank's return on average assets, *ETA* represents the equity to total assets ratio and $\sigma ROAA$ is the standard deviation of return on average assets. In order to capture the changing pattern of the bank's return volatility, we use a three-year rolling time-window to calculate $\sigma ROAA$. The Z-score reflects the number of standard deviations by which returns would have to fall from the mean in order to wipe out the bank equity. Higher values of Z-score are indicative of lower probability of insolvency risk and greater bank stability. Hence, we expect a negative sign for the relation between Z-score and our dependent variable, the

probability of bank distress. Since the Z-score is highly skewed, we use the natural logarithm of the Z-score, so-called ln_Z, which is normally distributed (Ivičić, Kunovac and Ljubaj, 2008; Laeven and Levine, 2009; Liu, Molineux and Wilson, 2013).

Besides the Z-score, we use other potential determinants relating to bank size, macroeconomic environment, banking market concentration, and the major areas of bank risk. We control for bank size using the natural logarithm of a bank's total assets in millions of Euros (SIZE).[7] This provides a variable proxy for a bank's market power, returns to scale, and diversification benefits. The inclusion of SIZE is particularly important because it allows us to distinguish between the risk effects of diversification and those of expected bailouts. The sign linking SIZE to the probability of bank distress is uncertain. The relationship can be interpreted negatively when bank growth leads to efficiency gains and superior diversification, which would result in higher bank stability. On the other hand, the relationship may become positive if large banks take large and unnecessary risks because of the implicit guarantee associated with the 'too-big-to-fail' argument, thus undermining the stability of the banks themselves and eventually that of the financial system in which they operate.

As macroeconomic factors we employ the annual percentage change of gross domestic product (GDPC) and inflation (INFC).[8] In addition, we consider a bank-industry-specific variable: the concentration ratio 3 (CR3), which is calculated as the total assets held by the three largest banks (operating in four areas of specialization: commercial banks, cooperative banks, savings banks, and real estate and mortgage banks) divided by the total assets of all banks operating in each country.[9]

Finally, we use three bank-specific variables respectively related to: the bank asset quality, computed as the ratio of impaired loans to gross loans (CRED); the managerial ability, approximated by the cost to income ratio (CIR); and the bank liquidity risk exposure, as the ratio of net loans to deposits and short-term funding (LIQ).[10] In the vector $X_{i,t-1}$ we also include year and country dummy variables.

Table 5.1 reports a description of the explanatory variables and their hypothesized relationship with the dependent variable.

In order to examine whether the models are able to correctly identify the distressed banks, we compute three types of error: Type 1, that occurs when the model fails to identify distressed banks (that is a missed distress); Type 2, that occurs when a healthy bank is falsely identified as distressed (that is a false alarm); and the sum of the two errors (Type 1+2).

In our analysis, we focus mainly on the Type 1 errors results, because supervisors, from a prudential perspective, are primarily concerned

Table 5.1 Explanatory variables definition and predicted signs

Variable	Measure	Notation	Expected Sign
Bank stability	Natural logarithm of the Z-score	ln_Z	NEGATIVE
Bank size	Natural logarithm of total assets in millions of euros	SIZE	NEGATIVE/ POSITIVE
Gross domestic product	Annual per cent change of GDP	GDPC	NEGATIVE/ POSITIVE
Inflation	Annual per cent change of inflation	INFC	NEGATIVE/ POSITIVE
Bank concentration	Concentration ratio 3	CR3	NEGATIVE/ POSITIVE
Credit risk	Impaired loans to gross loans	CRED	POSITIVE
Operational efficiency	Cost to income ratio	CIR	POSITIVE
Liquidity risk	Net loans to deposits and short term funding	LIQ	NEGATIVE

Source: Data to compute ln_Z, SIZE, CR3, CRED, CIR and LIQ are collected by BankScope Database; Macroeconomic variables (GDPC and INFC) are available from World Economic Outlook Database (International Monetary Fund, IMF).

about missing a distressed bank (Betz, Peltonen and Sarlin, forthcoming). Furthermore, to assign a particular bank to one of the two categories (distressed versus healthy), we need to set up a cut-off point in terms of the probability of bank distress. For this reason, in our analysis, we compute two different cut-off points: 1 and 10 per cent, but we focus principally on the results obtained using the cut-off point equal to 1 per cent, which tends to decrease the Type 1 errors.

5.4.2 Descriptive statistics

Table 5.2 presents descriptive statistics for the natural logarithm of the Z-score and of its components over the full sample period (2001–2011), the pre-crisis (2001–2007), and the crisis period (2008–2011). Concerning the full sample, the average value of ln_Z is 4.568. The ln_Z decreases moderately from 4.666 in the pre-crisis period to 4.431 in the crisis period. As expected, non-distressed banks exhibit higher values of the average ln_Z, both in the full period (4.551 vs 3.222) and in each of the sub-periods (pre-crisis period: 4.670 vs 3.444; crisis period: 4.452 vs 3.001), also showing a moderate decline from the first to the second sub-period. This outcome can be largely explained both by a lower volatility of returns (with the standard deviation ROAA as a proxy) for active banks compared to distressed banks and by higher average ROAA values.

Table 5.2 ln_Z and its components by bank status

	ln_Z			ETA			ROAA			Standard deviation of ROAA		
Sample banks	**Whole period**	**Pre-crisis period**	**Crisis period**	**Whole period**	**Pre-crisis period**	**Crisis period**	**Whole period**	**Pre-crisis period**	**Crisis period**	**Whole period**	**Pre-crisis period**	**Crisis period**
FULL	4.568	4.666	4.431	0.077	0.072	0.087	0.003	0.003	0.003	0.001	0.001	0.002
SAMPLE	(4.465)	(4.593)	(4.265)	(0.061)	(0.055)	(0.070)	(0.002)	(0.002)	(0.002)	(0.0007)	(0.0006)	(0.001)
NON-DISTRESSED	4.551	4.670	4.452	0.080	0.071	0.087	0.003	0.003	0.003	0.002	0.001	0.002
BANKS	(4.429)	(4.593)	(4.283)	(0.065)	(0.055)	(0.070)	(0.002)	(0.002)	(0.002)	(0.0008)	(0.0006)	(0.001)
DISTRESSED	3.222	3.444	3.001	0.118	0.164	0.072	0.002	0.005	0.0004	0.007	0.008	0.006
BANKS	(3.210)	(3.461)	(2.960)	(0.066)	(0.08)	(0.053)	(0.003)	(0.005)	(0.001)	(0.002)	(0.003)	(0.002)

Notes: This table displays the natural logarithm of the Z-score (ln_Z) and its components. Descriptive statistics for the full sample and for sub-samples based on the bank status are presented for the sample period (2001–2011), the pre-crisis period (2001–2007), and the crisis period (2008–2011). The numbers reported in the table refer only to those banks with data available to compute our target variable (the natural logarithm of the Z-score). To mitigate the effect of outliers, we winsorized observations in the outside 1 per cent of each tail of the natural logarithm of the Z-score. The 'full sample' includes the distressed and non-distressed banks. In light of the numerous missing data on banks 'under receivership', we exclude this event from our analysis. The values in the table are the averages. The medians are reported in parentheses.

Sources: BankScope Database; authors' calculations.

Conversely, distressed banks have a higher level of capitalization (ETA) compared to non-distressed banks.

Table 5.3 reports descriptive statistics concerning the control variables. The average size value (SIZE) grows moderately from 6.504 in the pre-crisis period to 6.580 in the crisis period.

With reference to the macroeconomic factors, the average value of gross domestic product (GDPG) exhibited a considerable decline from the pre-crisis period (+1.23 per cent) to the crisis period (+0.25 per cent) due to the hoarding effect of a contraction in the main determinants of demand. In contrast, the average value of inflation (INFC) remains substantially unchanged.

Looking at the banking-industry-specific variable, CR3 displays an important tendency to grow, from 0.402 in the pre-crisis period to 0.458 in the crisis period. The rise in banking system concentration during the period 2008–2010 is principally due to M&A operations aimed at avoiding bailouts. However, the average level of concentration of sample banking systems is low.

Table 5.3 Summary statistics of control variables

	Whole period		**Pre-crisis period**		**Crisis period**	
Variables	**Mean (Median)**	**N. Obs.**	**Mean (Median)**	**N. Obs.**	**Mean (Median)**	**N. Obs.**
SIZE	6.530 (6.379)	19,935	6.504 (6.394)	9,067	6.580 (6.359)	10,868
GDPC	0.007 (0.078)	19,935	0.012 (0.008)	9,067	0.002 (0.011)	10,868
INFC	0.017 (0.015)	19,935	0.017 (0.007)	9,067	0.017 (0.022)	10,868
CR3	0.423 (0.384)	19,935	0.402 (0.365)	9,067	0.458 (0.429)	10,868
CRED	0.005 (0)	19,796	0.003 (0)	9,013	0.008 (0)	10,783
CIR	0.684 (0.690)	19,838	0.686 (0.694)	9,020	0.680 (0.684)	10,818
LIQ	0.745 (0.713)	19,699	0.699 (0.704)	8,959	0.817 (0.727)	10,740

Notes: This table reports summary statistics of the control variables for the sample banks for the whole period (2001–2011) and for the pre-crisis (2001–2007) and crisis period (2008–2011). The numbers reported in the table refer only to those banks with data available to compute our target variable (the natural logarithm of the Z-score). To mitigate the effect of outliers, we winsorized observations in the outside 1 per cent of each tail of each variable. The control variables are defined in Section 5.4.

Sources: BankScope Database; authors' calculations.

The average value of impaired loans to gross loans (CRED) grows considerably, going from 0.003 in the pre-crisis period to 0.008 during the crisis period, due to a deterioration in the credit quality in the last years of the crisis. The average cost to income ratio (CIR) value remains substantially unchanged between the pre-crisis period (0.686) and the crisis period (0.680). The moderate improvement in operating efficiency is due to the rationalization process of operating costs fostered by banks during the crisis years. The average value of net loans to deposits and short-term funding (LIQ) shows a significant growth from the pre-crisis period (0.699) to the crisis period (0.817), which is due more to the drainage of bank deposits and short-term funding experienced by banks during the financial turmoil than to the increase in net loans.

5.5 Main results

5.5.1 Regression analysis

Table 5.4 summarizes the results of our empirical analysis. The first column (see regression I) shows the probit results obtained using our target variable only: the natural logarithm of the Z-score (ln_Z). In the other columns of the table we add to ln_Z, first the bank size variable SIZE (see regression II), then the macro-variables, GDPC and INF (see regression III), the bank-industry concentration index CR3 (see regression IV), and finally also the bank risk variables CRED, CIR and LIQ (see regression V). All these regressions are carried out on the full sample period (2001–2011), see Panel A of Table 5.4.

The natural logarithm of the Z-score (ln_Z) is strongly significant, with the expected negative sign in all regressions. The negative relation between the probability of bank distress and ln_Z means that higher values of Z-score are indicative of a lower probability of the occurrence of distress events. This result is in line with the findings of Vazquez and Federico (2012), who find that the probability of bank failure is influenced by the bank risk-profile, but not with the findings of Poghosyan and Čihák (2011), who find that the Z-score is not significant.

Regressions carried out using the control variables in the whole period indicate that the probability of distress is also explained by SIZE, CR3, CIR and LIQ. All these variables show the expected signs, except the liquidity bank indicator, which will be discussed later. The positive sign of SIZE and CR3 means that large banks take large and unnecessary risks because of the implicit guarantee associated with the too-big-to-fail argument, thus undermining the stability of the banks themselves and eventually that of the financial system in which they operate. More

concentrated banking markets results increase the probability of bank distress. Also, the relationship between CIR and the probability of bank distress is positive, as banks with low values of CIR are less likely to experience distress.

In comparing the explanatory power of the regressions in Panel A (see Table 5.4), we can observe that when we supplement the Z-score with indicators for bank size and risk, during the whole period, the model performance improves (in terms of Pseudo R^2). In contrast, the contribution of macro-variables is insignificant. The latter result is in contrast with that of Betz et al. (forthcoming), in which they show the usefulness of the macro-variables to predict bank distress.

To investigate the predictive power of the model in the pre-crisis period and in the crisis period, we run our model, first, with ln_Z as the sole explanatory variable and then adding the other control variables in the two sub-periods, see Panels B and C of Table 5.4. Our target variable, ln_Z, remains highly significant with the correct sign (negative) both in the pre-crisis period and the crisis period. During the pre-crisis period, the only significant control variables are SIZE and the macro-variable INFC, with the expected sign but with a low degree of significance. In contrast, during the crisis period the variables significant are, for the majority, the same as they are for the whole period: ln_Z, SIZE, CIR and LIQ. An interesting and unexpected result that emerges when comparing the findings of the two sub-periods, concerns the liquidity ratio. It becomes significant only during the crisis period, exhibiting a positive sign (rather than negative). A possible explanation for the positive relation between liquidity and the probability of bank distress is the difficulty of refunding on the interbank market, which could be due to the loss of deposits (bank runs) experienced by many banks during the crisis years. Related recent studies by Poghosyan and Čihák (2011) and Betz et al. (forthcoming) suggest that basic liquidity indicators (such as liquid assets to deposits and short-term funding or loans to deposits) do not have good predictive power.[11]

Also in the two sub-periods when we add the control variable to our target variable, the explanatory power of the estimations (in terms of Pseudo R^2) rises, especially in the crisis period.

5.5.2 Prediction results

In the second step of our analysis, we examine which one of the models presented in Table 5.5 performs better in correctly identifying distressed banks. As discussed in Section 5.4.1, to assess the model performance, we compute three types of error: Type 1; Type 2; and the sum of the

Table 5.4 Probit estimation results

	(I) ln_Z	(II) ln_Z and SIZE	(III) ln_Z, SIZE and MACRO	(IV) ln_Z, SIZE, MACRO and CR3	(V) ln_Z, SIZE, MACRO, CR3 and BANK RISK VARIABLES
Panel A: Whole Period					
ln_Z (–1)	–0.176***	–0.168***	–0.171***	–0.171***	–0.139***
	(0.031)	(0.032)	(0.032)	(0.032)	(0.038)
SIZE (–1)		0.170***	0.172***	0.172***	0.206***
		(0.019)	(0.019)	(0.019)	(0.022)
GDPC (–1)			0.001	0.001	0.002
			(0.003)	(0.003)	(0.003)
INFC (–1)			0.010	0.009	0.011
			(0.005)	(0.005)	(0.006)
CR3 (–1)				0.313	1.561*
				(0.681)	(0.760)
CRED (–1)					1.588
					(1.758)
CIR (–1)					0.524**
					(0.200)
LIQ (–1)					0.185*
					(0.085)
Year dummies	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes
N. of Obs.	19,935	19,935	19,935	19,935	19,594
Pseudo R2	0.232	0.284	0.286	0.286	0.324
Panel B: Pre-crisis period					
ln_Z (–1)	–0.155**	–0.155**	–0.167**	–0.167**	–0.173**
	(0.056)	(0.056)	(0.057)	(0.056)	(0.061)
SIZE (–1)		0.0009	0.007	0.007	0.111*
		(0.053)	(0.053)	(0.892)	(0.052)
GDPC (–1)			–0.007	–0.007	–0.0003
			(0.008)	(0.008)	(0.009)
INFC (–1)			0.056*	0.056*	0.057*
			(0.022)	(0.025)	(0.027)
CR3 (–1)				–0.013	2.071
				(0.874)	(1.271)
CRED (–1)					–0.667
					(3.798)
CIR (–1)					0.363
					(0.449)
LIQ (–1)					–0.266
					(0.256)
Year dummies	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes
N. of Obs.	8,722	8,722	8,722	8,722	8,493
Pseudo R2	0.165	0.165	0.184	0.184	0.218

Continued

Table 5.4 Continued

	(I) ln_Z	(II) ln_Z and SIZE	(III) ln_Z, SIZE and MACRO	(IV) ln_Z, SIZE, MACRO and CR3	(V) ln_Z, SIZE, MACRO, CR3 and BANK RISK VARIABLES
Panel C: Crisis Period					
ln_Z (–1)	–0.175***	–0.161***	–0.166***	–0.167***	–0.111*
	(0.039)	(0.040)	(0.041)	(0.041)	(0.049)
SIZE (–1)		0.215***	0.215***	0.215***	0.228***
		(0.023)	(0.023)	(0.023)	(0.026)
GDPC (–1)			0.005	0.004	0.004
			(0.004)	(0.004)	(0.004)
INFC (–1)			0.005	0.006	0.007
			(0.007)	(0.007)	(0.007)
CR3 (–1)				3.189*	2.437
				(1.700)	(1.724)
CRED (–1)					2.830
					(2.105)
CIR (–1)					0.689**
					(0.236)
LIQ (–1)					0.309**
					(0.098)
Year dummies	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes
N. of Obs.	10,868	10,868	10,868	10,868	10,691
Pseudo R2	0.251	0.334	0.335	0.337	0.358

Notes: This table shows the probit results obtained: first, using only our target variable, the natural logarithm of the Z-score, ln_Z (see regression I); then adding the control variables: SIZE (see regression II), SIZE and MACRO variables, that are GDPC and INFC (see regression III), SIZE, MACRO and CR3 (see regression IV); and finally, SIZE, MACRO, CR3 and the BANK RISK VARIABLES (CRED, CIR and LIQ).

The dependent variable is the distressed bank dummy variable ($DB_{i,t}$) that takes the value of 1 if bank *i* becomes distressed (that is: under receivership, bankruptcy, dissolved, in liquidation, dissolved by merger, with a coverage ratio smaller than 0 within 12 months before the M&A, or government bailout) at time t (the year in progress) and 0 otherwise. The coverage ratio is defined as the ratio of total equity and loan loss reserve minus non-performing loans all divided by total assets. In light of the numerous missing data on banks 'under receivership', we excluded this distress event from our analysis. The dependent variable and independent variables are defined in Section 4. Each regression is tested on the whole period, 2001–2011 (Panel A), pre-crisis period, 2001–2007 (Panel B) and crisis period, 2008–2011 (Panel C). All explanatory variables are lagged by one year. To mitigate the effect of outliers, we winsorized observations in the outside 1 per cent of each tail of each variable. Year and country dummy variables are also incorporated in the model.

The full sample comprises 12 European countries. These findings were obtained using consolidated bank statements and where these were not available for some banks, unconsolidated data. The robust standard errors of the estimated coefficients are reported in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

two errors (Type 1+2). Table 5.5 displays the relationship between model predictions and actual distress events for our baseline specification using two different cut-off points: 1 and 10 per cent. As already stated, we mainly focus on the Type 1 error obtained using cut-off points equal to 1 per cent. Using this threshold, we can observe that, in the whole period and during the crisis years, the performance of the model improves when we add the control variables to our target variable. During 2001–2011 the model which only uses ln_Z (see model(I) of Panel A) fails to correctly classify 46 distress events out of 185 (Type 1 error) and wrongly classifies 3,771 healthy bank year observations out of 19,750 as distressed (Type 2 error). Thus, in the full period the model which only uses our target variable correctly classifies 139 out of 185 distress events (75 per cent), and 15,979 out of 19,750 non-distress events (81 per cent) for the 1 per cent cut-off point. Adding all the control variables (see model (V) of Panel A) in the full period, 139 out of 171 distress events are correctly classified (81 per cent), as well as 16,882 out of 19,423 non-distress events (87 per cent) for the 1 per cent cut-off point.

During the crisis period, the model which only uses ln_Z (see model (I) of Panel C) fails to correctly classify 28 distress events out of 152 (Type 1 error) and wrongly classified 2,742 healthy bank year observations out of 10,716 as distressed (Type 2 error). Hence, during the financial turmoil the model which only uses our target variable correctly classifies 124 out of 152 distress events (81 per cent), and 7,979 out of 10,716 non-distress events (74 per cent) for the 1 per cent cut-off point. Adding all the control variables (see model (V) of Panel C) in the crisis years 132 out of 145 distress events are correctly classified (91 per cent) as well as 8,811 out of 10,546 non-distress events (83 per cent) for the 1 per cent cut-off point.

When we add the control variables in the pre-crisis period, we observe that the predictive power of the model slightly worsens for the Type 1 error and remains substantially unchanged for the Type 2 error. In particular, in the years before the onset of the crisis, the model which only uses ln_Z (see model (I) of Panel B) fails to correctly classify 14 distress events out of 33 (Type 1 error) and wrongly classifies 691 healthy bank year observations out of 8,689 as distressed (Type 2 error). Thus, during the pre-crisis period the model which only uses our target variable correctly classifies 19 out of 33 distress events (57 per cent), and 7,998 out of 8,689 non-distress events (92 per cent) for the 1 per cent cut-off point. Adding all the control variables (see model (V) of Panel B) in the pre-crisis years 14 out of 26 distress events are correctly classified (53 per cent), as well as 8,016 out of 8,689 non-distress events (92 per cent) for the 1 per cent cut-off point.

The predictive power of the model in the crisis period is higher than that of the whole period and of the pre-crisis years, reflecting the heavy deterioration of bank fundamentals and macroeconomic conditions during the financial turmoil.

5.6 Conclusions

The paper tests an early-warning model for predicting bank distress in the European banking sector during 2001–2011, using the Z-score, a well-known accounting indicator widely used in literature as a proxy for individual bank stability. The sample period is further split into two sub-periods to investigate whether the predictive power of the model differs in the pre-crisis period (2001–2007) and in the crisis period (2008–2011). The Z-score is firstly used alone and is then supplemented with other potential determinants, such as those relating to the bank size, macroeconomic environment, banking market concentration, and to the major areas of bank risk. Moreover, the study introduces a novel dataset of bank distress events. As outright bank failures have been rare in Europe, we introduce a novel dataset that supplements bankruptcies, liquidations and dissolved cases by also taking into account government interventions, and M&A that involve banks in distress.

Results indicate that the natural logarithm of the Z-score is a key determinant of the probability of bank distress in all the sample periods considered, even when we include other explanatory variables in the model. In particular, we find that higher values of Z-score are indicative of lower probability of distress and greater bank stability. In addition, the paper finds that supplementing the Z-score with indicators for bank size and bank risk improves the model performance, but only during the whole period and the crisis years. The contribution of the results from macro-variables is mainly insignificant.

Overall, we find that the Z-score is a reliable and parsimonious measure of bank distress because while it requires few data, it does not lose predictive power. This finding suggests that, when more sophisticated methodologies are not feasible because of the lack of market data, as is the case for unlisted banks, the Z-score could be used by supervisors as an early-warning tool to detect the symptoms of bank distress and adopt prompt corrective actions (PCA). Additionally, investors may benefit from the above results. This predictive measure is easy to compute and does not require private information – not available to investors – on bank soundness.

Table 5.5 Type errors

		(I) ln_Z		(II) ln_Z and SIZE		(III) ln_Z, SIZE and MACRO		(IV) ln_Z, SIZE, MACRO and CR3		(V) ln_Z, SIZE, MACRO, CR3 and BANK RISK VARIABLES	
Panel A: Whole period											
		Cut-off: 0.01									
Actual Distress		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Classified	Yes	139	3,771	150	3,050	150	3,051	150	3,045	139	2,541
distress	No	46	15,979	35	16,700	35	16,699	35	16,705	32	16,882
	Type 1	0.248		0.189		0.189		0.189		0.187	
	Type 2	0.190		0.154		0.154		0.154		0.130	
	Type 1+2	0.191		0.154		0.154		0.154		0.131	
		Cut-off: 0.10									
Actual Distress		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Classified	Yes	51	187	70	306	69	306	69	300	72	318
distress	No	134	19,563	115	19,444	116	19,444	116	19,450	99	19,105
	Type 1	0.724		0.621		0.627		0.627		0.578	
	Type 2	0.009		0.015		0.015		0.015		0.016	
	Type 1+2	0.016		0.009		0.021		0.020		0.021	
Panel B: Pre-crisis period											
		Cut-off: 0.01									
Actual Distress		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Classified	Yes	19	691	19	691	17	613	17	613	14	451
distress	No	14	7,998	14	7,998	16	8,076	16	8,076	12	8,016
	Type 1	0.424		0.424		0.484		0.484		0.461	
	Type 2	0.079		0.079		0.070		0.070		0.053	
	Type 1+2	0.080		0.080		0.072		0.072		0.054	

		Cut-off: 0.10									
Actual Distress		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Classified	Yes	5	20	5	20	5	14	5	14	4	14
distress	No	28	8,669	28	8,669	28	8,675	28	8,675	22	8,453
	Type 1	0.848		0.848		0.848		0.848		0.846	
	Type 2	0.002		0.002		0.001		0.001		0.001	
	Type 1+2	0.005		0.005		0.004		0.004		0.004	
Panel C: Crisis period											
		Cut-off: 0.01									
Actual Distress		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Classified	Yes	124	2,742	135	1,928	135	1,905	135	1,904	132	1,735
distress	No	28	7,974	17	8,788	17	8,811	17	8,812	13	8,811
	Type 1	0.184		0.111		0.111		0.111		0.089	
	Type 2	0.255		0.179		0.177		0.177		0.164	
	Type 1+2	0.254		0.178		0.176		0.176		0.163	
		Cut-off: 0.10									
Actual Distress		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Classified	Yes	63	262	81	312	81	323	75	314	78	291
distress	No	89	10,454	71	10,404	71	10,393	77	10,402	67	10,255
	Type 1	0.585		0.467		0.467		0.506		0.462	
	Type 2	0.024		0.029		0.030		0.029		0.027	
	Type 1+2	0.032		0.035		0.036		0.035		0.033	

Notes: This table displays the relationship between model predictions and actual distress events on the full sample for the whole period, 2001–2011, (Panel A), the pre-crisis period, 2001–2007, (Panel B) and the crisis period, 2008–2011, (Panel C), using two different cut-off points (0.01 and 0.10). The results reported in the table refer to the probit estimation results of table 5. All explanatory variables are lagged by one year. Year and country dummy variables are also incorporated in the model. Type 1 error occurs when the model fails to identify the distressed bank, and Type 2 error occurs when a healthy bank is falsely identified as distressed (i.e., a false alarm). Type 1+2 error represents the proportion of missed crises plus the false alarms to the total number of observations.

Notes

1. Data from the European Commission shows that the amount of aid granted by European Union (EU) states to stabilize the EU banking sector that had been used by the end of 2010 had exceeded €1.6 trillion, more than 13 per cent of EU gross domestic product (GDP).
2. The BankScope database defines: 'under receivership' those banks that remain active, though they are in administration or receivership; 'bankruptcy' those banks that no longer exist because they have ceased their activities since they are in the process of bankruptcy; 'dissolved' those banks that no longer exist as a legal entity; 'dissolved by merger' those banks that no longer exist as a legal entity because they have been included in a merger; 'in liquidation' those banks that no longer exist because they have ceased their activities, since they are in the process of liquidation. In light of the numerous data missing in BankScope database on banks 'under receivership', this kind of bank distress event is thus not included in our analysis. On the BankScope database there are also the three of the following types of bank status: 'active, no longer with accounts on BankScope', are banks that are still active, though their accounts are no longer updated on BankScope following an acquisition by another bank with accounts on BankScope integrating the accounts of its subsidiary in its consolidated accounts; 'dissolved by demerger', are banks that no longer exist as a legal entity (the reason for this is a demerger, the bank has been split); and 'inactive', are banks that are no longer active and the precise reason for inactivity is unknown. In our analysis we do not consider them given that they show no information for our sample banks.
3. Data on government bail-outs are from Mediobanca (2012).
4. Figure 5.1 shows the number of banks and distress events in 12 European countries during the period 2001–2011. The numbers reported in the table refers only to those banks with data available to compute our target variable (the natural logarithm of the Z-score). In light of the numerous missing data on banks 'under receivership', we exclude this kind of bank distress event from our analysis. Percentages are computed as the ratio of distressed banks on total banks.
5. In order to take into account the time varying nature of the bank status, we assigned to DB dummy variable the value of 0 in the years before the distress and the value of 1 in the year of distress. In addition, distressed banks are eliminated from our dataset if the bank ceases to operate.
6. To mitigate the effect of outliers, we winsorized observations in the outside 1 per cent of the tail of each explanatory variable.
7. Data are collected by BankScope Database.
8. Data on these variables are collected from the World Economic Outlook Database (International Monetary Fund, IMF).
9. Data used to calculate this variable were extracted with annual frequency from Bankscope Database. We also tested all the regressions using the normalized Herfindahl–Hirschman (HHI) index and the Concentration Ratio five (CR5) rather than CR3 and we obtained very similar results.
10. Data are collected by BankScope Database.

11. We verified alternative measures of bank liquidity suggested in the recent literature (Lopez-Espinosa et al., 2012; Vazquez and Federico, 2012). However, in light of the large number of missing data we were not able to adopt such novel proxies.

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6

The Impact of Deregulation and Re-regulation on Bank Efficiency: Evidence from Asia

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6.1 Introduction

The post-crisis reform period in Asia has been characterized by an emphasis on the prudential regulation of banks, concomitant with an increased liberalization of the banking systems. More specifically, while large-scale bank restructuring programmes and tighter prudential rules were put in place in those countries most affected by the 1997 crisis (e.g., Thailand, Indonesia and the Philippines), other countries, such as China, India and Vietnam, saw an acceleration of financial liberalization over the same time period. This process resulted in substantial changes in market structure, deriving both from greater foreign presence and from increased privatization across the region.

There is a general consensus in the literature on the benefits of financial liberalization, as it fosters competition and promotes economic growth (Cetorelli and Gambera, 2001; Claessens and Laeven, 2004). Deregulation-induced competition, in turn, can translate into incentives for managers to improve efficiency (Leibenstein, 1966). However, evidence on the role of prudential regulation on bank efficiency is inconclusive. Although prudential regulation is primarily designed to strengthen systemic stability and improve the functioning of banking markets, some argue that these regulatory policies can have adverse effects on financial intermediation. Economic theory suggests that prudential regulatory tools can impact on the effectiveness of financial intermediation in a number of ways. For instance, stringent capital requirements can reduce banks' borrowing costs because high capitalization can signal lower bankruptcy risk. On the other hand, the imposition

of minimum capital requirements may impose additional costs on banks. In particular, if banks are required to raise equity capital at a price higher than the interest rate on deposits, an increase in capital requirements may discourage banks' willingness to screen borrowers and lend (Thakor, 1996; Gorton and Winton, 2000). Recent years have seen an increasing interest in the academic literature in evaluating the impact of prudential regulation of banks on efficiency. The empirical results, however, are rather mixed. There is evidence indicating that the current regulatory and supervisory frameworks impede the efficient operation of banks (Chortareas, Girardone and Ventouri, 2012). As steps towards further regulatory reforms are taking place in many Asian economies, it is important for policy makers to ascertain whether the regulatory reforms implemented in the post 1997 crisis period successfully brought the Asian banking sector into a more competitive, efficient and stable state. An analysis of the Asian market is significant, given its unique and dynamic regional characteristics. The region comprises well-developed economies such as those in Japan and Hong Kong, along with transitional economies, such as those in China, India and South East Asia. In the aftermath of the Asian crisis, the process and pace of regulatory reforms in banking varied substantially from country to country. Such diversification provides us with an excellent laboratory within which to understand the impact of regulatory reforms on banks' managerial decisions and performance. In addition, the lessons from the resolution of the Asian crisis have a strong resonance today, when many economies are embarking on the restructuring of their banking sectors in the aftermath of the 2007–2009 global financial crisis.

Thus far, the established literature that attempts to identify the potential impact of regulatory progress on bank performance has typically focused on either the European market (e.g., Chortareas et al., 2012; Delis, Molyneux and Pasiouras, 2011), or has been based on publicly listed banks (Pasiouras, Tanna and Zopounidis, 2009; Haw et al., 2010). There is a paucity of studies that address the Asian market. This lack of empirical evidence makes the analysis of the Asian market particularly important from the perspective of regulatory authorities. Moreover, the established literature studying the impact of regulatory environments on bank performance often focuses on either deregulatory policies or prudential regulations; hardly any literature addresses both aspects simultaneously, or distinguishes the independent impacts of each regulatory tool on bank performance.

Against this background, our study explores how the coexistence of liberalization and prudential regulation affected banks' cost

characteristics in eight major Asian economies. We build a large panel dataset encompassing depository institutions from China, Hong Kong, India, Indonesia, Japan, Thailand, Malaysia and the Philippines, over the period 2001–2010. Given the presence of heterogeneity of technologies across countries, we use a stochastic frontier approach (SFA), followed by the estimation of a deterministic metafrontier, to provide 'true' estimates of bank cost efficiency measures. Bootstrapping techniques are also used to derive test statistics for the estimated coefficients of the metafrontier function.

Our results show that the liberalization of bank interest rates and the increase in foreign banks' presence have a positive and significant impact on technological progress and cost efficiency. However, not all liberalization policies have a positive impact on banks' cost performance, thus suggesting that the appropriateness of each policy should be considered individually. In addition, we find that prudential re-regulation tends to adversely affect bank cost performance. Policies which aim to strengthen prudential regulation (e.g., increased capital requirements under the Basel III capital adequacy accord) should take into account the potential negative effects on bank performance, with the goal of allowing for the need to foster stability without hindering financial intermediation.

The rest of this chapter is structured as follows: Section 6.2 provides a brief overview of the banking system development in Asia. Section 6.3 reviews the theoretical literature and empirical findings related to banking regulatory reforms and efficiency. Section 6.4 describes the data and the empirical strategy. Section 6.5 presents the empirical results, and concluding remarks are presented in Section 6.6.

6.2 Banking in Asia: a brief overview

Banking intermediation plays an important role in economic development in Asia: deposits and bank credit to the private sector are fairly high in China, Hong Kong, Japan, Malaysia, Thailand and Vietnam compared to international standards. However, banking penetration is still below international standards in India, Indonesia and the Philippines, with deposits accounting for less than 50 per cent of GDP; as a consequence, the level of loans extended to the private sector is rather low, being only a third of GDP.

The predominant role played by the banking sector within the financial system in Asia is apparent, and is primarily due to the underdevelopment of capital and bond markets in many countries: for instance,

in China, Thailand and Vietnam in the early 2000s the size of bank credit to GDP was three times higher than that of market capitalization. Nonetheless, more recent years have seen strong growth in market capitalization, suggesting firms are reducing their reliance on banks.

Financial deregulation began in some Asian countries in the 1970s and accelerated in the 1980s; this is the case, for instance, in Japan, Singapore, Malaysia, Indonesia and the Philippines. Liberal policies usually commenced with interest rate deregulation and in some instances moved to the opening of capital accounts to international investors. Table 6.1 outlines the interest liberalization process of selected Asian economies. As it can be seen, while the majority of Asian economies removed interest rate restrictions between the 1970s and the early 1990s, China and India retain considerable control to date (especially in terms of deposits). The free capital flows and liberalized interest rate regime, coombined with weak internal management systems and the complicated external economic environment, caused devastating meltdowns in the banking systems of some Asian economies with the onset of the 1997 financial crisis.

During the 1997 financial crisis, a number of banks failed whilst others were nationalized, restructured and later re-privatized. Bank restructuring and privatization were motivated by governments' desire to quickly resolve financial sector problems and return banks to the private sector. From 1998 to the completion of restructuring programmes, circa 2001, bank restructuring (in the form of compulsory M&A (mergers and acquisitions)) worked as an exit strategy for weak banks in Indonesia, Malaysia, the Philippines, Thailand and Japan. Since the early 2000s, M&A activities have become more market-driven in the countries most affected by the financial crisis (e.g., Thailand, Indonesia, the Philippines and Japan). In countries less affected by the 1997 crisis, such as China, Hong Kong, India and Vietnam, structural changes in domestic banking sectors were primarily the result of the acceleration of bank liberalization and of reforms in corporate governance. These dynamics in the Asian banking market have led to a significant change in the market structure, which manifested itself in increasingly diversified bank ownership (e.g., Indonesia, Thailand) and efficiency-driven corporate governance reforms (e.g., China, India and Vietnam). Figure 6.1 illustrates the change of ownership structure before and after the banking restructuring programmes. As it can be seen, state involvement in banks is reducing, especially in countries in which state-ownership was predominant, while foreign and private institutions play an increasingly important role in the banking sector.

Table 6.1 Interest rate deregulation

Country	Pre-crisis	1998–2003	2004–2010
CN	Interest rates were strictly controlled.	Allow loan and deposit rates to fluctuate within a certain range.	The ceiling on deposit rates and the floor on lending rates remain heavily controlled, but lending rates are allowed to float downward by 10 % over the benchmark.
HK	Interest rates on time deposits of less than 7 days were under control.	Interest rate restrictions were totally removed (July 2001).	Deregulated.
IN	The ceiling on time deposit rates was removed.	Interest rate control on loans over 200,000; the Rupee was removed.	Lending rates were deregulated; interest rates on savings accounts remain heavily controlled.
ID	Deregulated (interest rate deregulation completed in 1983).	Deregulated.	Deregulated.
JP	Deregulated (interest rate controls on loans and deposits removed in 1973 and 1994, respectively).	Deregulated.	Deregulated.
MY	Deregulated (interest rates were initially deregulated between 1971 and 1981. Deposit rates were then re-controlled by the government in 1985 and removed again in 1991).	Deregulated.	Deregulated.
PH	Deregulated (in 1983).	Deregulated.	Deregulated.
TH	Deregulated (in 1992).	Deregulated.	Deregulated.
VN	Deposit rates were liberalized in 1996.	Interest ceiling on lending rates was removed (in 2002).	Deregulated.

Notes: Countries' names are shortened as follows: CN for China, HK for Hong Kong SAR, JP for Japan, IN for India, ID for Indonesia, MY for Malaysia, PH for the Philippines, TH for Thailand, VN for Vietnam. These abbreviations apply to the whole chapter.

Source: The central banks of the selected economies.

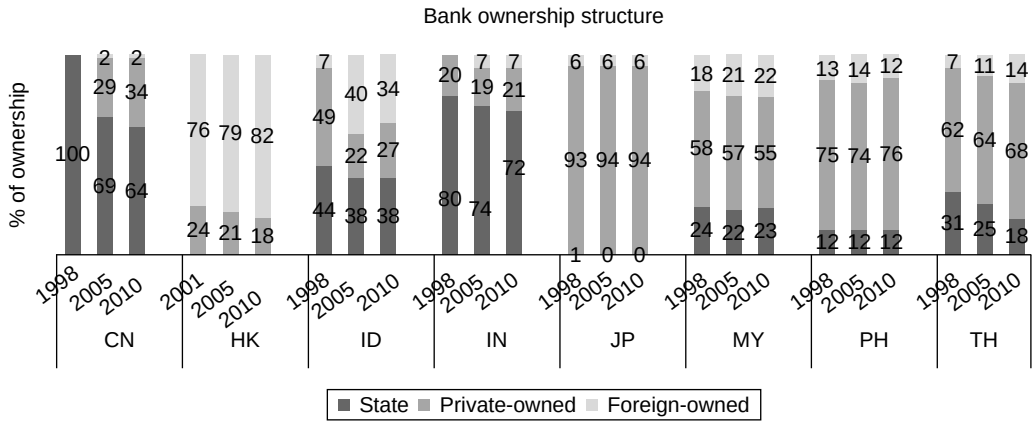

Figure 6.1 Bank ownership structure in selected Asian economies

Data sources: Country data from Bank Regulation and Supervision Survey (BRSS), Round I–IV, released by the World Bank in 2001, 2003, 2007 and 2012 (Note the four-round data capture for the information corresponding to the period 1998–1999, 2001, 2005, 2008–2010, respectively.). HK's data are compiled by the authors.

The change in market structure also shows up in the increasing concentration of assets. In the period 1998–2010, the number of banks in Asia decreased considerably as a result of market consolidation between small and medium-sized banks. However, the five-bank concentration ratio (CR5)[1] exhibits a mixed trend among Asian economies, as depicted in Figure 6.2. While the market is increasingly concentrated in countries in which the banking sector has been historically dominated by families or the private sector (such as Hong Kong, Japan, Malaysia and

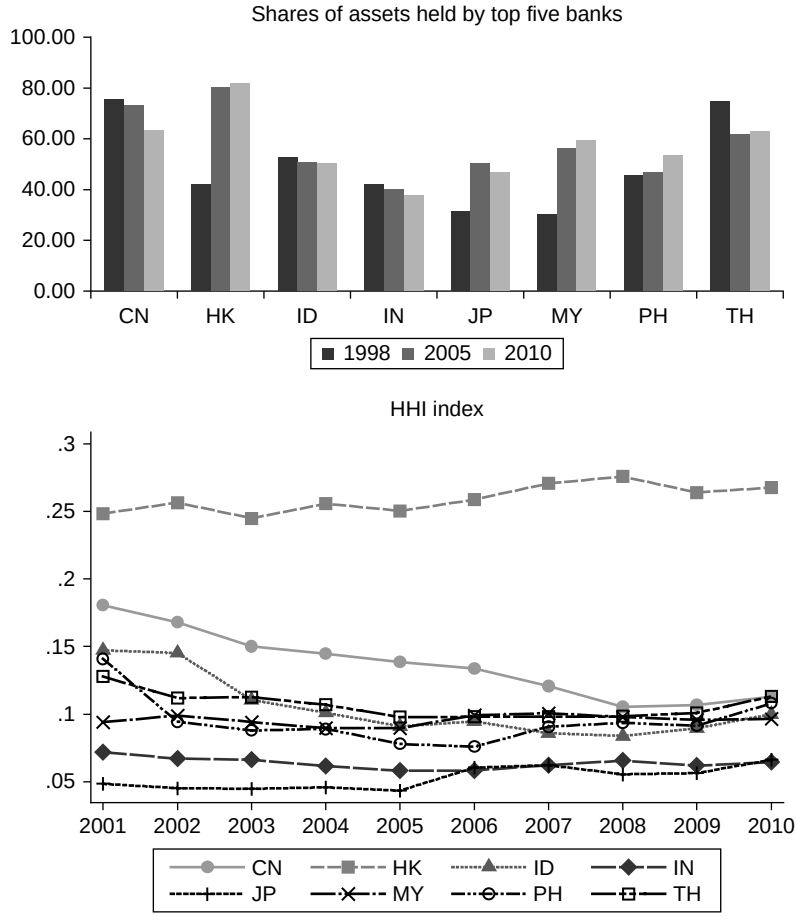

Figure 6.2 Market concentration indicators

Sources: Bank Supervision and Regulation Survey (the World Bank, 2001, 2007, 2012); Bankscope Database.

the Philippines), conversely, a gradual process of decentralization takes place in those countries formerly dominated by state ownership (such as China, Indonesia and India), as a result of banking privatization. In terms of the overall trend of market concentration, the Herfindahl–Hirschman Index (HHI)[2] of banks' assets indicates that banking markets became increasingly concentrated in the second half of the decade (from 2006 onward) despite a declining trend in the first half of the decade as shown in Figure 6.2.

The process of deregulation allowed banks to become bigger; of particular concern for policymakers is that higher levels of concentration could adversely impact on the competitiveness of domestic banking sectors, if banks collude over the setting of interest rates. While Japan, India and Malaysia experienced a slight fall in net interest margins (NIM), other countries did not show this declining trend, as shown in Figure 6.3. In particular, an increase in NIM is found in Indonesia, Hong Kong and Thailand, which implies market competitiveness might not necessarily have intensified.

The increasing trend of NIM may suggest no increase in competitive pressures due to increased concentration in some banking markets, especially from 2006 onward. Another important element may relate to the

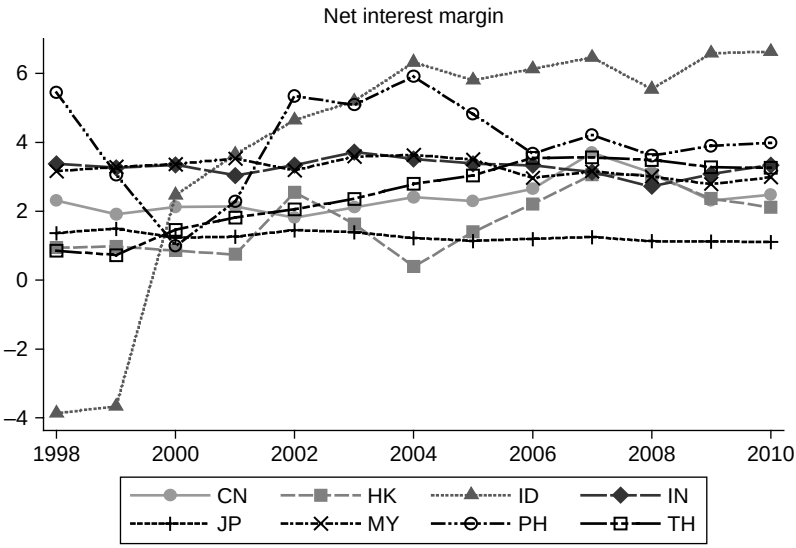

Figure 6.3 Net interest margin (NIM) by country

Note: Net interest margin computed as a share of its interest-bearing (total earning) assets.

Source: Financial Development and Structure Dataset (The World Bank, 2013).

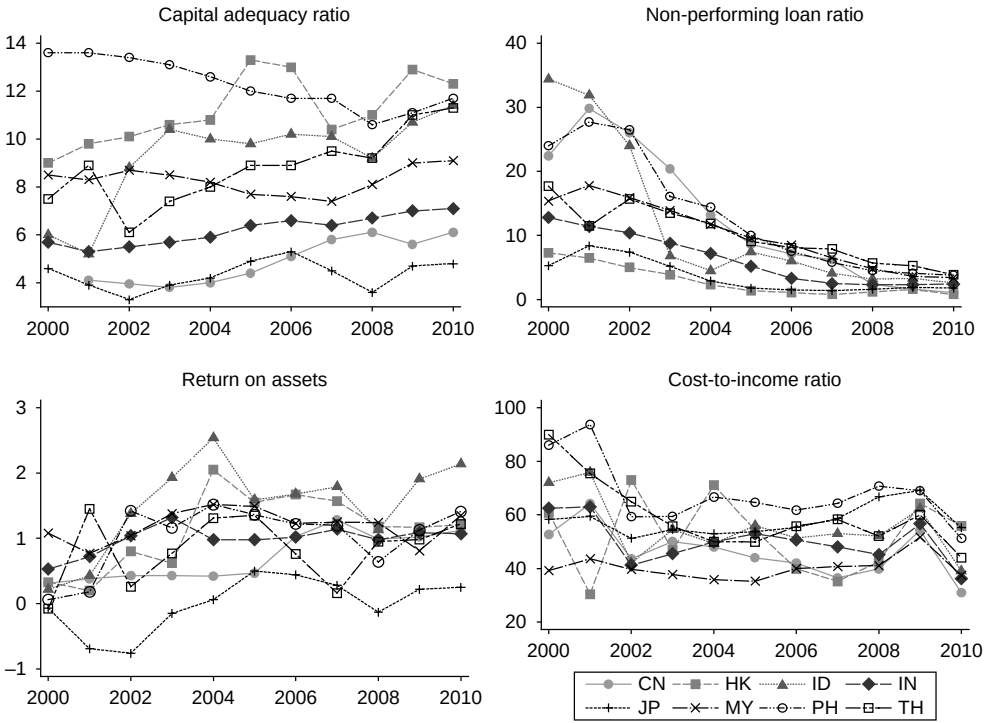

Figure 6.4 Indicators of banking system performance

Notes: Capital adequacy ratio is computed as total capital as a percentage of total assets; (b) Non-performing loan ratio is computed as non-performing loans as a share of total loans.

Data source: Financial Development and Structure Dataset (The World Bank, 2012, 2013).

shift in regulatory focus from bank deregulation to bank re-regulation. Bank re-regulation was implemented post-1997 in an attempt to reduce the risks associated with financial deregulation, and the process has gained increasing attention in recent years due to the adoption of international banking practices (i.e., the Basel accords). Under the new regulatory regime, increasing emphasis has been given to improving bank capital adequacy, strengthening supervisory powers and enhancing information disclosure and transparency. Indeed, improving banks' supervisory and regulatory frameworks by complying with the Basel accords has been put on the agenda in almost all Asian banking markets.

With the efforts made by governments to strengthen the banking system post-1997, most Asian banking sectors seem to be healthier now than than they were a decade ago. For example, as shown in Figure 6.4, the average capital adequacy ratio (CAR) exceeded 9 per cent of total assets in the majority of Asian economies, and the non-performing loans ratio (NPL) saw a steady decline from nearly 18 per cent to less than 3 per cent over the period. In addition, Asian banking markets saw a continuous growth of return on assets (ROA) and a fall of cost to income ratios (CIR), suggesting banks managed to grow, over time, by improving operational inefficiency.

In recent years Asian banks have also suffered as a result of the global financial crisis of 2007–2009, although the overall effect has been limited. This reflects, to a certain extent, the lessons learned from the Asian financial crisis of 1997, and more importantly, the subsequent efforts in strengthening the prudential regulations of the banking system.

Even if the Asian banking markets appear to have been resilient to the recent financial crisis, many uncertainties remain about the long-term developments. The key concern is how to achieve sustainable development by striking a balance between bank deregulation and re-regulation. The review of historical reforms and the exploration of how these reforms affect banks' competitive conduct, soundness and efficiency may have important policy implications; these could help policy makers upgrade their prudential and supervisory frameworks, especially for those countries that are still undergoing a period of transformation.

6.3 Literature review

Financial deregulation (or liberalization) refers to the implementation of policies that reduce the restrictions imposed on banks, such as the lifting of restrictions on banks' entry, on permissible activities, and on interest rates. The primary aim of deregulation policies is to foster

competition and improve the efficiency of financial intermediaries. However, the ultimate effects of liberalization on the financial sector are controversial.

In an early study, Bauer et al. (1993) find the average annual growth rates for US banks, during the period between 1977 and 1988, to be negative or close to zero. They attribute the poor performance of US banks to financial deregulation as it raised banks' cost of funding and increased competition from non-bank financial intermediaries. This view is supported by other studies which also document poor performance and few efficiency improvements during the post-deregulatory period in the US (Grabowski, Rangan and Rezvanian, 1993; Elyasiani and Mahdian, 1995; Humphrey and Pulley, 1997; Berger and Mester, 2001).

In contrast, studies focusing on Europe tend to show that deregulatory policies positively impacted on bank efficiency (see, e.g., Berg 1992; Zaim, 1995; Hasan and Marton, 2003). More recent cross-country studies investigating the banking industries in Central and Eastern Europe, during the period 1998–2003, also document a productivity improvement along with the progress of institutional and structural reforms (Koutsomanoli et al., 2009).

A positive relationship between banking reforms and efficiency is also found in studies focusing on the Asian banking market. Gilbert and Wilson (1998) measure the productivity change of Korean banks during the deregulation and privatization period (1980s and early 1990s). They find that Korean banks dramatically altered their input and output mix, which led to productivity growth. The authors attribute this productivity growth to the responses of local banks to the deregulation and privatization policies implemented over the period. Similarly, Leightner and Lovell (1998) find high productivity growth in the Thai banking market between 1990 and 1994 and attribute the result to financial liberalization. Chen, Skully and Brown (2005) examine the impact of China's financial deregulation in the mid-1990s; their results show that deregulation led to the improvement of cost efficiency.

When looking at India, Kumbhakar and Sarkar (2003) find no growth in banks' total factor productivity (TFP) following financial liberalization in the early 1990s, and attribute this result to the very dominant position of public sector banks and the fact that these did not respond to deregulation policies. In contrast, when extending the period of observation to 1992–2009 Casu, Ferrari and Zhao (2013) find that Indian banks enjoyed positive sustained growth in TFP, mainly led by technical progress and by the increasingly dominant position of foreign banks.

Overall, the empirical evidence on the effect of deregulatory policies on bank productivity growth and efficiency is inconclusive. This outcome may relate to the fact that deregulation relates to many different policy initiatives that can impact on bank performance in different ways. However, the existing literature tends to treat deregulation as one policy, instead of considering its multi-faceted nature. In addition, deregulation is a continuous process, and the existing literature may not sufficiently capture these dynamics. These issues may explain the contradictory findings and may hamper policy inference.

In addition to the fact that liberalization happens over time and through different policy initiatives, another complication results from the fact that governments often try to pre-empt the potential negative effects of deregulation by implementing policies which aim to strengthen the regulatory framework and the resilience of financial institutions. Prudential regulation (also known as re-regulation) refers to the enforcement of a mixture of *supervisory policies* that aim to monitor banks' activities and *restrictive policies* that aim to protect the banking sector from excessive risk-taking.

Over the decades, the instruments of prudential re-regulation have evolved in a number of ways. First, given the increasing complexity of the banking business, the objective of official supervision shifted from monitoring banks' activities to fostering banks' internal management. Second, capital norms tightened over time. Third, private monitoring that relies on market mechanisms to discipline banks' activities became a key tool of the supervisory system. These elements constitute the three pillars of international banking practices on capital adequacy and regulation (known as the Basel accords).

Theoretical arguments suggest that the instruments of prudential regulation may have opposite effects on bank performance. Let us consider the three pillars of capital regulation: (i) minimum capital requirements; (ii) supervisory review; and (iii) market discipline.

As we discussed earlier, higher capital may lower banks' cost of borrowing as banks are perceived as safer and less likely to fail. However, the imposition of higher capital ratios might burden banks with unnecessary costs. In particular, if banks are forced to raise equity capital to a price that is higher than the interest rate on deposits, an increase in capital requirements may discourage bank lending (Thakor, 1996; Gorton and Winton, 2000).

Official supervision, with the objective of monitoring banks and improving the quality of bank lending, may reduce market failures (Beck, Demirgüc and Levine, 2006). Powerful supervisors, however, may

abuse their powers to benefit their associates and extract bribes (Shleifer and Vishny, 1998; Quintyn and Taylor, 2002), with detrimental effects on bank intermediation.

Finally, the success of market discipline is conditional on two premises: (1) investors must be able to identify banks' financial conditions in a timely and accurate manner; (2) investors' reactions to a change in the financial conditions of a bank must influence the behaviour of other banks (Bliss and Flannery, 2002). Given the complexity and opacity of the banking sector, the effective implementation of private monitoring is difficult even in developed economies. For this reason, a reliance on private monitoring may lead to the exploitation of depositors and poor bank performance.

One of the earlier works investigating the regulation–efficiency relationship is that of Demirgüç-Kunt, Laeven and Levine (2003). The authors assess the effects of bank regulations, market structure and national institutions on the cost of intermediation (measured as bank net interest margin and overhead expenditure). The regulatory environment is captured by variables on bank entry, reserve requirements, activity restrictions and an overall index of bank freedom. Using a sample of 72 countries over the period 1995–1999, they find that tightening regulations on bank entry, bank activities, reserve requirements and bank freedom increases the cost of intermediation, but that the role of these regulatory variables becomes insignificant when controlling for economic freedom or property rights protection. These results support the view that bank regulations cannot be viewed independently. Barth, Caprio and Levine (2004) provide an insight into the association between re-regulatory policies and bank development, performance and stability. The authors find that tightening activity restrictions lowers banks' efficiency, a result consistent with the findings of Demirgüç-Kunt et al. (2003). In addition, the authors show that policies that enforce accurate information disclosure and private monitoring work best to enhance bank efficiency, whereas they find no statistically significant evidence to show that capital requirements and official supervisory power improve bank performance.

Following the above two seminal papers, voluminous literature supports the view that private monitoring contributes to the improvement of bank efficiency (e.g., Pasiouras et al., 2009; Haw et al., 2010; Delis et al., 2011), while only limited evidence supports the view that official supervisory oversight and capital requirements help improve financial intermediation (Pasiouras et al., 2009). In particular, Chortareas et al. (2012) find that all interventionist supervisory and regulatory policies, such as capital restrictions, official supervision and private monitoring,

hamper the efficient operation of banks. These results raise a cautionary flag as to the efficacy of capital requirements and bank supervision on bank performance.

Despite the growing literature, there is still a paucity of studies investigating the above issues with reference to the Asian banking markets. Thangavelu and Findlay (2012) examine the impact of bank off-balance-sheet activities, foreign penetration, bank regulation and supervision on the efficiency of six banking markets in South East Asia between 1994 and 2008. They find that official supervision helps improve banks' efficiency but that private monitoring actually decreases it. Zhao, Casu and Ferrari (2008, 2010) and Casu et al. (2013) identify a sustained productivity growth in India following the prudential re-regulation period (post-1998 onward), but the authors do not identify which re-regulatory policy contributed to the observed productivity growth. Banker, Chang and Lee (2010) investigated the post-1997 regulatory changes in Korea and found that policies aimed at strengthening banks' capital structures and risk management do not have a uniform impact on bank productivity, but rather favour strategically privileged banks. The evidence from the Asian banking market seems to show that supervisory oversight works better than private monitoring, possibly because it is more difficult for emerging economies to move towards a disclosure strategy, given that information asymmetry problems are more acute in those countries.

This study aims to fill these gaps in the literature by providing insights on the impact of each regulatory instrument on bank cost efficiency. In particular, this study estimates whether cost efficiency improved in Asian banking markets after the 1997 crisis. Furthermore it specifically assesses the impact of different deregulation and re-regulation policies on bank cost efficiency.

6.4 Methodology, data, variables and descriptive statistics

6.4.1 Methodology

The stochastic frontier approach is used to model banks' cost characteristics. The general stochastic cost frontier in a panel data setting is given as:

$$TC_{it} = TC\left(Q_{it,} w_{it}\right) + v_{it} + u_{it} \tag{6.1}$$

where *TC* is observed total cost; *Q* and *w* correspond to vectors of outputs and input prices respectively; *v* is a symmetric random noise term, and *u* is a non-negative term representing firm-level inefficiency. The subscripts *i* and *t* denote the *i*-th firm and the *t*-th period respectively.

According to Battese and Coelli (1995), firm-level inefficiency can be explained by a series of covariates, such as bank characteristics or other exogenous factors. This is done by modelling the inefficiency term, u_{it}, as a function of the composite factors y_{it}, as follows:

$$u_{it} = y_{it}\delta + \eta_{it} \tag{6.2}$$

Equations (6.1) and (6.2) are estimated simultaneously in one stage, thus overcoming the econometric problems associated with two-stage approaches (Kumbhakar and Lovell, 2003; Greene, 2005).

Many researchers have noticed that the assumption of a common ('pooled') frontier in a cross-country scenario is quite unwarranted given the differences in banking environments and the level and quality of services associated with bank intermediation (Berger and Humphrey, 1997; Dietsch and Lozano-Vivas, 2000; Chaffai, Dietsch and Loxano-Vivas, 2001; Bikker, 2002). If banking technology across countries is not homogeneous the estimation of a pooled frontier will produce biased results. As a solution, Battese and Rao (2002) and Battese, Rao and O'Donnell (2004) propose a *metafrontier* model: this involves defining an overarching mathematical function to envelope the deterministic components of the country-specific stochastic frontiers. The functional form of the metafrontier is the same as that of the stochastic frontiers that it envelops, and the coefficients are estimated by linear programming. The intuition behind the metafrontier is that technological spillovers do exist, meaning that all countries have theoretical access to a superior technology (the meta-technology), regardless of whether they actually make use of it. This approach thus allows for the identification of comparable efficiency scores for the banks of different countries. The distance of each bank from the metafrontier defines its metaefficiency score (*Meta-E*) and it is made up of two components, as shown in Equation (6.3): the technology gap ratio (*TGR*) and the bank's efficiency score relative to its country-specific frontier (*CF-E*):

$$\text{Meta-E}_{it} = \text{CF-E}_{it} * \text{TGR}_{it} \tag{6.3}$$

The *TGR* measures the distance between a country frontier and the metafrontier and so, in essence, the extent to which the technology of

a country lags behind the meta-technology. The *TGR* scores are bound between 0 and 1, with values closer to 1 indicating a closer proximity to the meta-technology and vice versa. The *CF-E* measures the distance of a bank from its country-specific frontier and it too is bound between 0 and 1; as a result, the *Meta-E* score is also bound between 0 and 1, as can be easily seen from Equation (6.3).

The metafrontier model is a non-stochastic approach, which means no distribution is associated to the estimators, thus ruling out the testing of hypotheses. One way to get around this problem is through *bootstrapping* (Efron, 1981; Efron and Tibshirani, 1986). Bootstrapping is a computationally intensive, non-parametric approach for making statistical inference when traditional parametric inference is unavailable (Mooney and Duval, 1992). It involves continuously resampling with replacements from the original sample data so as to derive an empirical estimator of the sampling distribution of a statistic. We will use the bootstrapping approach to derive confidence intervals and test statistics for the estimated coefficients of the metafrontier.

6.4.2 Data

We collected data from different sources to construct a panel database containing bank-level data and country-level data from eight Asian economies (China, India, Japan, Hong Kong, Thailand, Malaysia, Indonesia and the Philippines) over the period 2001–2010. The sample includes all types of depository institutions (commercial banks, saving banks and cooperatives) except for cooperative banks from Japan,[3] which results in a total of 3805 observations. Financial information is obtained from Bankscope. Data on regulatory variables is obtained from the World Bank survey database (Barth, Caprio and Levine, 2001, 2006, 2007) and the Economic Freedom Index of the Heritage Foundation.

We conduct the analysis at the bank level. Following an established banking literature, we specify a translog stochastic cost function,[4] where the dependent variable is measured by bank total costs (*TC*). In the specification of the inputs and outputs, we follow the intermediation approach (Sealey and Lindley, 1977) and specify input prices (*w*) as price of labour (*PL*), price of physical capital (*PC*), and price of funds (*PF*), respectively; outputs (*Q*) are defined as net loans (*LN*), other earning assets (*OEA*), and net fees and commissions (*NFC*). We also incorporate risk factors (*X*), with the capital ratio as a proxy (*CR*); the volatility of returns on assets (*VOroa*); and loan loss provisions *(LLP)*. In line with the aims of the analysis, we include a deregulation indicator *(Dereg)* and a re-regulation indicator (*Rereg),* which measure the extent to which the banking market of a country is liberalized and the strength of prudential

Table 6.2 Variables' specification

Variable	Specification
Dependent variable	
TC	Total Cost (*TC*) = Interest Expenses + Operating Expenses
Determinants of the cost frontier	
Input prices (*w*)	
PL (w_1)	Price of Labour = Personnel Expenses /Total Assets
PC (w_2)	Price of Capital = (Other Operating Expenses + Loan and other Impaired changes) / Total Assets
PF (w_3)	Price of Funds = Interest Expenses/ (Total Deposits + Money Market and Short-term funding +Other Funding+ Long-term Funding)
Outputs (Q)	
LN (Q_1)	Net Loans = Gross Loans – Reserves for Impaired Loans
OEA (Q_2)	Other Earning Assets
NFC (Q_3)	Net Fees and Commissions
Risk factors (X)	
CR (X_1)	Equity Capital Ratio = (Equity Capitals+ Reserves) / (Total Loans)
VOroa (X_2)	Volatility of ROA = Standard Deviation of Return on Assets
LLR (X_3)	Loan Loss Provision = Reserved for Impaired Loans/ Total Loans
Control variables	
GDP-growth	Annual GDP Growth Rate
Regulatory variables	
Dereg	Deregulation indicator, the mean values of ACTR and CMD.
Rereg	Re-regulation indicator, the mean values of CAPS, SUPP and MARD.
Determinants of inefficiency	
Regulatory variables	
ACTR	**Activities restrictions:** an index measuring the degree to which authorities allow banks to engage in fee-based activities, and the degree of regulatory restrictiveness on the mixing of banking and commerce. The degree of restrictiveness for each activity is quantified on a scale from 1 to 4, corresponding to 'prohibited' 'restricted', 'permitted', and 'unrestricted'. The index is the average of the scale of the activities; higher values indicate fewer restrictions on banking activities.

Continued

Table 6.2 Continued

Variable	Specification
CMD	**Capital market deregulation:** an index reflecting the degree to which a banking market is liberalized. The index includes information from 4 categories: the ownership of banks, foreign bank competition, private sector credit and interest rate controls. Each category is assigned values between 0 to10. The index is the average of the values of each category. Higher values indicate a more liberalized banking system.
CAPS	**Capital stringency:** index based on the answers to the survey questions regarding the overall capital stringency. The values assigned to the index range from 0 to 7, with higher values indicating greater capital stringency.
SUPP	**Supervision power:** the index measures whether supervisory authorities can take specific actions to prevent and correct problems. A value of 1 is assigned to a 'yes' answer and a value of 0 to a 'no' answer. This variable is the sum of these assigned values which range from 0 to 15, with higher values indicating greater supervisory power.
MARD	**Market discipline:** the index captures the degree to which accurate information is disclosed to the public. The values assigned to the index range from 0 to 7, with higher values indicating more transparency and hence greater private supervisory power.
Ownership dummies	
D-State	1 if banks are ultimately owned by the state, 0 otherwise;
D-Private	1 if banks are identified as private banks and ultimately owned by domestic private sector, 0 otherwise;
D-For	1 if banks are ultimately owned by foreign organisations or other parties, 0 otherwise;
D-Coop	1 if banks are credit cooperatives, or rural banks, 0 otherwise.
Market structure indicator	
HHI	The Herfindahl–Hirschman Index. Values range from 0 to 1, with higher values indicating greater market concentration.

Note: The definition of *CMD* is based on the database of the Economic Freedom Index; other regulatory variables are based on Barth et al. (2001).

regulations respectively. A quadratic time trend (T and T^2) and the annual GDP growth (*GDP-growth*) are included in the cost frontier to capture technological progress over time and to control for the macroeconomic environment. Next, we model the determinants of inefficiency in Equation (6.2), and we include indices of activity restrictions (*ACTR*) and credit market deregulation (*CMD*) and indices that reflect the strength of capital stringency policy (*CAPS*), supervision power (*SUPP*) and market discipline (*MARD*). All regulatory indices are scaled by the maximum value in each group to ensure that regulatory variables are bound between 0 and 1 and take an equal weight in the estimation. We also include ownership dummies (*D-State, D-Private, D-For, D-Coop*) and control for the degree of market concentration (*HHI*). Table 6.2 summarizes the definitions of the variables.

Table 6.3 summarizes the variables by country. As it can be seen, the average size of banks in Japan, China and Hong Kong is substantially larger than in other counties in the sample. Banks in Japan, China and Hong Kong also have lower input prices in relation to their neighbouring countries. In addition, countries which were most affected by the Asian crisis tend to have higher capital ratios, larger return volatilities and higher LLP (columns 9–11). In terms of the degree of liberalization, Hong Kong and the Philippines are highly liberalized while China, Indonesia and India lag behind the regional average (columns 12–14). As to the strength of prudential regulations, China has the least stringent capital requirements and India the highest (27.5 per cent and 83.3 per cent respectively, column 15). Both countries grant less power to official supervision (column 16). China however, places greater effort on information disclosure to foster market discipline (column 17). Overall, Japan, Hong Kong and the Philippines implement relatively austere prudential and supervisory frameworks (column 18). Turning to ownership structure, state ownership still plays a predominant role in the banking markets in China, India and Indonesia. Finally, the banking market is highly concentrated in Hong Kong but fragmented in Japan and India.

6.5 Empirical results

As a starting point, a likelihood-ratio (LR) test is conducted to try out the null hypothesis of technological homogeneity in the sample. We strongly reject the null hypothesis (with a p-value of 0.000) and conclude that banks from different countries indeed operate under different technologies, which justifies the use of the metafrontier approach.

Table 6.3 Sample descriptive statistics

	Dep. vars	Outputs (Qs)			Input prices (ws)			Macro-con.ition	Risk factor (Xs)			Deregulation indicators			Re-regulation indicators				Ownership dummies				Concen-tration
Country	TC	LN	OEA	NFC	PL (%)	PC (%)	PF (%)	GDP growth (%)	CR (%)	VO (roa) (%)	LLP (%)	CMD	ACTR	Dereg	CAPS	SUPP	MARD	Rereg	D_State (%)	D_Private (%)	D_For (%)	D_Coop (%)	HHI (%)
Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
HK	844	13,382	15,952	330	0.60	0.67	1.64	4.0	11.9	0.3	1.0	97.3	97.1	97.3	75.9	78.6	85.7	89.8	0.00	20.4	79.6	0.00	25.9
JP	968	33,996	23,025	239	0.37	0.83	0.47	0.7	6.4	0.4	1.6	86.8	63.2	80.2	66.7	92.9	68.5	90.8	0.00	100	0.00	0.00	7.22
CN	1,539	27,507	22,018	219	0.52	0.87	1.59	10.9	8.4	0.3	2.6	68.8	42.5	61.5	27.5	76.1	89.9	77.5	67.9	29.4	1.18	1.49	12.9
IN	927	7,433	4,427	170	1.04	1.44	5.15	7.4	11.4	0.2	1.8	70.8	60.4	67.9	83.3	75.8	42.9	77.5	73.8	20.9	4.47	0.82	7.2
ID	250	1,224	1,181	37	1.46	2.35	6.10	5.2	17.5	0.9	6.1	76.2	47.2	68.1	50.0	96.4	57.1	85.4	51.0	18.3	30.6	0.00	10.4
MY	434	6,252	2,405	105	0.73	1.26	2.42	4.5	14.3	0.5	4.2	80.6	62.2	75.5	49.6	93.5	64.4	85.7	22.9	54.6	22.5	0.00	9.6
PH	145	998	970	40	1.17	2.47	3.20	4.8	19.7	0.5	7.4	90.7	83.3	88.6	80.6	92.9	57.1	91.0	8.29	90.4	1.25	0.02	9.2
TH	540	8,223	3,424	113	0.77	1.79	1.94	4.3	12.0	0.9	6.1	87.0	55.2	78.1	59.0	76.4	64.8	78.2	35.0	60.0	4.99	0.00	10.6

Notes:

a) The cost and outputs (in columns 1–4) are the arithmetic average of each country and are expressed as per 1,000,000 USD. The amount is deflated using 2005 as base year.

b) Input prices and ownership variables are expressed as asset-weighted averages.

c) Dereg (Column 14) is the average of columns 12–13, and Rereg (column 18) is the average of columns 15–17.

d) All regulatory variables are scaled by the maximum values of each group to ensure the regulatory variables are bound between 0 and 1 and therefore carry an equal weight in the estimation.

e) Countries' names are shortened as follows: CN for China, HK for Hong Kong SAR, JP for Japan, IN for India, ID for Indonesia, MY for Malaysia, PH for the Philippines, TH for Thailand. These abbreviations apply to the whole chapter.

Table 6.4 Parameter estimations of metafrontier

Variable	Coef	Std-Err	T-ratio	95% Conf. Interval	
LnTC					
Constant	–0.4926	0.6050	–0.8142	–1.8325	0.4541
Ln(LN)	0.4937***	0.1906	2.5901	0.2296	0.8966
Ln(OEA)	0.8039***	0.1981	4.0572	0.4231	1.1383
Ln(NFC)	–0.0371	0.0326	–1.1384	–0.1110	0.0205
$0.5[\ln(LN)]^2$	0.1204***	0.0302	3.9813	0.0593	0.1767
Ln(LN)*ln(OEA)	–0.1062***	0.0395	–2.6885	–0.1893	–0.0495
Ln(LN)*ln(NFC)	–0.0097*	0.0057	–1.6983	–0.0150	0.0078
$0.5(\ln OEA)^2$	0.0695	0.0503	1.3802	0.0224	0.1816
Ln(OEA)*ln(NFC)	0.0126**	0.0057	2.2045	–0.0038	0.0186
$0.5(\ln NFC)^2$	0.0007	0.0015	0.4639	–0.0022	0.0035
Z_2	0.0515	0.1267	0.4067	–0.1604	0.3258
Z_3	0.3833***	0.1027	3.7330	0.1570	0.5578
Z_{12}	0.0705***	0.0169	4.1721	0.0149	0.0826
Z_{13}	–0.0588***	0.0139	–4.2282	–0.0880	–0.0320
Z_{23}	–0.0930***	0.0115	–8.0963	–0.1061	–0.0607
Ln(LN)*Z_2	–0.0083	0.0269	–0.3088	–0.0305	0.0683
Ln(LN)*Z_3	–0.0364***	0.0144	–2.5358	–0.0449	0.0081
Ln(OEA)*Z_2	0.0380	0.0309	1.2312	–0.0536	0.0597
Ln(OEA)*Z_3	0.0346**	0.0150	2.3109	–0.0098	0.0459
Ln(NFC)*Z_2	–0.0075	0.0061	–1.2398	–0.0149	0.0087
Ln(NFC)*Z_3	–0.0020	0.0020	–0.9947	–0.0056	0.0023
GDP_growth	–0.0054**	0.0027	–1.9703	–0.0070	0.0042
T	0.0952***	0.0185	5.1532	0.0288	0.1049
T^2	–0.0053***	0.0013	–4.2074	–0.0069	–0.0017
Ln(CR)	–0.0373***	0.0086	–4.3110	–0.0556	–0.0208
Ln[VO(roa)]	–0.0171**	0.0069	–2.4692	–0.0331	–0.0063
Ln(LLP)	–0.0003	0.0013	–0.2356	–0.0034	0.0016
Dereg	–0.5573***	0.0216	–3.9921	–0.1281	–0.0384
Rereg	0.0088	0.0173	0.0631	–0.0045	0.0633
Obs	3805				

Note: (a) Homogeneity in input prices is imposed, the cost function is therefore estimated in its transformational form, where, $Z_2 = lnPC - lnPL$, $Z_3 = lnPF - lnPL$, $Z_{12} = lnPL * lnPC - 0.5(lnPL)^2 - 0.5(lnPC)^2$, $Z_{13} = lnPL * lnPF - 0.5(lnPL)^2 - 0.5(lnPF)^2$, $Z_{23} = lnPC * lnPF - 0.5(lnPC)^2 - 0.5(lnPF)^2$.

In what follows, we first discuss the estimation of the country-specific frontiers and the determinants of bank cost inefficiency. We then look at the results of the estimation of the metafrontier and discuss the dynamics of banks' meta-cost efficiency scores.

6.5.1 Country stochastic frontiers

The results of the country-specific estimations comply with the micr-oeconomic theory requirements of a cost frontier,[5] with positive and

significant inputs and output cost elasticities. Technical progress, measured by the quadratic time trend, is mainly non-significant, with the only exception of Hong Kong. Efficiency levels are reasonably high in each country and do not show significant changes over time (this is shown in Figure 6.5 later on). Looking at the determinants of inefficiency (the y variables of Equation (6.2)) the results show that the relaxation of activities restriction *(ACTR)* does not have a uniform impact on banks' cost efficiency. Capital market deregulation *(CMD)* – which liberalizes interest rates, enhances private and foreign penetration and facilitates credit allocation – positively impacts on cost efficiency. The findings suggest that deregulation can improve banks' cost performance but the overall effects of liberalization policies appear to be multi-faceted and should be considered individually.

Turning to the re-regulation indicators, capital policies *(CAPS)* have a negative impact on banks' efficiency, possibly because higher capital requirements increase banks' costs. We find no convincing evidence that official supervision *(SUPP)* and market discipline *(MARD)* improve banks' efficiency, possibly because government intervention may intensify agency conflicts, which in turn can hinder the progress of cost efficiency. It is also necessary to point out that many Asian economies are characterized by the absence of experienced regulators, poor quality on-site supervision and poor law enforcement. These institutional weaknesses may undermine the quality and effectiveness of official supervision. Finally, it may be more difficult for transitional economies to move towards a disclosure-based supervisory regime, given the opacity of the banking system. Policy makers who are trying to upgrade their regulatory framework should take into account the potential negative impact of current re-regulatory instruments on bank efficiency.

6.5.2 The estimation of the metafrontier

Table 6.4 reports the estimated coefficients of the metafrontier. The confidence intervals and standard errors derived from bootstrapping are also reported in the table. It is noticeable that the vast majority of the bootstrapped standard errors are relatively small, indicating that the coefficients are precisely estimated and hence representative of the meta-cost frontier.

Focusing on the impact of regulatory variables on meta-cost technology, the results show that financial deregulation *(Dereg)* – which removes restrictions on banks' activities, liberalizes interest rates, or enhances foreign penetration – positively impacts on the meta-cost

technology. For instance, if the deregulation indices were to increase by 0.1 units, this would induce a reduction of cost by 5.57 per cent (holding other factors constant). These findings seem to support ongoing policies aimed at further liberalizing banking systems. However, banking re-regulation (*Rereg*) seems to adversely shift banks' cost technology, possibly because conforming to a more rigorous prudential regulatory system raises banks' costs. But the effect is relatively mild and statistically insignificant, so we remain cautious in interpreting this outcome.

The quadratic time trend (T and T^2) exhibits a concave pattern with the inflection point occurring after almost 9 of the 10 years of the sample, thus indicating a regression of cost technologies in 2001–2009. The finding is consistent with Sun and Chang (2011), who also detected a regression of cost technology in banks' operations, in their analysis of bank risk and cost efficiency in eight emerging markets in Asia. The outcome may relate to the fact that banks had to increase their efforts to clean up non-performing assets on their balance sheets after the 1997 crisis. In addition, extra resources spent on risk control, new business initiatives and technological innovation might have contributed to this pattern of cost technology.

Estimates of bank risk factors that indicate higher capital ratios *(CR)* are not associated with greater costs. We interpret this as a signalling effect, that is: a well-capitalized bank may signal higher retained earnings and greater cost savings. Returns volatility (*VOroa*) is associated with lower bank costs. The result is in line with Isik and Hassan (2002) and Havrylchyk (2006). The level of loan loss provisions (*LLP*), however, has a significant cost increasing effect on bank cost.

6.5.3 The evolution of meta-cost efficiency

Based on the estimation of the metafrontier, we can easily obtain the estimations of meta-cost efficiency scores for individual banks. To see how meta-cost efficiency evolved over time, in Figure 6.5 we plot the changes in the industry average meta-cost efficiency scores (*Meta-E*), technology gap ratios (*TGR*) and efficiency scores benchmarked by country frontiers (*CF-E*).

The figure shows that Asian banking markets experienced considerable improvements in meta-cost efficiency over the 2000s, except for Malaysia. These improvements suggest that bank deregulatory polices, such as the liberalization of interest rates and the relaxation of foreign bank entry, have transformed the financial landscape as they seem to have fostered reductions in managerial slack and allocative inefficiency. Moreover, when decomposing the meta-cost efficiency into its components, we find that while *CF-E* scores remain roughly unchanged over time, *TGR*s

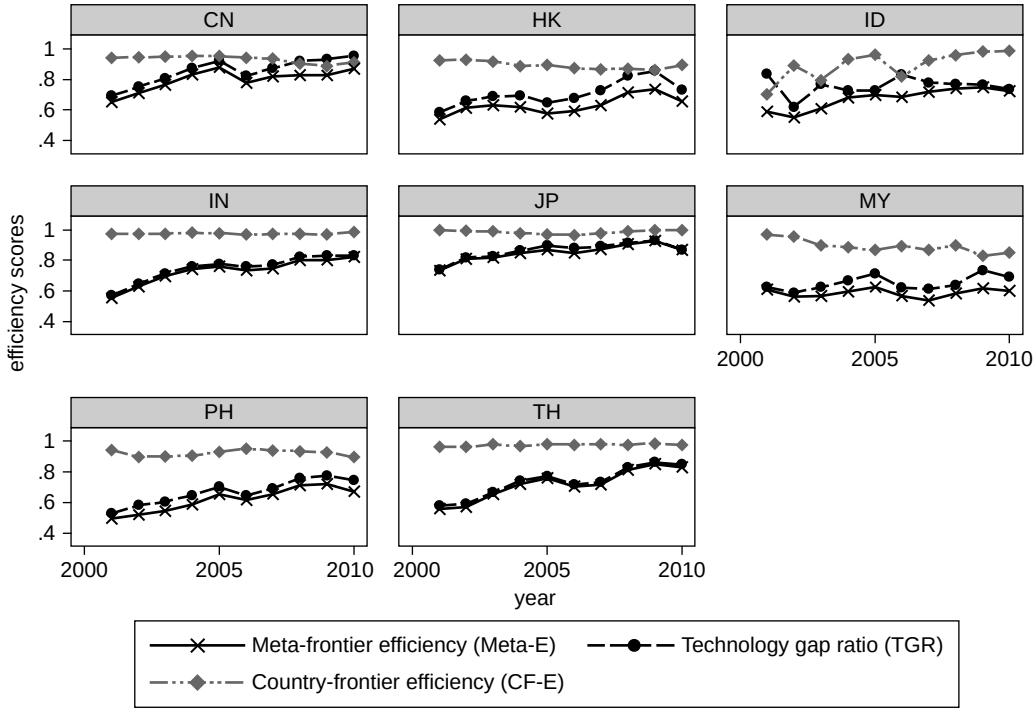

Figure 6.5 Decomposition of meta-cost efficiency scores

improve considerably. These results seem to suggest that the improvement in meta-efficiency is primarily driven by the advances of domestic technologies towards regional best practices (measured by the *TGR*s). The findings also suggest that domestic banks have equipped themselves with better technology, in order to embrace international competition.

In terms of differentials of cost performance between countries, the Japanese banking market is the most cost efficient. We tentatively explain this result as the outcome of the banking reforms (the so-called 'Financial Big Bang') implemented in Japan in the late 1990s, which aimed to foster a market-based mechanism and thereby to increase banks' incentives for cost-saving. In addition, some banking innovations (such as the IT revolution) implemented in Japan in the early 2000s, aimed at providing high-quality services at lower costs, also contributed to the efficient outcome of Japanese banks. In contrast, the Malaysian banking market is relatively cost inefficient and experienced little progress in cost performance over time. This poor performance can be ascribed to Malaysia's high market concentration and to its increasingly stringent capital norms. In addition, prudential policies (such as restrictions on foreign bank entry and branching) imposed in Malaysia over the past decade may also have hampered banks' incentives for cost reduction.

6.6 Conclusions

This study examined the impact of the coexistence of bank deregulation and prudential re-regulation on banks' cost characteristics in eight major Asian economies over the period 2001–2010. As a first step, this chapter explored the impact of bank regulation and market structure on cost efficiency by estimating country-specific frontiers. We then examined the factors that affect the meta-cost technology. We find that financial deregulation – which liberalizes bank's interest rates, removes activities restrictions and enhances foreign penetration – positively impacts on cost technology. This finding underscores the importance of further liberalizing banking systems in Asia. Bank re-regulation does not seem to have a significant impact on banks' cost technology. However, given the relatively short time-period since the implementation of re-regulatory policies, the long-term effects are still uncertain. Overall, meta-cost technology in Asia has regressed over the period 2001–2009. This may relate to the fact that banks had to increase their efforts to clean up their balance sheets after the 1997 crisis. Additional resources spent on risk control, new business initiatives and technological innovation may also have contributed to this results.

We also find that banks' meta-cost efficiency improved considerably over time in most Asian economies, except for Malaysia. This improvement is closely related to the progress of domestic technology towards the 'super-national' technology represented by the metafrontier. The analysis suggests domestic banks have equipped themselves with better technology to embrace international competition. Overall, the coexistence of deregulatory and re-regulatory frameworks observed in Asia appears to be beneficial for banks' cost performance, given the significant improvement of bank cost efficiency observed in the past decade. However, there are signs of a slowing down of such performance in recent years, which may be associated with the increasing emphasis on prudential re-regulation of banks. These results highlight the importance of combining policies which aim to foster financial stability with policies which promote financial intermediation.

Notes

1. CR5 is computed as the total assets share of the *5* largest banks in the system.
2. The HHI index is computed as the sum of the squares of the asset shares of banks in each country.
3. The exclusion of the cooperative banks of Japan from our sample is primarily due to the following consideration. There are more than 400 cooperative banks in Japan and they are small, locally based, and considered as 'not-for-profit' organisations (Liu and Wilson, 2010). Kano and Tsutsui (2003) find that loan markets for cooperative banks in Japan are segmented by prefecture, implying that they do not compete on the same platform as the regional and national players. We therefore exclude Japanese cooperative banks from our sample.
4. For the construction of a translog cost function see Ray (1982). For the application of the function in the banking literature, see Mester (1996) and Altunbas and Molyneux (1996), among others.
5. For reasons of space the results of the estimations for the country-specific frontiers are not reported but they are available upon request.

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7

Small Banks in Post-crisis Regulatory Architecture: The Case of Cooperative Banks in Poland

Ewa Miklaszewska

7.1 Introduction

Before the 2008 crisis, financial deregulation and market efficiency were considered to be the regulatory pillars, particularly within the Basel II framework. The 2008 crisis resulted in the adoption of a new regulatory philosophy: that of strengthening and tightening regulatory supervision (Beck, 2010). Basel III focused on strengthening prudential regulations, mostly by requiring more, and better, capital and better loss-absorption capacities by large banks (BIS, 2010). EU and US authorities have supplemented Basel III by instituting complex supervisory infrastructures, based on a number of newly created institutions together with a redefinition of the objectives and prerogatives of those already in existence. In many cases, these new regulatory structures are diamond-shaped, rather than ladder-shaped (Masciandaro, Nieto and Quintyn, 2011). The complexity of banking regulations, plus overlapping prerogatives on newly created institutions, have considerably increased regulatory costs and are thus a burden on banks (KPMG, 2013). Moreover, in the EU, the new institutional safety net has not been implemented consistently and has been more of a case of constant rearrangement according to changes in macroeconomic priorities: from financial stability (European Banking Authority-based framework) to financial growth (European Central Bank-based framework), which has led to increased organizational uncertainty and chaos.

Post-crisis bank restructuring has concentrated on stabilizing large banks and preventing systemic risk. In this respect, market-competitive conditions and the strengthening of local, mutual banks have been of marginal importance to the regulators. The current regulatory architecture, based on stabilizing the strong parties (SIFIs) with strong regulatory bodies (a weaker EBA replaced by a stronger ECB), resembles the neo-corporatism of the 1960s and 1970s, where high growth was to be achieved by a consensus between strong parties (corporations, trade unions, the government) at the expense of the efficiency of the whole market. Margaret Thatcher described this once as 'governing by bribery', since a consensus aiming at short-term growth does not usually bring long-term efficiency and development, either in economics or in finance.

There is one crucial aspect of post-crisis regulatory reforms which is frequently referred to as a failure: the modification of corporate governance within a financial institution. For this reason, a new regulatory priority has recently been flagged up: that of the need to democratize and humanize finance – making it work better for ordinary people (Kroszner and Shiller, 2013). For this the existence of a competitive and diversified banking market is a precondition.

Retail banking carried out by locally-based small institutions, such as credit unions, mutual savings banks, building societies or cooperatives, has always played an important role in many countries. However, the global financial crisis of 2008 has changed the competitive position of these banks. While on the one hand, their healthy business model has been praised, they nevertheless have to comply with regulatory requirements designed for large SIFIs. Hence the analysis in this chapter concentrates on: the relative position and future prospects of small, locallybased banks, with a focus on the Polish example of cooperative banks; whether these banks are being indirectly discriminated against by post-crisis regulations; and the different ways in which this sector could be assisted.

The following discussion on the challenges currently facing Polish cooperative banks and their future prospects is based on an analysis of bank performance, using a database provided by the Polish Supervisory Authority (KNF) together with a cooperative bank survey on how future challenges faced by the cooperative banks have been understood by the single banks. This survey, with a response rate of over 10 per cent of Polish cooperative banks, was conducted by the author in 2013. The contribution made by this chapter to the existing literature is its thorough analysis of the consequences of new European regulations on

Polish cooperative banks. Its policy implication is that regulators should possess a better understanding of the various cooperative bank models in existence and take more care to preserve diversity in the European banking sector.

The chapter is organized as follows: Section 7.2 describes the consequences of post-crisis regulatory restructuring and presents a literature review on this subject. Following this, Section 7.3 analyses its impact on the Polish banking market. In Section 7.4 Polish cooperative bank problems are discussed. In Section 7.5 the challenges facing cooperative banks are analysed, and in Section 7.6 the cooperative bank survey results are discussed. In the concluding section, recommendations are formulated.

7.2 The challenges to building post-crisis regulatory architecture

The deregulation of financial markets over the last two decades has dramatically influenced the scale and complexity of banking firms, as illustrated in Table 7.1. In the pre-crisis period, universal bank strategies were largely directed towards expansion, while business models centred on operational efficiency accruing from new sources of profits and high leverage. The main source of bank efficiency stemmed from expansion into new markets, non-depository funding and non-interest-based sources of profits (Demirgüç-Kunt and Huizinga, 2010). Changes in bank scale and scope of activities were facilitated by the new regulatory philosophy, as exemplified by the shift from the Basel I to Basel II regulatory framework, where market discipline and bank self-regulation were intended to replace tight supervision. The increasing complexity of banks and the expansion of conglomerate structures generated synergies between banking (regulated) business and relatively unregulated investment activities and offered both new sources of income and new areas of risk (Allen et al., 2011).

The financial crisis demonstrated that Basel II was built on many optimistic assumptions and incorrect trade-offs, namely that regulators do not understand the complexity of banking activities and that tight supervision should be replaced by market discipline (Masera, 2010). It looked at isolated areas of risk and focused on partially recognized threats to financial stability. As a consequence, banks, which for decades had been leaders in global efficiency or expansion, turned out to be the most severely affected, necessitating massive public stabilization funds and in some cases rescue by direct government intervention (Demirgüç-Kunt and Huizinga, 2011). From today's perspective, Basel II was an

Table 7.1 The largest global banks by assets, billions $, in selected years

1985		1995		2004		2011	
Top banks	**Assets**	**Top banks**	**Assets**	**Top banks**	**Assets**	**Top banks**	**Assets**
Citicorp	167	Deutsche Bank	503	UBS	1,533	Deutsche Bank	2,803
Dai-Ichi Kangyo B.	158	Sanwa Bank	501	Citigroup	1,484	Mitsubishi UFJ	2,741
Fuji Bank	142	Sumitomo Bank	500	Mizuho FG	1,296	HSBC	2,555
Sumitomo Bank	135	Dai-Ichi Kangyo	499	HSBC	1,277	BNP Paribas	2,545
Mitsubishi Bank	133	Fuji Bank	487	Credit Agricole	1,243	Japan Post Bank	2,543
BNP	123	Sakura Bank	478	BNP Paribas	1,234	Credit Agricole	2,449
Sanwa Bank	123	Mitsubishi Bank	475	JP Morgan	1,157	Barclays	2,431
Credit Agricole	123	Norinchukin Bank	430	Deutsche Bank	1,144	ICBC	2,400
Bank of America	115	Credit Agricole	386	RBS	1,119	RBS	2,343
Credit Lyonnais	111	Ind. Comm. Bank of China	374	Bank of America	1,110	JP Morgan	2,266

Source: Data for 1985–2004: The Economist (2006); for 2011: The Banker (2011).

over-optimistic regulatory solution, as illustrated also by the results of an opinion survey, presented in Table 7.2. The financial community (the respondents to a *Centralbanking.com* poll in Table 7.2) supports the post-crisis tightening of regulations, as epitomized by the Basel III capital accord, although many want to see a higher leverage ratio than the minimum of 3 per cent it prescribes (the leverage ratio was defined as a result of dividing Tier 1 capital by the bank's average total consolidated assets). However, almost one-fifth of the respondents of the poll (19%) voted for a return to the simplicity of Basel I.

By supplementing the Basel III regulatory framework, the EU and US authorities have created a complex regulatory infrastructure, based on a number of newly created institutions. The new European Supervisory Architecture has been constructed upon three pillars (Masera, 2010): macro-prudential supervision, micro-prudential supervision (based on three sectional authorities: the European Banking Authority (EBA), the European Insurance and Occupational Pension Authority (EIOPA) and the European Securities and Market Authority (ESMA)) and national

Table 7.2 Basel agreements and financial stability

Question: how would stability best be served?	Survey results (Answers in %)
• Implementing Basel III	34
• Implementing Basel III, with a higher leverage ratio	27
• Scrapping Basel III– just raise the leverage ratio	12
• Keeping Basel II, but enforcing it more effectively	8
• They got it right the first time – go back to Basel I	19

Source: Centralbanking.com: 28 January 2013 (accessed 10.03.2013).

supervisors. The micro-prudential bank regulator (the EBA) had broadly defined goals and competencies, such as preventing regulatory arbitrage, guaranteeing a level playing field, developing common reporting standards, strengthening international supervisory coordination, promoting supervisory convergence and fostering depositor and investor protection (CEBS, 2010), but the EBA had to reconcile itself to different national objectives and institutional arrangements and in many cases turned out to be powerless in confrontations with national regulators.

Moreover, views have been expressed that global financial stability and cross-border banking cannot be supported by nationally based supervision. The 'financial trilemma' states that financial stability, financial integration and national financial policies are incompatible (Schoenmaker, 2011), and hence a single supervisory power and lender, of last resort function, should be centralized in the ECB. There has also been growing recognition that a supervisory system focusing predominantly on bank safety may actually produce lower economic growth. According to OECD estimates, the post-crisis financial regulatory framework permanently reduces annual GDP by 0.15 per cent (De Larosière, 2013), and the Global Financial Stability Report has estimated that, in the EU, large banks would experience a reduction in assets of $2.2 trillion (7.3% of their assets) over the period Q3 2011 to Q4 2013 (IMF, 2012). Consequently, the ECB seems to be better equipped to prevent banking contractions and to stimulate growth with cheaper loans and investment programmes. The ECB had already been instrumental in slowing down bank deleveraging, by relieving funding pressures on euro area banks (EU Commission, 2012). These arguments were crucial to the decision, made by the European Council and the Euro Area Summit in June 2012, to move ahead from the coordination of national banking supervision towards an integrated system, whereby the large banks within the eurozone will come under the direct supervision of the ECB, planned initially for January 2014 and

later moved to March 2014, finally to November 2014 (EU Commission, 2012). The Banking Union will consist of three parts: a common banking supervisor (Single Supervisory Mechanism, SSM), a common resolution framework and a common deposit-guarantee scheme, the latter two to be constructed at a later date.

From 2014, the ECB will become responsible for tasks such as authorizing credit institutions' compliance with capital, leverage, and liquidity requirements and carrying out supervision of financial conglomerates. The ECB will be able to take early intervention measures by requiring banks to take remedial action. Initially there was a proposal that the ECB should be directly responsible for all 6,000 eurozone banks, on the principle that during a financial crisis, even relatively small banks may threaten the entire financial system. Under a compromise forged with national regulators, the ECB will now oversee large banks with more than 30 billion euros in assets, or with 20 per cent of national GDP (around 200 of the biggest European banks). In addition, the Single Supervisory Mechanism is a precondition for allowing the possibility of a direct recapitalization of banks by the European Stability Mechanism (ESM) – the eurozone's permanent bailout fund.

The Banking Union confers strong powers on the ECB, with an option for non-euro countries to join it on a voluntary basis. In contrast to the European Banking Authority, which sets the rules under which all banks in the EU must work, the ECB would be able to impose its will on national banking regulators. National supervisors outside the eurozone will continue to behave as before and the European Banking Authority will remain their common banking regulator (The Economist, 2012). The ECB will cooperate with the EBA within the framework of the European System of Financial Supervision and the EBA will continue to develop a single rulebook applicable to all 27 member states and make sure that supervisory practices are consistent across the whole union. The idea of a Banking Union has sometimes been depicted as the result of a choice between either 'returning to the past', where banks focus their activities on their countries of origin, or establishing a Banking Union, where banks would be encouraged to diversify across the EU and where supervision would be at the European level (OFCE, 2013). However, this alternative disregards the diverse structures of the EU banking systems and overlooks the challenges and threats which are created to smaller banks. Regulatory complexity and uncertainty are particularly harmful to small banks and in many cases regulatory information requirements are too profuse to be used effectively (KPMG, 2013). That is why, although EU states outside the euro area may sign up to the Banking Union, in most non-euro-based countries they hesitate to do this.

7.3 The banking sector in Poland: the importance of a competitive framework

Poland has a relatively low-level concentrated banking sector, which adheres to a traditional bank business model. Foreign capital dominates (61% of banking assets of fully capitalized subsidiaries and 4% of branches of foreign institutions), but the Treasury is also an important shareholder (22% of total assets). Polish private capital dominates in small, niche-oriented banks (6% of total assets) and the cooperative sector plays an important role in local markets (over 6% of total assets). At the end of 2011, commercial banks were controlled by capital coming in from Poland (35%), Italy (12.5%), Germany (10.5%), The Netherlands (8.5%), the US (6.2%), Spain (5.7%), France (5.1%), Portugal (3.9%), and other countries (12.6%) (MF, 2012). Overall, the Polish banking sector in the post-crisis period has been characterized by good performance as well as by sound fundamentals, as indicated in Table 7.3.

Cooperative banks represent 90 per cent of the total number of banks, 25 per cent of bank branches and 20 per cent of bank employees (Table 7.4), but only 6 per cent of total assets. They are small, locally based institutions: the majority (around 350 banks) have assets below 20 million euros, and only 66 are relatively large, with assets above 50 million euros (200 million PLN, Table 7.5).

The main objective of Polish banking sector restructuring since the 1990s has been the creation of a competitive market structure, which is why, at the beginning of this process, in 1989, branches of the monobank NBP were split up into nine independent banks so as to foster competition. Later on, there were frequent pro-competitive regulatory interventions. Today, the concentration level of the Polish banking sector remains moderate in comparison with other EU countries. At the end of 2009, the share of the five largest banks in total banking assets was 44 per cent. At that time, the CR5 concentration ratio was 72 per cent in Slovakia, 93 per cent in Estonia, and 62 per cent in the Czech Republic (Pawłowska, 2012). This characteristic of the Polish banking market, which is a competitive banking environment, was the main feature which attracted new players during the post-crisis period, such as the re-entry of Spanish bank, Santander.

In the financial literature, there is inconclusive evidence on the role of competition in bank stability and efficiency, and recent papers have stressed the role of an individual country's regulatory framework (e.g., Beck, De Jonghe and Shepens, 2013). The Polish banking market presents empirical evidence that a competitive market structure and adequate regulation perform well both in a pre-crisis and post-crisis environment.

Table 7.3 Polish bank performance (percentage values)

	ROA			ROE			C/I		
	2009	**2010**	**2011**	**2009**	**2010**	**2011**	**2009**	**2010**	**2011**
Total sector	0.81	1.03	1.28	8.37	10.21	12.78	54	52	51
Universal banks	0.83	1.10	1.32	8.22	10.19	12.98	53	51	50
Cooperative bs	1.18	1.12	1.24	10.54	10.46	11.88	72	69	67

Source: KNF (2013).

Table 7.4 Cooperative sector in Poland: basic statistics

	1995	**1997**	**1999**	**2001**	**2003**	**2005**	**2007**	**2009**	**2011**
No. of banks	1510	1295	781	642	600	588	581	576	574
No. of branches	n.a.	2550	2619	2878	3151	3598	4014	4374	4600
Employment (000)	n.a.	14.6	14.4	16.0	18.0	28.6	30.1	31.7	32.8
Capital adequacy (%)	8.4	11.1	12.8	13.9	14.2	14.7	14.0	13.4	13.4
Assets (billion PLN)	n.a.	11.3	15.4	21.5	25.7	36.4	48.9	61.7	78.4
Loans (billion PLN)	n.a.	5,5	8,1	11,3	14,8	18,0	27,9	36,2	44,3
Deposits (billion PLN)	n.a.	7,6	11,1	16,1	19,1	25.0	32,2	45,7	60,0
ROE	n.a.	14,3	30,8	18,0	19,4	12,2	17,3	10,5	11,9
C/I	n.a.	71.5	74.2	69.4	75.1	72.2	70.0	73.0	68.7

Source: Based on NBP summary evaluation of the financial situation of Polish Banks (various years).

Table 7.5 Asset size of cooperative banks, 2010 (in million PLN)

Asset size	**<50**	**50–100**	**100–200**	**200–500**	**>500**
No. of cooperative banks	185	172	153	53	13

Source: Pruski (2010).

7.4 Case study of Polish cooperative banks

The banking sector in Poland at the end of 2011 comprised the central bank (NBP), 47 commercial banks, 19 credit institution branches, and 574 cooperative banks. The cooperative sector operates on a two-level

Table 7.6 Changes in loan structure of commercial and cooperative banks (%)

	Commercial banks			Cooperative banks		
	2008	**2010**	**2011**	**2008**	**2010**	**2011**
Households	55.7	62.0	61.8	74.7	70.5	67.1
Firms	40.2	31.3	30.0	19.8	22.1	24.1
Local and central governments	3.8	6.2	7.8	4.9	6.7	8.0
Others	0.3	0.5	0.4	0.6	0.7	0.8

Source: KNF (2013).

model and in 2013 there were two cooperative networks, one headed by BPS SA (Bank Polskiej Spółdzielczości SA) with 366 banks, and the other by SGB-Bank (Spółdzielcza Grupa Bankowa) with 207 banks, with one cooperative bank (Krakowski Bank Spółdzielczy) operating independently (ZBP, 2012). Among locally active financial institutions, banking activities are also conducted by unregulated (until recently) credit unions (SKOKs). Although SKOKs represent only 1.4 per cent of total banking sector assets, they have grown at a remarkable rate since their implementation in 1992. SKOKs operate among low-income individuals, especially those who do not have accounts with other banks. In 2010, there were 61 SKOKs with 1800 branches, serving over 2 million customers (15% of Polish households). Their assets in June 2010 were over 4 billion US$ (The World Bank, 2012). The Credit Union Act of 1995 defined SKOKs as self-regulatory organizations, which gives them both flexibility and a low-cost advantage. The new Credit Union Act of 2009, implemented in October 2012, provided for external supervision and depositor protection, as in the rest of the regulated banking institutions, commercial and cooperative. This was a move in a right direction, as many surveys have indicated that customers cannot differentiate between self-regulated SKOKs and fully regulated cooperative and commercial banks. In 2011 SKOKs had deposits equal to 27 per cent of what was in cooperative banks (KNF, 2013).

Poland's cooperative banks are limited in both scale and operational scope. At the end of 2011, loans constituted 55 per cent of their assets (40% for households and micro-enterprises and 15% for firms, mostly SMEs), followed by interbank loans (30%) placed in associating banks. They financed 77% of their assets from deposits, mostly from households. The crisis changed their strategies, providing them with the incentive to move into more risky enterprise financing (Table 7.6), an area less attractive to commercial banks.

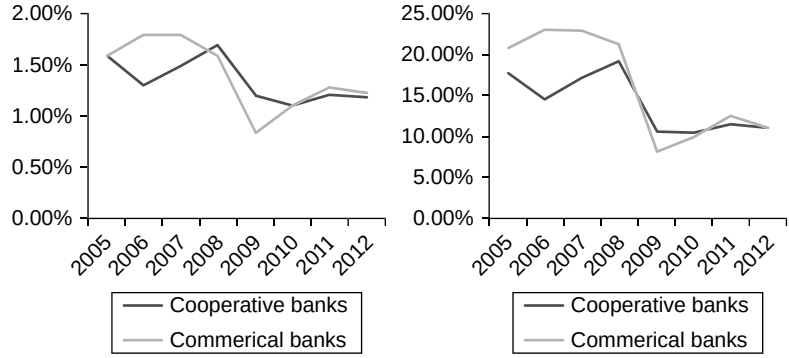

Figure 7.1 Cooperative and commercial banks' profitability in terms of ROA and ROE, respectively

Source: Own calculations based on dataset obtained from KNF (2013).

The cooperative model has performed well in the post-2008 crisis period in a number of countries. In Poland, cooperative banks, although less profitable in the pre-crisis booming years, have performed post-crisis in a similar way to commercial banks (Figure 7.1). However, the cooperative sector is not homogenous, and there are small banks within this group which struggle to retain the required capital and there are also large banks which could easily demutualize (Siudek, 2010).

For cooperative banks, the crisis years were the most profitable, thanks to businesses and customers returning to them from commercial banks which were reducing some of their activities. Overall, the Polish cooperative sector in the post-crisis period is characterized by good performance and has been playing an important role in local SME financing (Table 7.6).

In order to analyse cooperative bank soundness, a Z-score index of bank sensitivity to risk was used. This index is based on the volatility of returns and lack of adequate capital as the main sources of risk (Demirgüç-Kunt and Huizinga, 2010; Rabobank, 2009). The Z-score is calculated as the sum of equity capital to assets ratio (CAR) and return on assets ratio (ROA), divided by the standard deviation of the ROA. Thus the value of the Z-score is determined by the level of capitalization and by the level and stability of profits, and can be interpreted as the distance from default, measured by the standard deviation of profits. A high level in the Z-score denotes bank stability, and signifies that it has enough equity capital to cover potential losses. The financial crisis resulted in a lowering of the Z-score index for the entire banking sector, both globally and in Poland, but more profoundly for commercial banks

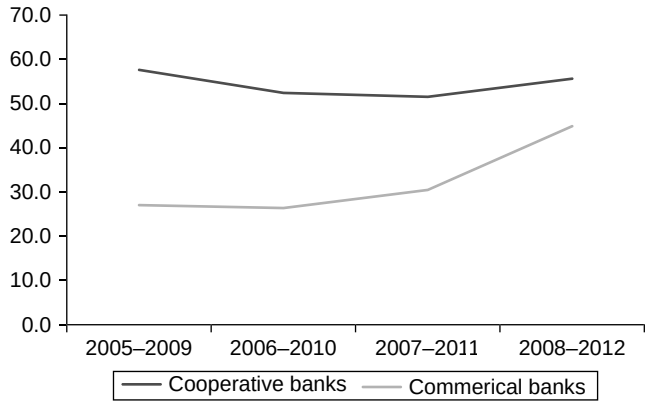

Figure 7.2 Z-score for commercial and cooperative banks

Source: Own calculations (in 5-year rolling windows) based on dataset obtained from KNF (2011).

(Figure 7.2). Changes in the Z-score index for the cooperative banking sector were less dramatic and values were higher than for commercial banks, demonstrating their stable position throughout the crisis.

7.5 The challenges to cooperative banks

Cooperative banks in Europe form a mix of different business models, associating (network) models and governance structure. Despite their varying organizational and ownership structures, they are well integrated and complementary to the European commercial banking sector. Cooperative bank governance models range from a centralized model, where member banks have delegated significant supervisory and decision taking power, to a central entity (like the Rabobank model) and, at the other extreme, a network model, where a central entity provides support and has an advisory role; but the power to make decisions rests with member banks (McCarroll and Habberfield, 2012). In some countries, networks have evolved into large complex conglomerates, with strong reliance on the central institution. In networks with less formal organizational structures, such as in Poland, there is a potential area of conflict between bottom-up ownership and top-down authority, and the cooperative banks oppose stronger centralization being afraid that it may damage the identity and mission of local banks. In general, Italian and Spanish models are considered less centralized than Austrian, German, Dutch, Finnish and French models (Ayadi et al., 2010:20).

In the decentralized cooperative network model, intra-group protection schemes are advocated by the EU as a key factor in ensuring the overall resilience of cooperative groups. Protection schemes are administered by a central body, which acts as overseer. The Capital Requirements Directive (2006/48/EC) accepts cooperative networks as 'Institutional Protection Scheme' (IPS) if they make use of a mutual support system. In this case, the central network institution may intermediate liquidity within the network in agreement with the CRD IV Directive liquidity requirements, assigning a zero weight for intra-network exposures. The IPS is advocated as a key factor in ensuring the overall resilience of cooperative groups, although they bring a significant degree of centralization. The evolution of the decentralized cooperative network structures is thus an important challenge for cooperative banks.

Another challenge is not to lose one's identity in terms of operational independence and regional focus. In many countries, savings and cooperative banks have essentially disappeared, having been converted into a large cooperative banking group, sold to private banks or demutualized (Bülbül, Schmidt and Schüwer, 2013). The European Association of Cooperative Banks has pinpointed the following cooperative values as the key ones (McCarroll and Habberfield, 2012):

- trust,
- governance,
- resilience (adapting to changing circumstances),
- proximity to customers,
- social commitment (supporting local customers),
- solidarity: i.e. reinvesting capital at local level.

The financial crisis of 2007–2009 stressed how important these values were in a time of growing mistrust and restricted access to finance. Throughout the crisis, local banks in many European countries demonstrated a superior performance to big banks (Ayadi, Schmidt and Carbó-Valverde, 2009; Ayadi et al., 2010), highlighting the fact that diversity in a financial system should be regarded as an important policy goal, especially since we do not know which type of banks work best for the economy and for society.

The report published by Oliver Wyman, based on a global survey of cooperative banks (McCarroll and Habberfield, 2012) identified key success factors for cooperative banks, such as efficiency, customer satisfaction and the proper handling of regulations. A similar cooperative bank survey was conducted by the author in the early months of 2013, with the aim of analysing how Polish cooperative banks understand the challenges

ahead. Key questions and answers are analysed below, and more questions are included in the appendix. Answers are analysed for the whole cooperative sector and for subsections of small and large cooperative banks.

7.6 The results of a cooperative bank survey

Both for Polish cooperative banks and globally, the implementation of post-crisis regulations will impose considerable new costs related to the quality of capital, higher capital requirements, the introduction of the leverage ratio and new liquidity standards (McKinsey, 2012). According to cooperative bank forecasts, with a stricter definition of Tier 1 capital, many smaller banks may have a short-term problem with finding adequate capital. In Poland, the biggest problem will be with the implementation of CRD IV liquidity requirements, particularly for central network banks (Figure 7.3).

In the Polish cooperative network model, the subordinated cooperative banks have excess liquidity from local deposits, which they place in the central network banks (BPS and SGB- Bank) and which collect deposits from the market only marginally. For the local cooperative banks, 30 per cent of their net interest income comes from interbank activities. However, these transactions are treated as interbank ones and do not count as required liquidity for the central banks. If central network banks start to take deposits directly from the market, this will be in direct competition with the subordinated banks, thereby risking problems with their owners. In the Polish model, associated banks coordinate and control the subordinated banks, but at the same time are owned by them, which sometimes leads to stalemate.

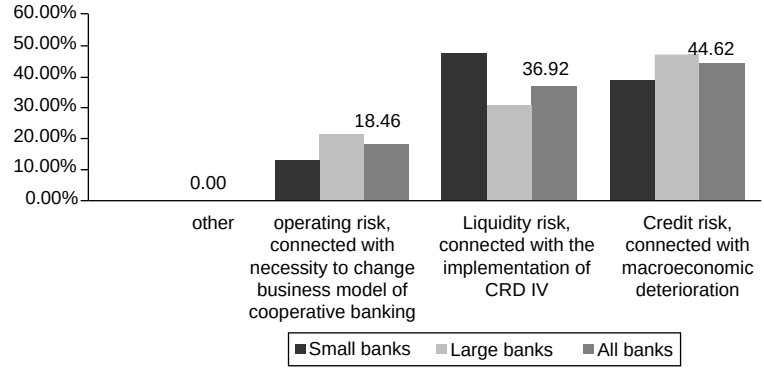

Figure 7.3 Major risks for cooperative banks

Source: Own research: Cooperative Bank Survey (CBS, 2013).

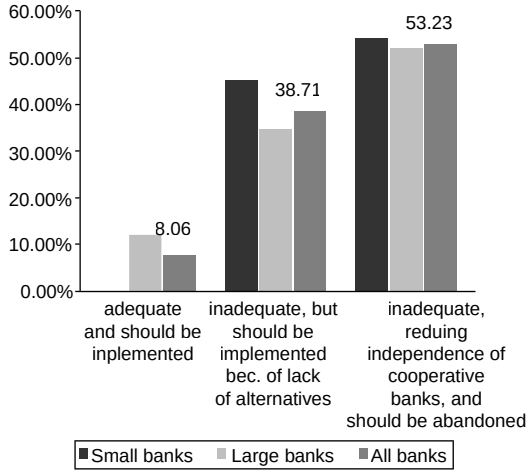

Figure 7.4 The assessment of the IPS proposal
Source: Own research (CBS, 2013).

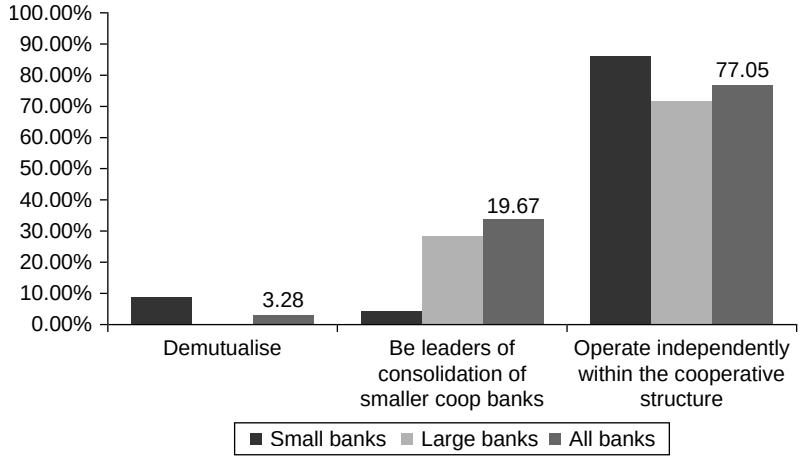

Figure 7.5 The future of the largest cooperative banks
Source: Own research (CBS, 2013).

The Polish regulatory body (KNF) has suggested a compromise by implementing an Institutional Protection Scheme (IPS), which is also advocated by the EU. This organizational innovation is intended to ensure the solvency and liquidity of a group of affiliated institutions (BIS, 2010). The first pillar entails all participants relinquishing to the central body of the IPS the capacity to determine and implement

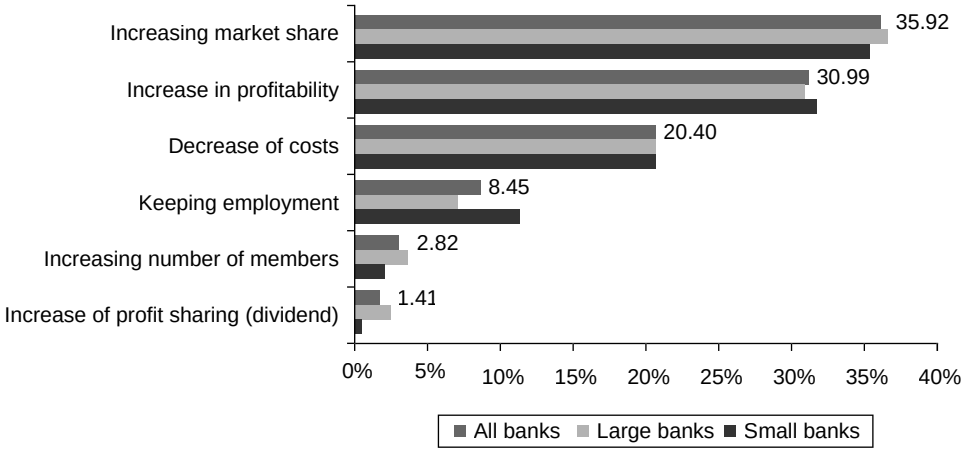

Figure 7.6 The priorities of cooperative banks

Source: Own research (CBS, 2013).

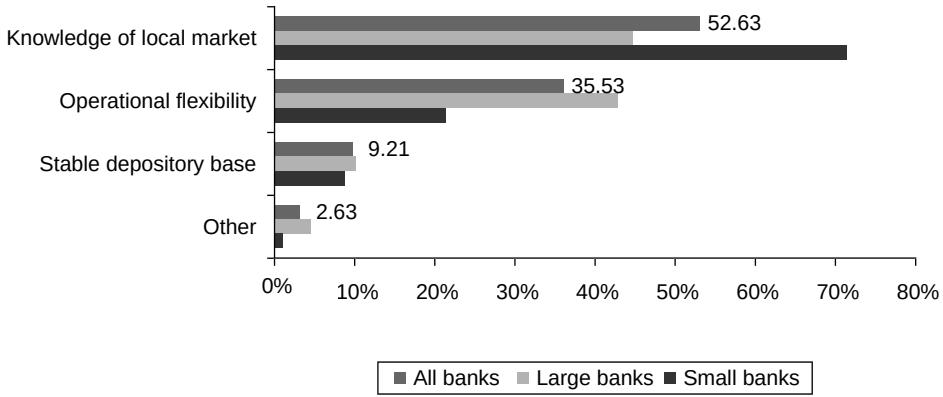

Figure 7.7 The main advantages of the cooperative model

Source: Own research (CBS, 2013).

business strategies and internal risk control. The second pillar comprises mutual liquidity and solvency pacts between the participating cooperative banks, and the third pillar is a commitment to the stability of the agreements. Thus the IPS results in the cooperation within a group of affiliating banks becoming much tighter than it was in the past. However, there is a considerable resistance, from most Polish cooperative banks, to giving up their independence and the scheme is immensely unpopular (Figure 7.4).

So far, it has not been the intention of the regulatory authorities to interfere directly with the cooperative banking structure, as was done in 1994 and 2000. However, certain actions could be advisable when considering the regulatory challenges ahead. Regulatory intervention could be aimed either at strengthening the position of central bank for cooperative networks, or at encouraging the strongest cooperative banks to demutualize. However, the latter option is also revealed as being hugely unpopular in the bank survey (Figure 7.5). Another solution is to split the sector, making IPS obligatory for small cooperative banks only. This solution would result in the considerable weakening of cooperative networks, but may be the most acceptable.

In the strategic part of the survey, cooperative banks signalled that there were many regulatory threats ahead, the main one connected to the implementation of the CRD IV Directive, as analysed in Figure 7.3. As to strategic priorities, cooperative banks seem to be ready to benefit from the favourable post-crisis environment, indicating a need to expand and increase operational efficiency (Figure 7.6).

On the other hand, cooperative banks do not sense any necessity for a long-term fundamental change in their competitive position as, according to the survey, the cooperative banking share will increase only marginally (from the current 6% to 10%) and the main advantages of the cooperative model are local knowledge and flexibility (Figure 7.7).

The core mission of cooperative banks is to support the stakeholders – their customers as well as members of the local community – as opposed to the profit-maximizing objectives of commercial banks. The Polish cooperative banks support this notion, as evidenced by the answers from the cooperative bank survey.

7.7 Conclusions

Economic theory provides contrasting evidence as to the impact of bank regulation and supervision on bank performance (e.g., Barth, Capiro and

Levine, 2004; 2008). In the post-crisis period, most research in this area has concentrated on regulatory impact on large global banks. However, post-crisis overregulation has created an immense burden: particularly for smaller, regionally based banks. The analysis of Polish cooperative banks and the data presented in the empirical part of the chapter provide a case in point.

In the 1990s, the Polish banking sector underwent a comprehensive and painful restructuring, which resulted in an efficient regulatory and institutional framework. However, the post-crisis regulatory architecture has created a new environment, forcing commercial banks to be more oriented towards owner markets than the Polish markets (particularly in the future Banking Union scheme). The Banking Union is handing over strong supervisory powers to the ECB and is creating a mechanism of shared bank-rescue burden for eurozone members. Instead of deleveraging big banks, it will be creating another rescue vehicle for them, which may encourage more moral hazard behaviour. For Poland, with its small and domesticallybased banking sector, the new architecture will increase costs rather than bring benefits.

Cooperative banks, with their traditional business model, have emerged from the financial crisis with the highest stability and satisfactory profitability. However, these were only short-term advantages. Today they face compliance with many new regulations. In Poland, they also face the need to restructure their network model and to devise new strategies in order to avoid marginalization in the coming years. As far as restructuring is concerned, there is strong resistance among cooperative banks to the applying of the recommended IPS system, which works well in some European countries but entails a diminution of independence and provides for mutual solvency guarantees. When it comes to strategies, cooperative banks are already beginning to change their business model, gradually replacing local consumer financing with SME loans in the post-crisis period, but this strategy is more risky and its effects need to be carefully studied, perhaps through further research.

To conclude, Polish cooperative banks have survived the crisis years well, but their stable business model has created only a short-term advantage. Currently, they face a number of regulatory and strategic challenges, as indicated in the bank survey, and the path they choose could lead to expansion or to further marginalization.

Appendix

The structure of answers of the cooperative bank (CB) survey: selected questions (2013, in %)

	All CBs (62)	Small CBs: assets <100 million PLN	Large CBs: assets >100 million PLN
1. The current model of cooperative banking:			
stable in the short run	37.10	40.91	35.00
stable in the long run	48.39	45.45	50.00
needs urgent modification	14.52	13.64	15.00
2. Large cooperative banks (capital above 5 million Euro) should ultimately:			
operate independently within the cooperative structure	77.05	86.36	71.79
Demutualize	3.28	9.09	0.00
be leaders of consolidation of smaller coop banks	19.67	4.55	28.21
3. The powers of associating banks:			
should be stronger	40.32	50.00	35.00
should remain as they are today	30.65	27.27	32.50
should be modified	29.03	22.73	32.50
4. In the ST, the major risks for CBs is:			
credit risk, connected with macroeconomic problems	44.62	39.13	47.62
operating risk (necessity to change business model)	18.46	13.04	21.43
liquidity risk (implementation of CRD IV)	36.92	47.83	30.95
5. The regulatory proposal to deal with liquidity requirements (IPS) is:			
adequate and should be implemented	8.06	0.00	12.50
inadequate and should be abandoned	53.23	54.55	52.50
inadequate, but has to be implemented (lack of alternatives)	38.71	45.45	35.00
6. Main advantage of cooperative model is:			
stable depository base	9.21	8.33	9.62
knowledge of local market	52.63	70.83	44.23
operational flexibility	35.53	20.83	42.31
Other	2.63	0.00	3.85

Continued

Continued

	All CBs (62)	Small CBs: assets <100 million PLN	Large CBs: assets >100 million PLN
7. ST CB priority is:			
keeping employment	9.23	13.64	6.98
increase of profit sharing (dividend)	0.00	0.00	0.00
increase of profitability	67.69	63.64	69.77
decrease of costs	23.08	22.73	23.26
8. LT CB priorities are (indicate 3):			
keeping employment	8.45	11.11	6.82
increase of profit sharing (dividend)	1.41	0.00	2.27
increase of profitability	30.99	31.48	30.68
decrease of costs	20.42	20.37	20.45
increasing market share	35.92	35.19	36.36
increasing number of members	2.82	1.85	3.41
9. Ownership of the surveyed banks:			
local SMEs	3.2	4.5%	2.5
individuals	85.5	77.3%	90.0
bank employees	0.00	0.00	0.00
others	11.3	18.2%	7.5

Source: Own research.

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8

The Sovereign Debt Crisis: The Impact on the Intermediation Model of Italian Banks

Stefano Cosma and Elisabetta Gualandri

8.1 Introduction

This chapter sets out to analyse the impact of the financial crisis, in particular since the start of the sovereign debt phase, on Italian banks and their intermediation model. The Italian banking and financial system showed more resilience than other national systems in the first wave of the global financial crisis, the so-called subprime phase (2007–2008), but the impact was much more severe in the second, sovereign debt and redenomination risk phase (2010–2012), and the system continues to show major signs of difficulty in the current phase of deep economic recession.

The first part of the chapter describes the two main phases of the financial crisis and their general impact on the Italian banking system, with its very low level of available recourse for public facilities compared to other systems in the European Union (EU). The focus is on the deterioration of the situation during the sovereign debt crisis, and thereafter in the present severe recession, which has involved large-scale use of the facilities of long-term refinancing operations (LTROs) facilities, one of the set of non-standard measures introduced by the European Central Bank (ECB) as lender of last resort for euro-area banks.

In the second part we provide an in-depth analysis of the specific financial situation of Italian banks and the different ways in which they have been affected by the crisis, concentrating on the sovereign debt phase and the present period of deep recession. The analysis covers crucial aspects related to the effects on the financial and capital structure of the Italian banking system (illustrated by comparisons with the other euro-area countries), and lending and funding operations, and the impacts on their financial equilibrium and profitability.

8.2 Italian banks and the crisis

The various phases of the crisis have had different levels of impact on Italian banks, with a gradual deterioration of the situation over time. In fact, the Italian banking and financial system showed more resilience than other national systems in the first wave of the global financial crisis, the so-called subprime phase (2007–2008) (FSB, 2011), but the impact was much more severe in the second, sovereign debt and redenomination risk phase (2010–2012) (Cosma and Gualandri, 2012). To add to their difficulties Italian banks are now facing the severe consequences of the recession, which hit the Italian economy hard from 2012 onwards, with increasing amounts of non-performing loans (NPLs)[1] in their balance sheets and negative outlooks arising from the economic situation.

The greater general resilience of the Italian banking system is reflected by the relatively low amount of public facilities granted in the period 2007–June 2012, with the use of public funds mainly concentrated in the first phase of the crisis.

Figure 8.1 shows that Italian banks' use of public facilities was just 5 per cent of the total granted within European countries. Moreover, the proportion is 1 per cent, if only public facilities in the form of capital injections are considered (Figure 8.2). The difference between the two figures mainly derives from the state guarantees on bank bonds eligible for long-term refinancing operations (LTROs) with the European Central Bank (ECB) (December 2011, February 2012). The same figures were 45 per cent and 30 per cent for the UK (the highest values in Europe); 16 per cent and 12 per cent for Germany; 5 per cent and 7 per cent for France. The figures for Greece are relatively low when compared with the total amount of public facilities granted in Europe as a whole.

8.2.1 The subprime phase (2007–2009)

Until the Lehman Brothers crash in September 2008, Italian banks suffered less from the first phase of the crisis as they held lower-risk portfolios – and above all fewer toxic securities – and were focused strongly on the traditional banking business. The stock market value of Italy's biggest banking groups fell considerably, but less so than value of the principal foreign banks. Overall profits were lower but the banks were not losing money; and the fall-off in earnings, due to write-downs of securities, trading losses and reductions in commissions was relatively small compared to the serious losses suffered by the banks

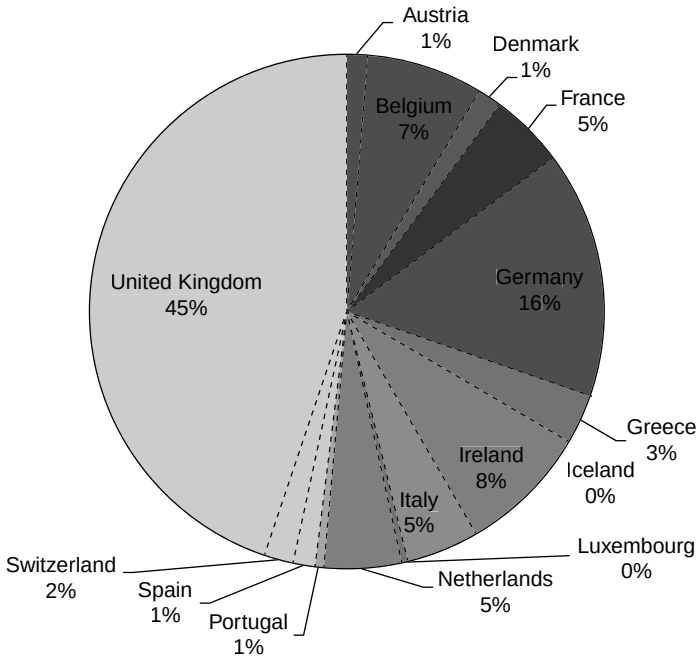

Figure 8.1 EU – total public facilities for banks, 2007–2012 (June)
Source: Processing of Mediobanca R&S, 2012.

in other EU member states. Last but not least, in general capital had remained comfortably above the regulatory minimum levels (Cosma and Gualandri, 2012).

There are two main reasons for this relatively low impact. The first is the prevailing business model of Italian banks: they are mainly traditional, relationship-oriented institutions, that rely heavily on lending activities and have a stable retail funding base. In the first decade of this century, Italian banks had not embraced financial innovation at the same speed or in the same depth as those of other systems. The second reason is the national regulatory and supervisory framework, centred on the Bank of Italy: the authorities' approach has traditionally been not 'light touch' but, rather, prudent and thorough, aiming to prevent aggressive mortgage lending practices and discourage banks from participating in complex securitization activities. When implementing the principle of national discretion allowed under European Union regulations, the methods for the calculation of Italian groups' capital ratios set by the Bank of Italy – within the Capital Adequacy Accord (Basel I at

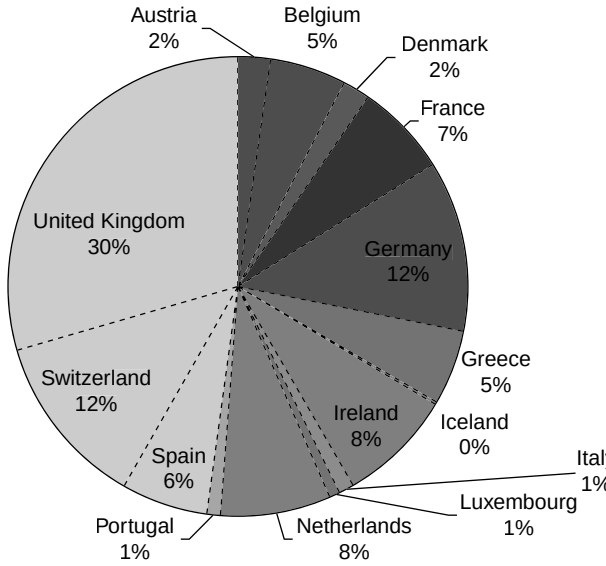

Figure 8.2 EU – public facilities for banks (capital), 2007–2012 (June)
Source: Processing of Mediobanca R&S, 2012.

that time) – adopted more prudential criteria on deduction and lower-quality components than those of other states.

After the Lehman Brothers crash, Italian banks were hard hit by the general loss of faith in banking systems and the consequent lack of liquidity, due to greater difficulties in acquiring both retail and, above all, wholesale funding, which arose from the freezing of the interbank deposit market. In spite of this, all the main banks continued to return a profit over this period, and only four of them (and not the largest) made use of the capital injection facilities provided in 2009 by the government, the so-called Tremonti Bonds (Table 8.1). The largest banks' liquidity ratios and capital adequacy improved during 2009 thanks to both capital increases and the sale of non-strategic assets, which were encouraged by the Bank of Italy.

8.2.2 The sovereign debt and redenomination risk phase (2010–2012)

The onset of the sovereign debt crisis harshly spotlighted flaws in the Italian banking system, which were already known to be present and were mainly linked to the prevailing traditional business model, based

Table 8.1 Tremonti bonds – public facilities

Banks	Date	Amount € billion	Situation (December 2013)
Banco Popolare	19/6/2009	1.45	Reimbursed 14 March 2011
Banca Popolare di Milano	21/9/2009	0.500	Reimbursed 30 June 2013
Monte dei Paschi	14/12/2009	1.9	Reimbursement originally scheduled in four years. Replaced by Monti Bonds in December 2013 after scrutiny by the EC (State Aid Procedures)
Credito Valtellinese	30/12/2009	0.200	Reimbursed 30 June 2013

Source: Bank of Italy, Il sole 24 ore, various editions.

on maturity transformation and the dominance of variable interest loans. The very characteristic which had been central to the Italian banking system's greater resilience in the first phase of the crisis now became a disadvantage (Cosma and Gualandri, 2012). Several factors contributed to the deterioration of profitability: first and foremost, the increase in non-performing loans, due to companies' worsening financial situations. Moreover, Italian banks' low level of proprietary trading on the securities market was not sufficient to support earnings as in the case of other European and United States (US) banks, which used the large amounts of liquidity injected by central banks through their non-standard monetary policy operations for investments of this kind. Last but not least, Italian banks were unable to benefit from the large public facilities available to other European banks. As Table 8.2 shows, the total government capital injections received by the four Italian banks amounted to less than 0.30 per cent of gross domestic product (GDP): sharply lower than levels in other EU countries. If the guarantees applied for, in particular to access the December 2011 and February 2012 LTROs, are included, the figure rises to 7.9 per cent of GDP with a total of 258 institutions involved: the size of this amount is due to the fact that many small banks applied for assistance under the second LTRO. In the period considered, the total amount of public facilities used rose to 2,696 billion euro for 437 banks in Europe and 2,853 billion dollars in the US, for 446 banks. Within Europe the largest total amount of public facilities was granted to UK banks (1,206.5 billion euro) and the second largest to German banks (419.6 billion Euro). In the case of Belgium (196.7 billion euro) and the Netherlands (132.5 billion euro), the level of public

Table 8.2 Public facilities (2007–2012 June). Billion € not including USA

	Capital	% Eu total	Guarantees	Others	Total	% EU total	Capital/ GDP%	Total/ GDP%	Total institutions involved
USA(*)	562.7		1869	421.6	2853		3.9	19.6	446
Austria	8.85	2.3	24.4	–	33.3	1.2	3.1	11.6	8
Belgium	20.9	5.4	170.2	5.5	196.7	7.3	5.9	55.5	6
Denmark	7.6	2.0	26.8	6.6	41.1	1.5	3.2	17.5	59
France	25.3	6.5	102.4	0.5	128.2	4.8	1.3	6.6	8
Germany	46.9	12.1	365.4	7.3	419.6	15.6	1.9	16.8	13
Greece	20.3	5.2	45.5	17	82.8	3.1	9.3	37.9	10
Iceland	0.8	0.2	–	–	0.8	0.0	7.5	7.5	3
Ireland	31.5	8.1	190.2	–	221.7	8.2	18.7	131.7	6
Italy	4.1	1.1	119	–	123.1	4.6	0.3	7.9	258
Luxembourg	2.8	0.7	7.2	0.2	10.1	0.4	7.1	25.5	4
Netherlands	30.1	7.7	94.1	8.3	132.5	4.9	5.1	22.5	14
Portugal	4	1.0	10.2	0.4	14.6	0.5	2.4	8.6	9
Spain	23.5	6.0	0.4	13	36.9	1.4	2.2	3.5	27
Switzerland	47.9	12.3	–	–	47.9	1.8	11.8	11.8	1
United Kingdom	114.5	29.4	1007.8	84.1	1206.5	44.8	6.4	67.0	18
Total Europe	389.2	100.0	2163.9	142.8	2696	100.0	n.a.	n.a.	437

Source: Processing of data from: Mediobanca R&S 2012; Eurostat, Bureau of Economic Analysis; US Commerce Department, various editions.
GDP data are calculated as the average for 2007–2011.
(*) billion $

facilities in relation to the GDP was quite high (55.5 per cent and 22.5 per cent), due to the difficulties of two cross-border groups based in these countries: Fortis and Dexia. The highest level of public facilities in relation to GDP was reached in Ireland: 131.7 per cent, involving six banks.

Until the end of 2010, Italian banks suffered no serious repercussions from the sovereign debt crisis, since their exposure to the debt of the peripheral states (Greece, Ireland, Portugal and Spain) was very low: about 1 per cent of the assets of the banking system as a whole. Towards the end of 2010, Italy's sovereign risk started to rise, with detrimental effects on the wholesale funding markets (Gualandri, 2012).

In the meantime, the need for further recapitalization became more pressing as a result of market conditions and the supervisory authorities' demands in the run-up to the introduction of Basel III, which was approved in December 2010, although banks are granted a relatively long transition period (until the end of 2018). Italian banks were trapped between a rock and a hard place, needing to raise funds from the market again but faced with an outlook of unsatisfactory profits (given the poor prospects for the Italian economy), which appeared to limit their ability to raise equity quickly.

The picture was transformed starting in mid 2011, due to several international and domestic factors. Internationally, there were dramatic consequences from: the worsening of the sovereign debt crisis in the peripheral EU states, especially Spain and Italy; the failure to find a solution to the Greek crisis; the delay in drawing up new rules on governance for the European Union; and the ineffectiveness of the instruments available to Europe for overcoming the sovereign debt crisis. At a domestic level, the increase in sovereign risk had further negative effects for Italian banks due to their large holdings of national government bonds. In addition, general economic forecasts began to worsen with a further decline in expected earnings, while the country's political situation was clearly no longer able to manage the emergencies facing the economy. The markets' perception of Italy's risk level soared in response to its high public debt and rising refinancing risk.

As a consequence, Italian banks were hit by the increase in sovereign risk on various fronts: funding, with a rise in retail funding costs, made more crucial by the continuing strains on the interbank market; a fall in the value of the guarantees – mainly government bonds – available for refinancing with the ECB; and the conditions of access to the capital markets for the recapitalization operations required for some of the largest banks by the European Banking Authority (EBA), following stress tests in the second half of 2011. The total amount required by the EMU

banks was 114.7 billion euro, of which 39.4 billion was for a specific buffer required for sovereign risk. The highest figure was for Spanish banks (26.2 billion euro). The second highest figure was for Italian banks: 15.3 billion euro, of which 9.6 billion was for sovereign risk, due to the banks' large holdings of public bonds. The third highest figure was for German banks: 13.1 billion euro. In the case of Italian banks, the situation varied widely among the five banks assessed (Table 8.3): for Intesa SanPaolo, Italy's largest banking group, no capital deficit was reported, while for Unicredit the figure produced was 7.974 billion euro (virtually half of the total required by the five Italian banks), one third of which was due to sovereign risk.

By June 2012 the shortfalls had mainly been resolved, by means of both recapitalization and asset disposal operations. The only case still pending at the time of writing is that of Banca Monte dei Paschi di Siena (MPS), which has recorded huge losses since 2011 due, to a large extent, to derivatives traded to cover the costs arising from the acquisition of Banca Antonveneta in 2007. Moreover, at the end of 2012 MPS was hit by a scandal concerning the management of these derivatives. MPS applied for access to public facilities and a new capital instrument, to be underwritten by the Treasury, was created to replace the Tremonti Bonds, which the bank was no longer capable of reimbursing; this would provide additional capital to meet EBA requirements. The new instrument, called the Monti Bonds after the Prime Minister who first proposed it, requires EC approval for state aid. In 2013 the new management also submitted a restructuring plan for the same purpose. The total amount required is 4.071 billion euro, also to be underwritten by the Treasury: 1.9 billion to replace the old Tremonti Bonds, 171 million to pay interest

Table 8.3 Italian banks' shortfalls – December 2011

Name	Total amount (bl. €)	Shortfall to 9 % before application of sovereign capital buffer (bl. €)
Intesa Sanpaolo S.P.A	0	0
Unicredit S.P.A	7.974	5.741
Banca Monte Dei PaschiDi Siena S.P.A	3.267	0
Banco Popolare – S.C.	2.731	2.357
Unione Di Banche Italiane Scpa (Ubi Banca)	1.393	0.526

Source: EBA, Recommendation and final results of bank recapitalization plan as part of coordinated measures to restore confidence in the banking sector, London 8 December 2011.

on Tremonti Bonds, and 2 billion to meet EBA requirements, due to the shortfall reported by the 2011 stress test.

8.2.3 The deep recession phase, 2012–201X

Since 2012 Italian banks have been facing the consequences for the national economy of the financial crisis: the double-dip recession and sovereign debt tensions.

As Ignazio Visco (2013b), Governor of the Bank of Italy states:

> In 2012 Italy's gross domestic product was 7 per cent smaller than in 2007, households' disposable income was more than 9 per cent lower, and industrial production was down by a quarter. Hours worked were down 5.5 per cent, and more than half a million jobs had been lost. The unemployment rate, at 11.5 per cent this March, has practically doubled since 2007; it is nearly 40 per cent among young people and higher still among those in the South.

Since 2011 the Italian economy has suffered from an acute restriction on the supply of credit, only partially attenuated by the unlimited liquidity supplied by the ECB at the beginning of 2012. In the first four months of 2013, the shrinkage in lending to firms was nearly 4 per cent on an annual basis. Difficulties were even greater for SMEs, which are typically more dependent on bank lending.

One of the main problem for banks is now the severe deterioration in credit quality and the increase in NPLs generated by the lasting recession. As we will see below, the growing level of risk in lending to companies and the consequent increase in banks' provisions – in a situation of low profitability and varying degrees of problems relating to funding gaps, capital adequacy and the gradual introduction of liquidity ratios – are some of the main causes of the credit crunch the Italian economy has been experiencing since the end of 2011, in terms of both a reduction in the amount of credit available and a worsening of lending conditions (Gualandri and Venturelli, 2013). NPLs are receiving specific scrutiny from the Bank of Italy, especially during its on-site supervisions for the 20 largest banks (15 of them will be included in the ECB's direct supervision programme during 2014).

The rise in NPLs is a general problem in the European countries hardest hit by the crisis. The EBA (2013) survey on risk assessment (data referring to June 2012) identifies a trend of growing geographical variation in asset quality across Europe, indicating an increasing divergence in loan portfolio quality (June 2012): in six countries the ratio of impaired loans

to total loans is over 16 per cent, while in four other countries the same ratio is less than 2 per cent. Impairments are on the increase in banks in financially-distressed countries, while they remain stable in other countries. However, international comparisons with regard to NPLs are difficult and provide distorted results, due to a lack of uniformity in the definition of the variables in play from various points of view: supervisory regulations, accounting practices and supervisory operations in the field, the last of which, moreover, are not in the public domain (Bank of Italy 2013, Financial Stability Report, no. 5, April; EBA 2013).

In other respects the situation of Italian banks is improving, thanks to the reduction of stress in the financial markets in general and the liquidity market in particular. Banks are continuing policies to curb costs and improve risk management, partly in response to specific Bank of Italy requirements.

Although capital strengthening will have to continue, in mid 2013 most of the largest intermediaries met the new prudential requirements: the shortfall in high-quality capital needed to satisfy the capital adequacy requirements envisaged by Basel III (to be phased in by 2019) fell from €35 billion at the end of 2010 to below €9 billion in December 2012.

8.3 The role of the ECB and non-standard monetary policy measures

During the crisis, central banks have had a key role in providing banks with liquidity and refinancing, with the aim of reducing systemic risk. During the sovereign debt phase in particular, new non-standard measures were introduced by the ECB (Table 8.4) and other central banks, along with very low interest rates and unlimited liquidity. The use of unconventional monetary policy instruments by the BCE and the injection of large amounts of liquidity onto the market have helped to restore the proper transmission of monetary policy in the financial market (Draghi, 2012).

The ECB's three-year LTROs were particularly important for Italian banks, enabling them to survive the exodus of foreign investors which began in summer 2011, caused by the sovereign debt crisis and the consequent crisis of confidence. Italian banks tapped the ECB's two long-term refinancing operations (LTROs) for quite large amounts: 255 billion euro, 25 per cent of the total granted (Figure 8.3).

Italian banks (mainly the largest ones) and Spanish banks constituted the lion's share of the first LTRO (21 December 2011) accounting for 24 per cent each of the total amount of 490 billion euro (net

Table 8.4 ECB – non-standard monetary policy measures

Securities Market Program SMP (May 2010–August 2012)	Purchase of public and private securities by the ECB to ensure markets' liquidity and stabilize security prices. These measures were sterilized by operations which reabsorbed the liquidity issued. Especially from August to November 2011, SMP operations mainly involved the purchase of Italian and Spanish government bonds, to reduce the stresses generated by the sovereign debt crisis.
Long-term financing operations	These involve the temporary creation of a monetary base. Programmes were introduced with expiry at six months in 2008, one year in spring 2009, and three years in December and February 2012: they are known as the long-term financing operations (LTROs).
Outright Monetary Transactions OMTs (so-called 'Big Bazooka')	Operations involving the definitive purchase of securities, announced by Mario Draghi in July 2012, and so far never used. The size and duration of any such operations have not been set a priori. Operations are subject to strict conditionality for the countries concerned and are related to the activation of a financial aid programme by the EFSF or ESM. The sterilization of the effects of operations on liquidity (as in the case of the SMP, which was terminated on announcement of the OMTs) is envisaged.

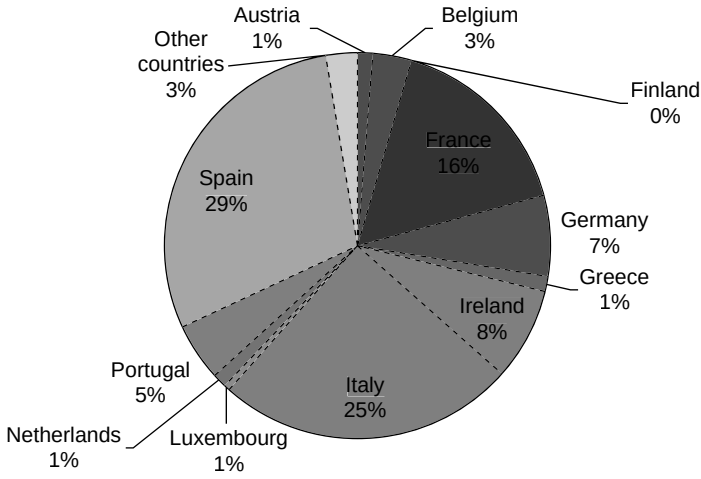

Figure 8.3 LTROs (21 December 2011 and 29 February 2012) countries' shares of the total amount of €1,020 billion

Source: Processing of ECB data.

210) allocated to 523 euro-area banks. In the second LTRO (29 February 2012), which granted a total amount of 530 billion euro (net 290) to 800 banks, Italian intermediaries (mainly medium-sized and small banks) took a share of 26 per cent, exceeded only by Spanish banks with 34 per cent.

As of June 2013, 200 billion of the first LTRO and 101.5 of the second had been reimbursed in advance. As of that date, Italian and Spanish banks had not made any advance reimbursements. The largest Italian banks started to make some advance repayments after that date.

8.4 The banks' situation up until the sovereign debt crisis

The various phases of the crisis had very different effects on the financial situations of Italian banks. At the time of the subprime mortgage crisis, the Italian banking system had been enjoying a period of growth, with high margins and ongoing capital consolidation, and development strategies mainly focusing on commercial banking activities. With some differences between large and small institutions, Italian banks' level of financialization of their assets is generally low, and their credit intermediation operations are based mainly on a deposit funded model (Mottura and Paci, 2009) in which, on the assets side, loans predominate over other areas of business, while on the liabilities side retail funding (sight deposits, term deposits and bonds) plays a larger role than wholesale funding and liquidity generated by the securitization of assets.

Together with a low funding gap (the proportion of loans not financed by retail funding), in general the financial equilibrium and operating model for banks mitigated the consequences of the 2007 financial crisis, leading to fewer liquidity, financial instability and credit rationing problems, especially among the smallest banks. ALM strategies and the mainly 'retail' composition of banks' assets and funding helped to maintain their economic value – even in face of the sharp drop in value of financial assets on the market, as a result of the crisis – and, equally important, helped to increase Italian banks' soundness, since Basel II requires higher weighting of loan portfolio risk. Italian banks therefore faced the first phase of the crisis with a satisfactory level of capitalization and a low degree of leverage (Draghi, 2011).

The banking system's greater stability was also derived from the importance of funding by retail depositors (above the European average) and its general soundness.

An analysis of the effects of the sovereign debt crisis for Italian banks must consider two levels: the first, 'real' level, relating to its impact in terms of the aggravation of the recession, and the second, 'financial', regarding the effects of the sovereign debt crisis on monetary and financial parameters, and thus on banks' profit and loss accounts and balance sheets.

8.4.1 Real effect

The sovereign debt crisis occurred during a period of recession, which had not only reduced disposable income and domestic demand and consumption, but had also decreased companies' sales and squeezed their traditional markets, leading to a need for increased financing and a deterioration of their financial situation. Moreover, both sectors were affected by tough fiscal and budget measures by the state, intended to deal with the effects of the crisis and meet the requirements of the EMU. These triggered a further drop in disposable income and domestic demand, as well as worsening payment times for sums due to companies from government bodies at all levels. All this led to a gradual, remorseless weakening of the retail clientele from households and small-medium enterprises (i.e., the main counterparties of Italian banks of all sizes). From the banking point of view, all this has generated a deterioration in the quality of the loans portfolio and an increase in NPLs, while on the liabilities side it has been reflected in a reduction in households' ability to save, leading to difficulty in obtaining retail funding.

The sustainability of the 'traditional' banking model – based on funding from retail deposits and a higher incidence of lending to households and businesses, with less dependence on wholesale borrowing and a low funding gap – has become more complex and more difficult to manage.

8.4.2 Financial effect

During the last six months of 2011, the increased risk level of some European states, including Italy, as perceived by the markets and institutional investors, led to a sharp surge in yield differentials between Italian and German government bonds. The rise in the yield of Italian government bonds put pressure on Italian banks' financial situation with regard to both lending and funding policies.

The spread triggered between the yields on Italian and German state securities led to both a swift rise in the cost opportunity of bank deposits and bonds for the banking clientele and greater difficulty in obtaining

funding, especially from foreign investors. It is possible to identify three channels through which sovereign tensions may be transmitted to bank funding and lending conditions (Panetta et al., 2011):

- losses of value due to the write-down of the government bonds among banks' assets, which reduce their profitability and, in some cases their capital, and may lead to deleveraging with a consequent reduction in the amount of credit they are able to offer (balance sheet channel);
- the reduction of the usefulness of government bonds as guarantees for interbank transactions, or for refinancing operations with the ECB (liquidity channel);
- the effects triggered on the costs of funding and lending, which reduce banks' ability to repay their creditors, or the demand for credit (price channel).

These phenomena, fears regarding Italian banks' risk level and the growing uncertainty have even filtered through to the retail clientele and depositors, who are generally more immune to market volatility. Taken as a whole, these problems have affected banks' volumes, liquidity and funding costs, forcing them to converge on shorter-term funding instruments to mitigate the interest rate risk and the impact on their profitability (and to tempt investors).

Obviously, the financial effects of the crisis have not only affected the liabilities side but have also directly involved lending policies and volumes. Most Italian banks have modified their lending policies and revised their criteria for the selection of new loans and the review of existing loans, the volumes of credit granted and, in particular, the pricing policies adopted. All this, together with the banks' lack of liquidity, the refinancing risk and the increase in interest rates resulting from the increased cost of funding, has led to a reduction in the amount of credit available to the economy. In contrast with events in 2009, the more recent credit squeeze has involved not only the largest banks but the whole of the industry, including the smallest institutions, which in this phase have not acted as a financial buffer for Italian businesses, resulting in serious consequences for the financial stability of firms, especially the smallest companies.

8.5 Current trends and future prospects for the Italian banking system

The sovereign debt crisis and the increase in the spread between Italian and German bond yields have hit Italian banks especially with regard

to funding, leading to a rise in the relative cost and a reduction in the resources available. Naturally, the most immediate effects were felt on the wholesale markets, which responded at once to the write-down in value of bank portfolios containing government bonds, the reduction in the value of government bonds used as collateral in the context of the transactions guaranteed and, indirectly, the effects on the rating of the banks resident in the countries affected by the crisis. The negative effects then gradually extended to retail funding too, as a result of the deterioration of the general situation, the uncertainty and the crowding-out of bank securities by the returns available on government bonds.

The situation of the Italian banking system is currently extremely complex, since it is suffering the effects of two financial crises (the subprime and the sovereign debt crises) and a double-dip recession triggered after the subprime mortgage crisis, together with the uncertainty of the political scenario and the demands of the international regulatory framework, which set tight capital adequacy requirements.

Our analysis of the impact of the sovereign debt crisis on Italian banks' intermediation model sets out to examine:

- the effects on the financial and capital structure of the Italian banking system, illustrated by comparisons with the other euro-area countries, and lending and funding operations;
- the effects on financial and capital soundness and profitability.

The analysis uses the harmonized statistics compiled by the Bank of Italy as a member of the ESCB, available in the 'Eurosystem statistics: euro-area aggregates and national contributions' section of the Banca d'Italia website. The data refer to the aggregate balance sheets of monetary and financial institutions (MFIs), excluding the Eurosystem.

8.5.1 Effects on financial and capital structures

On the liabilities side, the occurrence of the two crises in rapid succession confirms a distinctive feature of the Italian banking system: the high degree of trust it enjoys and its consolidated ability to attract funding, especially on the retail markets.

In view of the turbulence and uncertainties on the financial markets, the deposits (Table 8.5) held by Italian banks have played an essential role in financing bank lending, showing an increase which is above the euro-area average and – a point worth underlining – a trend which is the opposite of that found in the other countries involved in the sovereign debt crisis (e.g., Spain, Portugal or Greece). The deposits of ordinary

Table 8.5 Deposits of other euro area residents(*)/total assets (**)

	2007	2008	2009	2010	Jun. 2011	Dec. 2011	Jun. 2012	Dec. 2012	Sep. 2013
Spain	48.7	48.6	48.9	49.0	49.8	46.4	42.5	42.5	45.6
Portugal	39.9	40.9	40.3	40.6	40.5	40.6	37.8	37.8	40.7
Greece	51.5	50.3	49.6	38.8	41.9	37.8	35.7	38.0	40.3
Germany	34.5	35.8	38.7	38.3	35.8	36.8	36.5	38.2	40.2
Netherlands	34.4	35.5	36.7	36.5	36.3	35.4	35.1	35.9	39.3
Cyprus	36.1	34.2	30.2	37.6	36.5	37.2	37.4	37.8	38.9
Italy	30.8	30.9	32.3	36.5	37.9	34.1	34.1	35.5	37.1
Euro area	30.3	30.5	32.2	33.6	32.7	32.1	31.7	33.3	34.8
Finland	31.3	27.2	27.3	24.3	24.6	19.4	20.0	22.7	26.8
France	20.0	19.6	21.0	23.0	22.1	22.3	22.2	24.0	23.8
Ireland	13.0	12.5	13.4	14.5	13.2	14.9	15.6	16.8	20.0

Source: Bank of Italy – 'Eurosystem statistics: euro-area aggregates and national contributions'.
(*) Excluding central government and monetary financial institutions.
(**) In per cent based on aggregated balance sheets of MFIs, excluding the Eurosystem.

customers have become more important for the funding of Italian banks, while the deposits of monetary and financial institutions have shrunk due to factors related to the system's liquidity levels. During the phases since the sovereign debt crisis, there has been a slight fall-off in sight deposits but a significant rise in 'term deposits', which have increased by 55 per cent compared to June 2011, especially deposits at 1 and 2 years.

While funding by ordinary customers has held up well, there has been a slight reduction in bond issues, especially in 2013, which can probably be explained as the effect both of the stagnation caused on the markets by the sovereign debt crisis, and the low economic benefits to be expected from bond issues in view of the high opportunity cost generated by government bond yields (Figure 8.4). In absolute terms, funding from bonds has fallen mainly as a result of the rise in the taxation on interest, the buyback operations run by some banks and the clientele's growing return to the investment fund market. However, during both the first and the second phases of the crisis, Italian banks have shown an impressive ability to place their debt security issues, which has helped to increase their bonds as a proportion of total assets by about 4 percentage points.

During the early months of 2013, Italian banks' total funding fell slightly in absolute terms, in spite of the positive trend in deposits by residents, which have grown by about 6 per cent. The increase in deposits

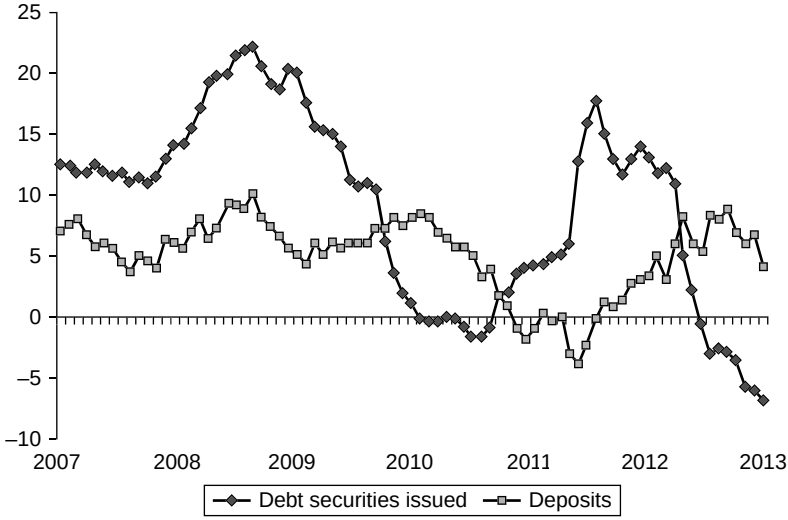

Figure 8.4 Annual growth rates in deposits and debt securities issued (*)

Source: Processing of Bank of Italy – 'Eurosystem statistics: euro-area aggregates and national contributions'.
(*) Aggregated balance sheets of MFIs, excluding the Eurosystem.

of this kind has only partially compensated for the drop in funding from non-residents and the lower level of use of Eurosystem refinancing and funding from the wholesale markets.

The effects on funding impacted on asset management decisions, especially on credit, where banks first modified their pricing strategies to pass the increase in the cost of funding on to borrowers and then adopted tighter selection criteria, with the aim of reducing lending and, specifically, the financing of the highest-risk corporations. During 2013, the trend in lending to households and firms was negative (Figure 8.5). Bank customers are suffering the effects of a further worsening of the recession in the country's economy, which is causing widespread deterioration in its credit rating.

There has been a high degree of restructuring of bank assets, with a significant reduction in the size of loan portfolios in relation to total investments. The total loans/total assets ratio has fallen from 67 per cent in 2010 to 58 per cent in June 2013, with a sharp drop in concomitance with the sovereign debt crisis (i.e., from June 2011 to June 2012 (Table 8.6)).

This trend is common to all the countries that have been worst hit by the sovereign debt crisis, due to both the reduction in the liquidity

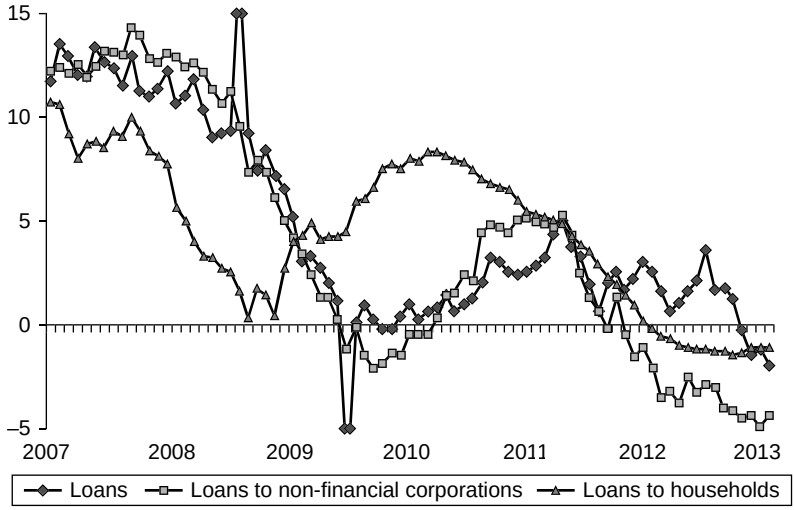

Figure 8.5 Annual growth rates in loans (*)

Source: Processing of Bank of Italy – 'Eurosystem statistics: euro-area aggregates and national contributions'.
(*) Aggregated balance sheets of MFIs, excluding the Eurosystem.

Table 8.6 Loans to euro area residents/total assets (*)

	2007	2008	2009	2010	Jun. 2011	Dec. 2011	Jun. 2012	Dec. 2012	Sep. 2013
Cyprus	56	56	54	54	60	59	64	62	70
Greece	61	59	58	58	65	66	60	63	61
Germany	59	60	61	61	56	57	57	57	59
Italy	68	67	67	67	61	64	59	59	58
Spain	73	69	66	66	62	64	59	60	57
Netherlands	54	54	56	56	56	55	55	56	56
Euro Area	57	57	57	57	55	56	55	55	55
Portugal	72	69	65	65	57	59	55	55	54
France	52	51	52	52	53	54	55	52	53
Finland	55	48	49	49	44	44	51	46	50
Ireland	38	39	38	38	40	40	36	37	35

Source: Processing of Bank of Italy – 'Eurosystem statistics: euro-area aggregates and national contributions'.
(*) In per cent based on aggregated balance sheets of MFIs, excluding the Eurosystem.

available to banks and to the weakness of the real economy, which has led to an increase in the risk level of the loans portfolio and restrictive lending practices.

A large proportion of this decrease relates to MFIs, which halved their interbank lending in response to the 2011–2012 liquidity crisis.

The Italian banking system is revising its lending policies and cutting its lending quotas, especially to non-financial corporations (Figure 8.6). The proportion of assets employed for lending to this customer segment fell from 24 per cent in 2011 to 20 per cent in June 2013. The reduction in lending to businesses reflects both the greater severity of lending criteria and banks' need to reduce their volume of loans to bring them into line with their liquidity and the risk level their balance sheets are able to support. However, there is also the significant effect of the shrinkage in the demand for credit, triggered by the economic situation, which has put investment plans – and thus the need for the relevant financing – on hold. Firms are experiencing low operating margins due to the weakness of demand, which is depressing their capacity for self-financing, alongside a lengthening of payment times and a deterioration in the quality of receivables.

Banks have made no changes to the quota of assets allocated for lending to households, which has remained more or less constant throughout the period, although there has been a significant shift towards lending for home purchases and away from consumer credit (Figure 8.7).

Restructuring of assets and a reduction in loans, especially to businesses, have occurred in all the countries most seriously hit by the sovereign debt crisis, in particular Spain, Portugal and Italy. However, the euro-area average has remained more or less stable, if these countries are

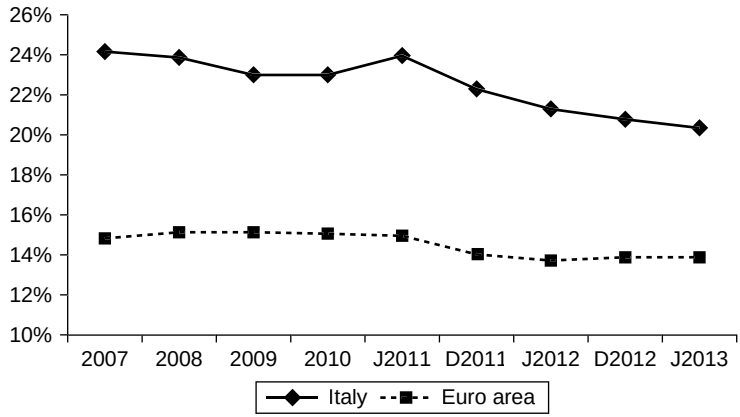

Figure 8.6 Loans to non-financial corporations/total assets (*)
Source: Bank of Italy – 'Eurosystem statistics: euro-area aggregates and national contributions'.
(*) Aggregated balance sheets of MFIs, excluding the Eurosystem.

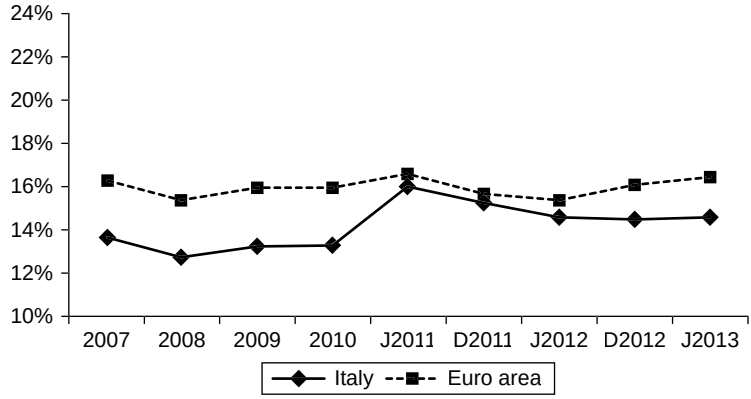

Figure 8.7 Loans to households/total assets (*)

Source: Bank of Italy – 'Eurosystem statistics: euro-area aggregates and national contributions'.
(*) Aggregated balance sheets of MFIs, excluding the Eurosystem.

excluded. In spite of the reduction in the proportion of assets allocated for loans during the last two years, Italy is still a typically bank-based country, with the percentage of firms' financing obtained from banks remaining above the euro-area average. The Italian figure for lending to households is in line with the euro-area average.

The Italian banking system's liquidity level is showing signs of improvement thanks to the gradual reduction of the funding gap, which has returned to values close to those recorded around the middle of the last decade: 12.2 per cent at the system-wide level last September, compared to the 19.3 per cent recorded in September 2011 (Bank of Italy 2013, Financial Stability Report, no. 6, November). Table 8.7 shows the ratio between loans to customers and customer deposits, which is a proxy for the funding gap and reveals that the liquidity stresses experienced by Italian banks are gradually decreasing, thanks to both a reduction in lending and an increase in customer deposits. This positive trend is confirmed by the loans/ deposits + bonds ratio, which fell from 89 per cent in 2007 to 70 per cent in June 2013. This indicator rose slightly in the third quarter of 2013 due to a drop in retail funding. However, in spite of its good retail funding capacity, one crucial factor affecting the Italian banking system is its difficulty in obtaining funding on the wholesale markets; after a cautious recovery at the end of 2012, wholesale borrowing has now slumped again due to political uncertainty. All this is aggravating the problems of both the volumes and the due dates

Table 8.7 Loans to deposits ratio (*)

	2007	2008	2009	2010	Jun. 2011	Dec. 2011	Jun. 2012	Dec. 2012	Sep. 2013
Finland	145	140	144	137	146	179	178	173	146
Netherlands	116	117	126	128	127	135	132	129	121
Cyprus	108	88	81	85	99	99	102	111	113
France	121	115	115	116	116	112	112	112	110
Italy	129	125	125	119	119	113	108	108	102
Euro area	112	108	107	107	108	107	106	105	101
Germany	102	101	101	101	101	103	106	103	100
Greece	95	84	80	79	92	90	86	84	93
Portugal	124	115	115	101	98	95	94	96	91
Ireland	118	98	92	90	93	91	88	90	90
Spain	112	106	101	102	101	99	94	92	86

Source: Processing of Bank of Italy – 'Eurosystem statistics: euro-area aggregates and national contributions'.
(*) In per cent based on aggregated balance sheets of MFIs, excluding the Eurosystem.

of the loans received from the BCE, and introduces an element of risk into Italian banks' balance sheets if the country risk were to rise back to the levels seen at the end of 2011, with an increase in the spread between Italian and German government bonds and the consequent downgrading of Italian bank securities.

From the capital point of view, in spite of the difficulties in the real economy there is an improvement in the average leverage of Italian banks, which, however, was already below the European average in 2007 (Table 8.8). The ratio between total assets and net capital is about 10.9. The biggest Italian groups' ratio between total assets and Tier 1 capital confirms this difference, with a figure of 18 compared to a European average of 23.

This is due to a large number of factors; first and foremost the demands of the changes to regulations post-2008, which have toughened capital requirements and generated an increase in Core Tier 1 capital, reflected in banks' net capital. Although partly responsible for a reduction in ROE, the reduction in the leverage ratio has allowed an improvement in the economic and financial stability of Italian banks – and banks which have experienced low margins during the last few years – together with a reduction in their risk levels.

From the regulatory point of view, the gradual improvement in capital adequacy continues: the Tier 1 capital ratio of the 14 largest Italian groups is about 11.1 per cent, an increase compared to 2011, while

Table 8.8 Leverage ratio (total assets to capital) (*)

	2007	2008	2009	2010	Jun. 2011	Dec. 2011	Jun. 2012	Dec. 2012	Sep. 2013
Finland	13.8	17.3	16.6	19.2	24.9	19.9	24.1	25.0	20.8
Netherlands	19.3	23.5	21.6	22.3	22.0	22.6	20.9	21.1	20.6
Germany	21.6	20.9	19.6	21.8	21.3	20.2	19.8	21.0	18.0
France	18.1	18.5	16.8	16.4	16.9	15.9	15.6	16.9	16.1
Euro Area	17.5	18.0	16.2	15.7	15.0	14.7	13.9	15.0	13.4
Italy	12.9	13.4	12.7	10.9	10.7	10.0	11.3	11.3	10.9
Portugal	12.4	13.1	12.1	12.9	13.9	13.1	11.2	12.3	10.5
Ireland	22.3	23.5	18.2	13.7	10.3	12.4	8.6	9.4	8.1
Spain	14.6	14.1	12.8	12.3	9.9	10.9	8.9	9.7	8.1
Greece	13.4	16.4	12.5	11.6	9.0	10.7	8.3	11.0	7.4
Cyprus	9.7	11.8	12.9	10.5	11.6	9.3	8.5	9.0	6.7

Source: Processing of Bank of Italy – 'Eurosystem statistics: euro-area aggregates and national contributions'.
(*) Aggregated balance sheets of MFIs, excluding the Eurosystem.

the total capital ratio is about 14.15 per cent (Bank of Italy, Financial Stability Report, no. 5, April). The levels achieved are the outcome not only of banks' efforts to recapitalize, but also of risk management activities, which have helped to significantly upgrade assets and restructure them in favour of less capital-intensive operations, as well as the effects of the ever-increasing use of more up-to-date internal models.

The capitalization of Italy's largest banking groups is in line with the average for big European banks. Recent assessments both by the Bank of Italy and by the FMI (Banca d'Italia, Financial Stability Report, no. 6, November) have confirmed that the Italian banking system's capitalization level is satisfactory.

8.5.2 Effects on financial stability and margins

Given this situation, margins in the Italian banking system require careful attention, since they are the most critical factor in ensuring banks' financial stability. A large number of factors have hit Italian banks' margins and have continually reduced them from 2007 to the present day. First and foremost, the commercial bank model widely adopted in the Italian system has lower structural profit margins than other credit intermediation models. Moreover, Italian banks' strong focus on the retail sector and their close interdependence with the business and household sectors have generated a sharp reduction in the system's overall profitability since 2008 (Figure 8.8).

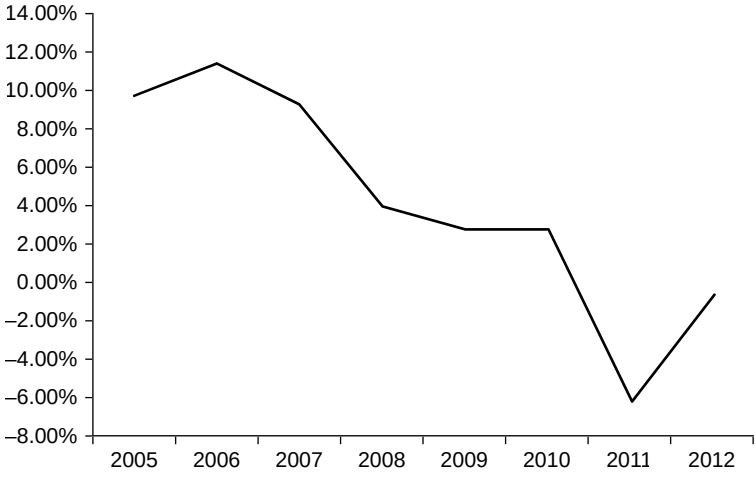

Figure 8.8 ROE (%)

Source: Processing of Bank of Italy – Money and banking Statistical Database (Bip On-Line).

ROE shows a downward trend throughout the period, and even when it is corrected by the write-downs in intangible assets, the overall result is still negative (Figure 8.9). There is no doubt that one factor depressing ROE is the increased capitalization and lower degree of leverage. However, during the last few years Italian banks have not been capable of generating value due to the significant reduction in their operating profitability: since 2007 the net interest income/total asset ratio has fallen at an average annual rate of –2.1 per cent.

On the assets side the profitability of lending activities (margin of interest) is suffering from the inability of traditional pricing systems to generate an acceptable return on credit given, variable interest rates indexed to a very low Euribor and a deterioration in credit rating not envisaged when loans were granted, while on the funding side it is hit by the rise in the cost of borrowing and the need to reduce the liquidity gap due to liquidity stresses. During the last year, margins have deteriorated in the typical retail earnings areas: loans and services. One positive input which helps to cushion the drop in profitability comes from securities trading, which has enjoyed a particularly successful period, but by its very nature this sector is not capable of guaranteeing the same support for margins during the next few years (Figure 8.10).

On the costs side, there has been a gradual reduction in operating costs throughout the period, except for 2011, generated by the major

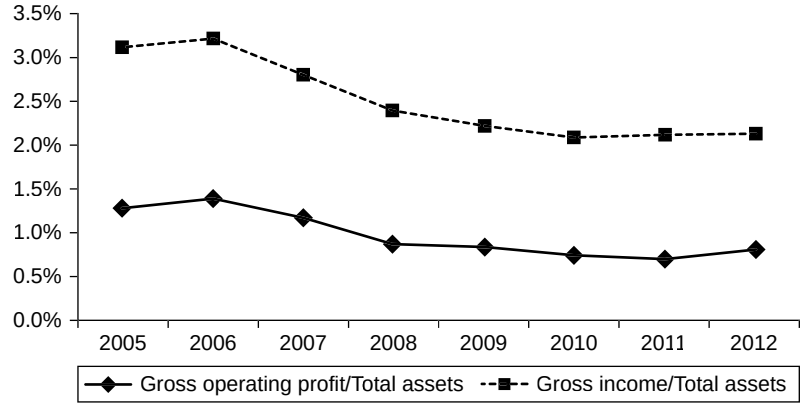

Figure 8.9 Gross operating profit/total assets; gross income/total assets
Source: Processing of Bank of Italy – Money and banking Statistical Database (Bip On-Line).

banking sector reorganisations and the rationalisation of business units and staff levels. However, the system is not showing the benefits of this recouped efficiency, reflecting the lack of alignment between trends in earnings and operating costs. At the end of 2012, the cost income ratio was 62.9 per cent, compared to 58.9 per cent at the end of 2007. One key negative earnings item is credit write-downs, which rose constantly throughout the period and contributed to the worsening of the income situation (Figure 8.10).

As already mentioned, Italy's economic situation is affecting the quality of banks' loans. After the effects of the initial phase of recession which followed the 2008 crisis, the Italian banking system is now dealing with the consequences of the second phase of recession, triggered by the sovereign debt crisis, which has led to a significant rise in the ratio of bad debts, standing at 4.5 per cent for businesses and 1.5 per cent for households in 2013 (Figure 8.11). Many businesses and households, already weakened by the 2009 crisis, have been unable to withstand the effects of such a long recession and the consequent stresses on demand and the labour market.

Impaired loans, which include non-performing and doubtful loans and restructured, overdue or overdrawn credits, amounted to more than 14 per cent of total loans to customers at the end of the period considered, an exceptionally high value exacerbated by the slowness of the judicial credit recovery procedures and the long deductibility times under the fiscal regulations governing bad debts (Figure 8.12).

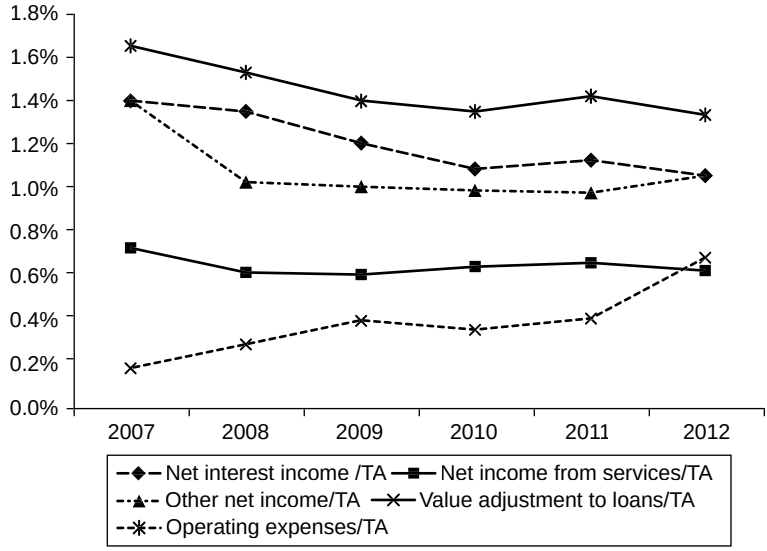

Figure 8.10 Components of gross operating profit of Italian banks (*)

Source: Processing of Bank of Italy – Money and banking.
(*) Value adjustments to loans means value adjustments and re-adjustments to loans and allocations to provisions for loan losses.

Thanks in part to intensive action by the supervisory authorities, Italian banks have increased their degree of coverage of their NPLs, which have risen during the last few years. The Bank of Italy is monitoring this phenomenon carefully, requiring banks to keep the value adjustments of their total loan portfolios in line with the current and forecast trend in the general economy. Moreover the second pillar of the Basel accords imposes specific additional capital requirements for banks found to be significantly below the system average when inspected.

It should be remembered that in Italy, the definition of NPEs (non-performing exposures) comprises all credits that have deteriorated in any way (including 'substandard loans': loans to customers in temporary difficulties that can be expected to be cleared up in a reasonable time) gross of any security held. This leads to an overestimation of NPLs in international comparisons, which the Bank of Italy has estimated at around 47 per cent; this would give a coverage rate of about 54.9 per cent in 2012 (Bank of Italy, Financial Stability Report, no.5, 2013). On 21 October the EBA published its technical standards on NPEs and

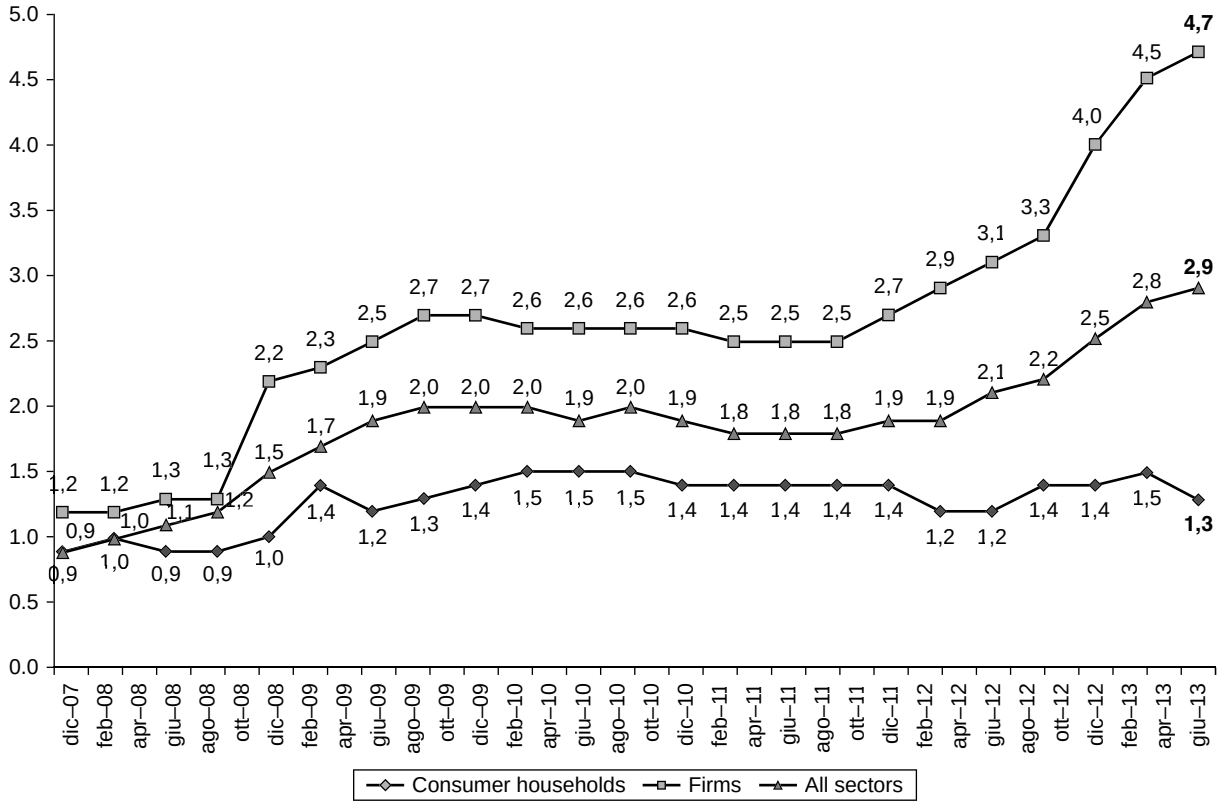

Figure 8.11 Ratio of new bad debts to outstanding loans (Val.%)

Source: Processing of Bank of Italy – Money and banking, Financial Stability Report 2/2013, Economic Bulletin, no.73, 2013.

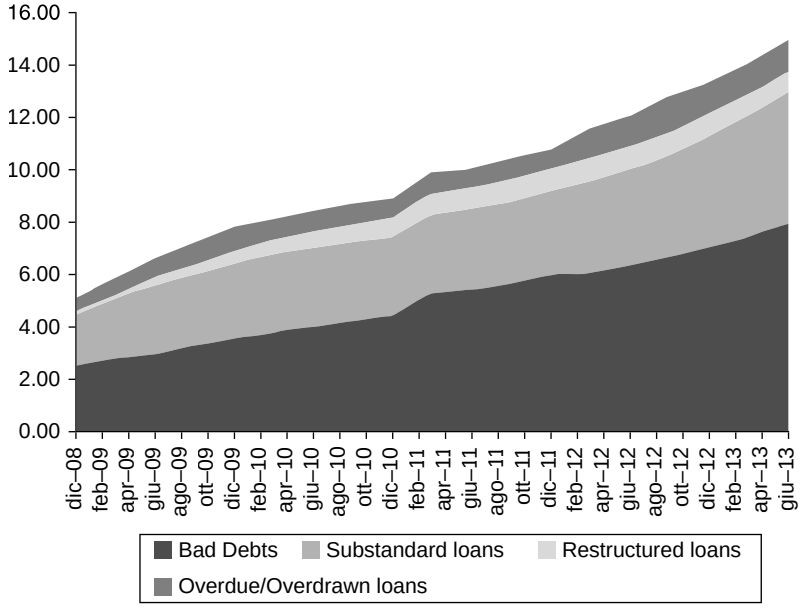

Figure 8.12 Impaired loans/total loans to customers (Val.%)

Source: Processing of Bank of Italy – Money and banking, Financial Stability Report 2/2013, Economic Bulletin, no.73, 2013.

forbearance; the EBA's definition of NPLs, is substantially in line with that in use in Italy.

8.6 Conclusions

The impact of the financial crisis on the various banking systems has been quite severe, even dramatic, and has required interventions of different kinds: bailout operations by governments; regulatory and supervisory rethinking by policy makers and supervisory authorities; the definition of new strategies and the refocusing of their business, on the part of financial intermediaries.

Italian banks' specific intermediation model explains why they suffered less than other countries during the first phase of the crisis, requiring one of the lowest levels of public facilities in the EU in terms of GDP. Most of these same characteristics have mutated from positive to

negative factors since the sovereign debt crisis – which hit Italy hard – as well as during the present deep recession.

The negative repercussions of a long period of low economic growth, since the mid 1990s, and two very severe recessions (in 2008–2009 and since 2011), are now being felt by the economy as a whole, and thus by the banks.

The double-dip recession has significantly weakened businesses and households, Italian banks' key customer segments, impairing the sustainability of the 'traditional' intermediation model. The sovereign debt and country risk have placed further pressure on Italian banks' financial stability, affecting first their liquidity and second the cost and volumes of funding and loans.

In the period since the height of the sovereign debt crisis, the Italian banking system has regained its financial and liquidity equilibrium by increasing retail funding and reducing loans: the loans to deposits ratio has fallen by 17 percentage points in two years. From the capital point of view, there has been significant deleveraging of the financial structure and gradual capital reinforcement, also in response to regulatory requirements.

The restoration of the system's financial and capital stability has not been accompanied by a similar recovery in its earnings; given the current recession and monetary policy, the prospects for growth of Italian banks' core assets are poor, especially for the less diversified banks with a strong focus on the domestic market.

Italian banks' operating margins are adversely affected by the deterioration in the quality of loans and the low level of net interest income. On the assets side the profitability of lending activities (margin of interest) is suffering from the inability of traditional pricing systems to generate an acceptable return on credit given, variable interest rates indexed to a very low Euribor and a deterioration in credit rating not envisaged when loans were granted, while on the funding side it is hit by the rise in the cost of funding and the need to reduce the liquidity gap due to liquidity stresses.

It is important for banks to switch towards intermediation models that include a higher proportion of financial intermediation and services, and to integrate them into their existing business models. This would also enable them to improve their financial support for companies and encourage them to increase their openness to the capital markets. However, many Italian banks are too small to take this opportunity, because changes of this kind require major investments in facilities and skills.

The banking system's low level of profitability could be a major factor of weakness in the near future, especially in the absence of an adequate recovery of the Italian economy: a recovery which would need to be capable of strengthening Italian banks' traditional counterparties: businesses and households.

In this situation, the transition to Basel III, the asset quality review and the forthcoming stress tests (due to be performed by the BCE during the next few months, in the run-up to the transition to the Single Supervisory Mechanism (SSM)) could apply further pressure to the balance sheets of some Italian (and probably also European) banks, by requiring higher provisions to increase the degree of coverage and prepare for the effects of the stress tests. Very probably, and also in view of the weakness of Italy's political situation and the possible tensions on its sovereign debt, further capital increases will be necessary; in a context in which banks are unable to generate value, there is a lack of institutional investors (not only foreign but also Italian) capable of supporting them, and the market is generally weak.

Note

1. 'The definition of non-performing loans (NPLs) varies between Western European nations. Supervisors, at least those in general practice in the majority of Western European countries, seem to endorse the rule that for a loan to be non-performing, at least one of two (primary) elements has to be present: (1) principal or interest 90 days or more overdue, and (2) existence of underlying well-defined weaknesses of loan or borrower. However, there are also other (secondary) elements that have an impact on NPL measurement and the comparability of definitions: the question whether a restructured loan is classified as NPL or not, whether the presence of a collateral or guarantee influences loan classification or not, whether the full outstanding value or only part of a loan is reported as non-performing, and whether a bank is required to downgrade all loans to a given debtor if any of these loans are classified as impaired or not' in Barisitz S.; 'Non-performing loans in Western Europe – a selective comparison of countries and national definitions', in Oesterreichische Nationalbank, Focus on European Economic Integration, Q1/13.

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9

Diversification Strategies and Performance in the Italian Banking System

Paola Brighi and Valeria Venturelli

9.1 Introduction

This chapter addresses the subject of diversification in the Italian banking sector. The Italian banking system represents an ideal experimental setting since it is characterized by a heterogeneous range of banks. The processes of deregulation, innovation and consolidation during the 1990s prompted a new competitive contest within the banking system, which forced new managerial strategies to emerge from attempts to find new opportunities in terms of increased profits.

Theoretically, the literature suggests bank diversification policies may lead to cost savings or revenue improvements due to spreading of fixed costs, exploitation of economies of scope from using the same information, and customer cost economies. Diversification also creates benefits in terms of reducing agency costs of managerial discretion, by lowering cash-flow volatility.

As in previous studies, rather than attempting to measure economies of scope and agency problems directly, we investigate whether two types of diversification strategy (i.e., revenue and geographical diversification), may affect bank risk-adjusted performance.

Using an unbalanced panel dataset of 3,002 observations relating to Italian banks for the period 2006–2011, the core question is to analyse the effect of geographical and functional diversification, across and within both interest and non-interest income, and their effect in terms of risk-adjusted performance, verifying also if the results have been affected by the financial crisis.

With respect to the previous work on bank diversification, our study represents one of the first attempts to directly assess the risk/return implications of mixing different type of product. Moreover, in our empirical

analysis we investigate whether certain types of institution are better able to reap the benefits of diversification, which we do by focusing on the performance implications of size. Finally, we use consolidated balance sheets when available (and unconsolidated if not), since banks tend to reserve non-traditional innovative activities for non-banking subsidiaries whose contributions can be more precisely evaluated if consolidated financial statements are available.

The main results suggest that revenue and geographical diversification play a role in determining bank performance, but the relative effects appear to be different, depending on the banks' size. Moreover, in the after crisis period banks that have been less penalized in terms of risk-adjusted profit are those characterised by a greater focus on non-interest income component and the ones more geographically diversified.

The chapter is structured as follows. Section 9.2 reviews the literature on the nexus between diversification and bank performance. Section 9.3 presents the econometric methodology and the data used. Section 9.4 describes the results. Section 9.5 concludes.

9.2 Literature review

Theoretically, the literature on bank diversification analyses the benefits and costs associated with the strategy developed. In terms of benefits, diversification may lead to an increase in performance through cost savings or revenue improvements (Chandler, 1977; Teece, 1980 and 1982; Herring and Santomero, 1990; Gertner, Scharfstein and Stein, 1994; Llewellyn, 1996; Houston, James, and Marcus, 1997; Klein and Saidenberg, 1997; and Berger, Hanweck and Humphrey; 1987 and Berger, Demsetz and Strahan, 1999). Moreover, diversification can generate positive effects also associated with the reduction of information asymmetries (Diamond, 1984, 1991; Rajan, 1992; Saunders and Walter, 1994; Stein, 2002) and a decrease in agency costs (Stulz, 1990; Gertner et al., 1994; Stein, 1997).

Alongside the positive effects, adverse implications for performance have been identified. Diversification can intensify agency problems between corporate insiders and small shareholders (Jensen and Meckling, 1976; Jensen, 1986; Aron, 1988; Stulz, 1990; Rotemberg and Saloner, 1994; Scharfstein and Stein, 2000). Increasing the size and scope of a bank's activities introduces the 'cost of complexity', which at some point may dominate the benefits that can be achieved (Rajan, Servaes and Zingales, 2000). Moreover, diversified banks can use their advantage

to operate with greater leverage, since several fee-based activities can be performed while holding little or no regulatory capital, and to pursue riskier lending (Demsetz and Strahan, 1997; DeYoung and Roland, 2001; Salas and Saurina, 2002).

Despite extensive research on the economic consequences of diversification, the empirical literature does not provide clear evidence on whether diversification generates net benefits or costs. First of all, the empirical literature is centred mainly on the US experience and fatherly developed with the implementation of the Riegle Neal Act of 1994 which allowed for an interstate bank merger, and the completion of the Gramm Leach Bliley Act in 1999 which allowed for consolidation between investment banks, commercial banks and insurance companies.

The empirical analysis has centred on the profile of the diversification between interest and non-interest bearing activities, with few exceptions,[1] and concludes that the costs of diversification outweigh the benefits (Stiroh, 2004a, b; Stiroh and Rumble, 2006; Laeven and Levine, 2007; Mercieca, Schaeck and Wolfe, 2007; Goddard, McKillop and Wilson, 2008; Lepetit et al., 2008) and the result is valid both for financial holding companies and smaller institutions such as credit unions. Also for Italy, the results are mixed. Acharya, Hasan and Saunders (2006) conclude that diversification of bank assets is not guaranteed to produce superior performance and/or greater safety for banks. Chiorazzo, Milani and Salvini (2008) and Cotugno and Stefanelli (2012) find that income diversification increases risk-adjusted returns. Vallascas, Crespi, and Hagendorff (2012) verify that institutions that were diversified within narrow activity classes before the crisis experienced large declines in performance during the financial crisis.

Focusing on the link between geographical diversification and performance, Hirtle (2007) shows how the increase in size of the branch network engenders a downturn in bank performance. Deng and Elyasiani (2008) find that geographical diversification is associated with BHC (bank holding company) value enhancement and risk reduction, in particular when significant economic differences are present in the areas where a bank is located. Regarding Italy, a few papers have recently investigated the topic. Among them, Cotugno and Stefanelli (2012) find a positive relation between geographical diversification and several bank performance measures. Bernini and Brighi (2012a, 2012b) find that for mutual banks a greater degree of diversification at the local level determines an increase in the cost inefficiency; in this sense, provincial geographical diversification does not appear to be enough to eliminate the local market risk (DeYoung, Hunter and Udell, 2004; Emmons, Alton and Yeager, 2004; Yeager, 2004).

The review of the literature suggests a further analysis of (i) the diversification effects between interest and non-interest revenue bearing activities and its principal components and, (ii) relationship between bank profitability and geographical diversification.

With respect to previous works on bank diversification, our study represents the first attempt to directly assess the risk/return implications of mixing different types of product. Moreover, in our empirical analysis, we investigate whether certain type of institutions are better able to reap the benefits of diversification, which we do by focusing on the performance implications of size. Finally, we use consolidated balance sheets when available (and unconsolidated if not). This latter choice is of particular importance for several reasons: on one hand banks tend to reserve non-traditional innovative activities for non-banking subsidiaries whose contribution can be more precisely evaluated if consolidated financial statements are available; furthermore, diversification benefits may exist for the institution as a whole and not for the single subsidiary. On the other hand, financial holding companies represent the relevant unit of observation for regulators on extremely important topics, such as the level of systemic risk (Stiroh and Rumble, 2006).

9.3 Variables definition, methodology and data

This section presents the variables employed in the empirical analysis, the econometric methodology, along with the data used in the study.

9.3.1 Measure of banks' revenue and geographical diversification

The first type of diversification analysed is the one related to the diversification across different sources of income. This measure, defined as DIV_REV, evaluates for each bank the degree of diversification between interest and non-interest income activities. Using the standard definition of INT (gross interest revenue)[2] and NON (non-interest income), according to Mercieca et al. (2007), we compute the Herfindahl Hirschman Index (HHI) revenue as follows:

$$HHI_{REV} = \left(\frac{INT}{TOP}\right)^2 + \left(\frac{NON}{TOP}\right)^2 \tag{9.1}$$

where TOP = INT + NON.

As the HHI rises, the bank becomes more concentrated and less diversified. To have a direct measure of diversification (DIV_REV) the sum of squared revenue shares have been substracted from unity so that DIV increases to the degree of revenue diversification. Moreover, following DeYoung and Roland (2001), Elsas, Hackethal and Holzhäuser (2010) and Vallascas et al. (2012), we use gross measures. Analytically:

$$\text{DIV\_REV} = 1 - \left(\left(\frac{\text{INT}}{\text{TOP}} \right)^2 + \left(\frac{\text{NON}}{\text{TOP}} \right)^2 \right) \tag{9.2}$$

By definition DIV_REV can take on values between zero (the bank is fully specialized in one business area) and 0.5 (the bank generates a fully balanced revenue mix from the two business areas).

The second set of indicators relate to the diversification between different sources of non-interest income (DeYoung and Roland, 2001; Stiroh, 2004a,b; Mercieca et al., 2007; Lepetit et al., 2008). Two principal components of non-interest income have been identified: commission and fee revenue (COM) on one hand and the net results of financial operations (OPFIN)[3] on the other. Analytically:

$$\text{DIV\_NON} = 1 - \left(\left(\frac{\text{COM}}{\text{NON}} \right)^2 + \left(\frac{\text{OPFIN}}{\text{NON}} \right)^2 \right) \tag{9.3}$$

where COM denotes gross commission revenue, OPFIN is the absolute value of net results from financial operations including results from trading, hedging and other activities.

NON is equal to the sum of the absolute values of COM and OPFIN. Also in this case, DIV_NON can take on values between zero and 0.5.

Geographical diversification (and indirectly, the level of concentration) is measured using an index of the average degree of the bank concentration (HHI_GEO). This indicator is constructed to account for the distribution of the branches of an individual bank throughout the Italian territory, considering the province of the bank operations as the reference market. In mathematical terms, the indicator is calculated as:

$$\text{HHI\_GEO}_i = \frac{\sum_{z_p=1}^{P_i} \left(\frac{\text{Branches}_{iz_p}}{\text{Branches}_i} \right)^2}{P_i} \tag{9.4}$$

where i refers to the bank i and z_p to the provinces where that branch is located.

This indicator is 1 when the bank is characterized by the maximum geographical concentration, (i.e., the bank has all its branches in only one province, exhibiting no geographical diversification). Conversely, this indicator becomes zero if the bank has maximum geographical diversification, with branches distributed throughout the national territory.[4]

For each bank holding company, the geographic diversification measure stems from an average computation. First of all, we have calculated the HHI_GEO measure for all the individual banks belonging to the BHC. Then, in order to obtain a single index for each BHC, we compute the average of the individual scores weighted for the contribution of the individual bank total asset to the group total asset.

9.3.2 Performance measures

Following Stiroh (2004a, 2004b) and Chiorazzo et al. (2008), we use a risk-adjusted measure of performance. In particular, we introduce the variable SHROA computed as the yearly return on assets[5] (ROA) divided by its standard deviation calculated over the entire sample period. Since our sample is dominated by mutual banks, for our purpose it is advisable to use ROA instead of ROE as a proxy for bank performance since, as for mutual banks, it is well known that for regulatory reasons they have different rules of provisions for capital reserve, which implies that their degree of capitalization is structurally higher than that of other banks. Analytically:

$$\mathrm{SHROA}_{i,t} = \frac{\mathrm{ROA}_{i,t}}{\sigma \mathrm{ROA}_{i}} \tag{9.5}$$

9.3.3 Control variables

This section describes the control variables that we use in the econometric model to distinguish between bank specific and external determinants.

Bank specific determinants

To capture the effects of bank size we use the continuous variable SIZE which is equal to ln (total asset) here total asset is the year-end total asset. To control for the potential non-linear relationship between size and performance, as in Berger, Hasan and Zhou (2010), we also include

the squared term of ln (total asset) – SIZE_SQ. To measure the effect of efficiency on bank profitability, we introduce in the analysis the cost income ratio – COST_INCOME. As a proxy for bank capital, we use the ratio equity over total asset – E_TA. As a proxy for a bank's credit quality, we use the ratio of loan loss provisions over total loans – LLP. To evaluate if loans are more profitable than other earning assets, we use the variable LOAN, which is the ratio between total loans and bank total asset (DeYoung and Rice, 2004; Stiroh, 2004a).

External determinants

The GDP_INDEX measures the GDP growth rate calculated in respect to the i-bank, weighting the indicator at the province level with the ratio of branches in the province in respect to the total amount of branches of the i-bank. This procedure allows us to take into account the different impacts that the macro indicator has on the bank based on the presence of that bank in that province. Analytically:

$$\text{GDP\_INDEX}_{\text{i}} = \frac{\sum_{z_p} \frac{\text{Branches}_{iz_p}}{\text{Branches}_{\text{i}}} * (\text{GDP\_RATE})_i}{P_i} \tag{9.6}$$

where i refers to the bank and z_p to the province where the bank operates.

The GDP_RATE measures the growth rate of the GDP at the provincial level. Also in the case of GDP_INDEX, the variable for bank holding companies has been computed in terms of weighted average of the individual bank score weighted for the contribution of the individual bank total asset to the formation of the group total asset.

To account for the consequences of financial crisis we insert a structural break dummy variable – BREAK – equal to zero for the years 2006, 2007 and 2008 and equal to 1 otherwise (2009, 2010 and 2011).

9.3.4 Empirical methodology

We use the econometric model shown in Equation (9.7) to examine the link between diversification and profitability. This regression uses Y = [SHROA] as dependent variable:

$$\begin{aligned} y_{i,t} = {} & \alpha_{i,t} + \beta_1 \text{DIV\_REV}_{i,t} + \beta_2 \text{PRP\_NON}_{i,t} + \beta_3 \text{DIV\_NON}_{i,t} \\ & + \beta_4 \text{PRP\_COM}_{i,t} + \beta_5 \text{HHI\_GEO}_{i,t} + \sum_{c=1}^{8} \gamma_c \lambda_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{9.7}$$

where i identifies the individual bank observation belonging to the sample ($i = 1, 2, 3, \ldots, 3002$); t expresses the time variable ($t = 2006 \ldots, 2011$); β_s are the parameters to be estimated, γ_c are the control variable coefficients, λ is a matrix of control variable. Both the constant and the error terms are also indicated in the model. DIV_REV is revenue diversification, PRP_NON is the proportion of non-interest income in the sum of non-interest income and gross interest revenue. To differentiate between the non-interest income stream, DIV_NON is the non-interest diversification measure, PRP_COM is the proportion of fee and commissions in non-interest income. The other variables control for factors potentially affecting the level and volatility of profits.

As underlined in Chiorazzo et al. (2008) it is important to note that the regression coefficients on the individual component shares (PRP) in the revenue shares measure the effect of a shift from the omitted category of the component share into an alternative, since one component share has to be excluded to avoid perfect collinearity.[6]

A list of the variable used is presented in Table 9.1.

Table 9.1 Variables' names and definitions

Name	Definition
ROA	Net results from ordinary activity over total asset
SHROA	Annual ROA over its standard deviation calculated over the entire sample period
DIV_REV	Diversification measures across interest revenues and non-interest income
PRP_NON	Proportion of non-interest income in the sum of non-interest income and gross interest revenue
DIV_NON	Diversification index between different sources of non-interest income (i.e.,: commission revenue and net results from financial operations)
PRP_COM	Proportion of gross commission revenue in the sum of gross commission revenue and net results from financial operations
HHI_GEO	Geographical diversification measures
SIZE	ln (total asset)
SIZE_SQ	ln (total asset)^2
COST_INCOME	Personnel and other administrative expenses over intermediation margin
E_TA	Equity over total asset
LLP	Loan loss provisions over net loans
LOAN	Total loans over total asset
GDP_INDEX	GDP growth rate at provincial level
BREAK	Dummy variable equal to zero for the years 2006, 2007, 2008 and equal to one otherwise (2009, 2010 and 2011)

9.3.5 Data

Data is provided by the consolidated and unconsolidated balance sheets of BHC and individual Italian banks submitted to the Bank of Italy and collected by the Italian Banking Association over the period 2006–2011. The starting date is 2006 since Italian banks report unconsolidated accounting data based on IFRSs (International Financial Reporting Standards) from that date. We exclude banks with missing data on basic accounting variables, including assets, loans, deposits, equity, interest income, non-interest income, commission and trading revenues.

The final dataset includes 3002 bank-year observations corresponding to 397 mutual banks and 104 non-mutual banks in the last year. The coverage of our sample relative to the population of the whole Italian banking system is nearly 85 per cent, and it is quite stable over the analysed period.[7]

Information on GDP at the provincial level is provided by Istituto Tagliacarne. The number of branches (referred to each bank at the municipal level) is taken from the Bank of Italy.

9.4 Empirical results

9.4.1 Descriptive statistics

Descriptive statistics of our sample are reported in Table 9.2. The average (mean) bank generated 79.4 per cent of its revenues from interest-generated activities (PRP_INT). Turning to the non-interest income revenues, 80.4 per cent is represented by commission and fee income, while the ratio of results from financial operations (OPFIN) contributes nearly 20 per cent to the formation of the non-interest income.

As a preliminary investigation, this sub-section examines bank characteristics by dividing the whole sample into different groups. The first one rests on size distribution (i.e., large and small-sized banks based on asset size). We distinguish between large and small banks following a classification frequently used in the literature (Lepetit et al., 2008): large banks are banks with total assets greater than 1 billion euro, on average, over the period 2006–2011 while small banks are the ones with total average assets lower than 1 billion euro. To evaluate the relevance of organizational structure we divide the sample between BHC and Independent banks. Finally, to catch the effect of the bank nature of owners we split the sample between mutual banks and others. Mutual banks are generally considered as relatively less profitable but nonetheless characterized by low risk preferences (Iannotta et al., 2007). Table 9.3 shows various bank

Table 9.2 Summary statistics for all banks, on average, over the period 2006–2011

	obs	mean	min	p25	p50	p75	max	st. dev
Performance measure								
ROA	2,994	0.007	–0.09	0.004	0.007	0.011	0.214	0.010
SHROA	2,992	1.832	–4.13	0.782	1.707	2.838	9.609	1.584
Revenue diversification								
DIV_REV	3,001	0.296	0.000	0.236	0.292	0.355	0.500	0.085
DIV_NON	2,999	0.261	0.000	0.131	0.260	0.396	0.500	0.151
Shares of different sources of revenues								
PRP_INT	3,002	0.794	0.000	0.763	0.821	0.862	1.000	0.125
PRP_NON	3,002	0.206	0.000	0.138	0.179	0.237	1.000	0.125
PRP_COM	2,999	0.804	0.018	0.723	0.845	0.928	1.000	0.165
PRP_OPFIN	2,999	0.196	0.000	0.072	0.155	0.277	0.982	0.165
Geographical diversification								
HHI_GEO	2,975	0.630	0.000	0.253	1.000	1.000	1.000	0.402
Control variables								
SIZE	3,002	12.849	8.499	11.784	12.672	13.491	20.768	1.597
SIZE_SQ	3,002	167.339	72.230	138.863	160.587	181.999	431.304	44.603
COST_INCOME	2,880	0.702	0.145	0.630	0.703	0.774	1.000	0.115
E_TA	3,001	0.123	0.015	0.090	0.113	0.144	0.984	0.059
LLP	2,992	–0.006	–0.21	–0.007	–0.004	–0.002	0.016	0.008
LOAN	3,001	0.665	0.000	0.592	0.704	0.774	0.990	0.159
GDP_INDEX	2,492	0.016	–0.93	–0.009	0.012	0.024	9.172	0.299

characteristics and risk measures for each of the groups identified: size classes (large vs small banks), institutional category (mutual vs non-mutual banks) and organizational structure (BHC vs independent banks).

Large and small banks exhibit a similar profitability in terms of return on assets (ROA); if measured on a risk-adjusted basis (SHROA) large banks show higher performance if compared to small banks. Moreover, small banks show a high ratio of equity to total assets (E_TA) when compared to large ones. Last, and most relevant to this study, non-interest income to operating income (PRP_NON) is higher for large banks than small banks. This implies that non-banking activities, including fee, commission and trading income, are relatively important for large banks compared to small banks; moreover, for small banks the tendency towards the prevalence of traditional banking commission is verified.

Concerning the institutional category, mutual banks are on average more profitable than non-mutual banks and more involved in traditional activities, as verified by the higher ratio of interest income. This result is also in line with highest ratio of loans to total assets (LOAN).

Table 9.3 Descriptive statistics of bank characteristics, on average, over the period 2006–2011

	TA [euro 000]	ROA	SHROA	PRP_ NON	PRP_ COM	COST_ INCOME	E_TA	LOANS
Small banks [416]								
Mean	313,410	0.0070	1.802	0.190	0.809	0.716	0.129	0.661
Std	278,145	0.010	1.575	0.109	0.161	0.107	0.059	0.150
Large banks [94]								
Mean	29,586,004	0.0074	1.969	0.274	0.783	0.638	0.096	0.683
Std	117,452,273	0.008	1.616	0.162	0.177	0.126	0.049	0.194
BHC [61]								
Mean	45,183,305	0.0071	1.556	0.361	0.784	0.650	0.095	0.642
Std	144,870,842	0.018	1.527	0.223	0.189	0.131	0.072	0.225
Independent [449]								
Mean	451,492	0.0070	1.868	0.185	0.807	0.709	0.126	0.668
Std	593,111	0.008	1.588	0.086	0.161	0.111	0.056	0.148
Mutual [403]								
Mean	353,330	0.0072	1.880	0.178	0.811	0.714	0.124	0.676
Std	330,670	0.008	1.513	0.062	0.153	0.103	0.045	0.129
No-mutual [107]								
Mean	26,416,756	0.0066	1.643	0.313	0.776	0.652	0.117	0.621
Std	111,624,129	0.016	1.825	0.216	0.201	0.144	0.095	0.240

Note: The number of banks for the different groups, reported in square brackets, refers to the average number of banks in the sample during the period 2006–2011.

BHCs are, on average, less profitable than independent banks. This category is the one most involved in non-traditional activities, as confirmed by the higher ratio of non-interest income on total operating income. Moreover, these banks are associated with low ratios of loans to total assets and are less dependent on traditional financial intermediation activities with less capital leverage (E_TA).

9.4.2 Multivariate analysis

As for product diversification between interest and non-interest income (DIV_REV) the main results suggest that the diversification implies a negative effect on bank risk-adjusted profitability (SHROA). This result, is in line with Goddard et al. (2008) and would suggest that for a bank, at least in terms of profitability, it is more convenient to focus on interest or non-interest business.

To investigate more thoroughly the effects of income diversification on bank profitability, it could be useful to control for the effect of the share of the non-interest component over the total revenue (PRP_NON).

As the non-interest component increases the profitability decreases, but the results drastically change with respect to the crisis break. Before the crisis, the non-interest income has a negative effect in terms of SHROA, while after the crisis the effect is simply reversed, maintaining the statistical significancy (Table 9.4). Considering the model with the break dummy (column 5) the bank profitability is, in fact, strictly related to the non-interest component when the interest margins are substantially nil and the volumes drastically reduced. In other words, traditional business strictly linked to lending activity becomes riskier given the current economic crisis. As for the pre-crisis period our results are in line with Stiroh (2004b), Stiroh and Rumble (2006) and Mercieca et al. (2007).

Another point is to investigate whether a further diversification among the non-interest component could be profitable for the bank (DIV_NON). In this respect, the results suggest that increasing diversification inside the non-interest income fees appears to negatively affect the risk-adjusted profitability (which is consistent with Stiroh (2004a)) becoming, however, statistically insignificant when taking into account the crisis break. As for the non-interest activities, the commission variable (PRP_COM) is negative and highly significant; shifting into this non-interest income activity lowers bank and again becomes statistically insignificant once the crisis break is taken into account.

Turning to geographical diversification, a greater geographical concentration (HHI_GEO) implies a minor risk-adjusted profitability, especially in the post-crisis period. This result is consistent with the literature that suggests that geographically diversified banks could better absorb local systemic risk (Bhattacharya and Gale, 1987). Finally, as for the control variables, they appear coherent with the usual expected sign.

To verify how size affects diversification approaches, it could be of interest to investigate how our main results, when referred to the revenue and geographical diversification variables, could change the interaction effect among those variables and bank size (Sanya and Wolfe, 2011). The interaction term captures bank performance in terms of the degree of product diversification (PRP_NONxSIZE and PRP_COMxSIZE) and geographical dimension in relation to asset size (HHI_GEOxSIZE). Results are shown in Table 9.5.

First, as for the non-interest component, evidence suggests that if a bank increases the share of non-interest income (PRP_NON) as well as its size the impact in terms of risk-adjusted profitability is positive, whether or not the break crisis effect is taken into account. The result could be connected to the fact that larger banks are better equipped to manage risk linked to non-interest income activities. As for the direct effect of

Table 9.4 Revenue diversification, geographical diversification and performance of sample banks

VARIABLES	(1) SHROA	(2) SHROA	(3) SHROA	(4) SHROA	(5) SHROA
Constant	15.580***	17.180***	19.857***	17.755***	6.261
	(4.525)	(4.513)	(4.623)	(4.521)	(4.501)
DIV_REV	–1.133***	–1.329***		–1.292***	–0.449
	(0.343)	(0.343)		(0.344)	(0.342)
PRP_NON	–0.945**	–1.339***		–1.375***	0.774*
	(0.380)	(0.385)		(0.386)	(0.421)
DIV_NON		–0.399**		–0.383**	–0.225
		(0.189)		(0.189)	(0.184)
PRP_COM		–0.823***		–0.801***	–0.271
		(0.195)		(0.195)	(0.195)
HHI_GEO			–0.278*	–0.253*	–0.299**
			(0.142)	(0.139)	(0.134)
SIZE	0.673	0.479	0.476	0.445	1.502**
	(0.679)	(0.676)	(0.695)	(0.676)	(0.662)
SIZE_SQ	–0.099***	–0.089***	–0.107***	–0.089***	–0.110***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.025)
COST_INCOME	–7.028***	–6.894***	–7.652***	–6.911***	–6.302***
	(0.173)	(0.174)	(0.163)	(0.174)	(0.178)
E_TA	1.907**	1.771*	0.813	1.692*	1.692*
	(0.943)	(0.939)	(0.959)	(0.939)	(0.910)
LLP	60.124***	59.321***	62.551***	59.611***	55.327***
	(2.380)	(2.371)	(2.427)	(2.375)	(2.333)
LOAN	–0.092	0.074	–0.400	0.038	0.255
	(0.269)	(0.269)	(0.273)	(0.270)	(0.262)
GDP_INDEX	–0.097***	–0.099***	–0.089**	–0.086**	–0.105***
	(0.036)	(0.035)	(0.037)	(0.036)	(0.035)
BREAK					–0.478***
					(0.043)
Observations	2,366	2,366	2,366	2,366	2,366
R-squared	0.767	0.770	0.756	0.771	0.785
Adj. R-squared	0.703	0.707	0.690	0.708	0.726

Notes: This table reports the results of a panel data regression fixed effect. Regression coefficients are reported with standard error in parenthesis. The dependent variable is the measure of risk-adjusted performance (SHROA). DIV_REV measures revenue diversification between interest and non- interest income. DIV_NON measures revenue diversification between fee and commission income on one hand, and net results from financial operations on the other. PRP_NON and PRP_COM measure the share of non-interest income in total operating revenue and the share of fee and commission in total non-interest income. The following bank specific controls are included in the regression: SIZE is the natural logarithm of total assets in thousands of euro, SIZE_SQ is the squared term of SIZE, COST_INCOME is the ratio between personnel and other administrative expenses over intermediation margin, CAPITAL_RATIO is the ratio of equity to total asset, LLP is the ratio of loan loss provisions to net loans, LOAN is the ratio of total loans to total assets. Two macroeconomic controls are included as follows: GDP_INDEX is the annual growth rate of GDP, weighted for branches and provinces, and BREAK a dummy variable equal to zero for the years 2006, 2007 and 2008 and equal to one otherwise (2009, 2010 and 2011). For a definition of the variables, see Table 9.1. The observation period is 2006–2011.

***, **, * indicates statistical significance at 1%, 5% and 10% respectively.

Table 9.5 Revenue diversification, geographical diversification and performance of sample banks – size interaction effect

	(1)	(2)	(3)	(4)	(5)
VARIABLES	**SHROA**	**SHROA**	**SHROA**	**SHROA**	**SHROA**
Constant	10.646**	12.421***	20.885***	13.764**	3.467
	(4.773)	(4.760)	(5.773)	(5.781)	(5.669)
DIV_REV	–0.871**	–1.003***		–0.959***	–0.102
	(0.352)	(0.350)		(0.350)	(0.347)
PRP_NON	–6.737***	–10.342***		–10.429***	–8.433***
	(1.858)	(1.947)		(1.946)	(1.892)
PRP_NON x SIZE	0.424***	0.653***		0.657***	0.669***
	(0.133)	(0.139)		(0.138)	(0.134)
DIV_NON		–0.431**		–0.412**	–0.246
		(0.188)		(0.189)	(0.183)
PRP_COM		–3.318***		–3.236***	–2.963***
		(0.873)		(0.874)	(0.846)
PRP_COM x SIZE		0.189***		0.184***	0.206***
		(0.067)		(0.067)	(0.065)
HHI_GEO			–0.726	-0.638	–1.198
			(1.512)	(1.470)	(1.423)
HHI_GEO x SIZE			0.035	0.030	0.070
			(0.116)	(0.113)	(0.109)
SIZE	1.552**	1.545**	0.338	1.406*	2.312***
	(0.732)	(0.725)	(0.836)	(0.849)	(0.826)
SIZE_SQ	–0.137***	–0.143***	–0.102***	–0.139***	–0.156***
	(0.028)	(0.028)	(0.031)	(0.032)	(0.031)
COST_INCOME	–6.966***	–6.752***	–7.653***	–6.770***	–6.151***
	(0.174)	(0.175)	(0.163)	(0.176)	(0.179)
E_TA	1.974**	1.831**	0.813	1.754*	1.754*
	(0.941)	(0.933)	(0.959)	(0.934)	(0.904)
LLP	60.443***	59.308***	62.555***	59.615***	55.257***
	(2.376)	(2.361)	(2.428)	(2.366)	(2.322)
LOAN	–0.147	0.037	–0.396	0.004	0.230
	(0.269)	(0.268)	(0.274)	(0.269)	(0.261)
GDP_INDEX	–0.094***	–0.089**	–0.089**	–0.076**	–0.095***
	(0.036)	(0.035)	(0.037)	(0.036)	(0.035)
BREAK					–0.483***
					(0.043)
Observations	2,366	2,366	2,366	2,366	2,366
R-squared	0.768	0.773	0.756	0.774	0.788
Adj. R-squared	0.705	0.711	0.690	0.711	0.729

Notes: This table reports the results of a panel data regression fixed effect. Regression coefficients are reported with standard error in parenthesis. The dependent variable is the measure of risk-adjusted performance (SHROA). DIV_REV measures revenue diversification between interest and non- interest income. DIV_NON measures revenue diversification between fee and commission income on one hand, and net results form financial operations on the other. PRP_NON and PRP_COM measure the share of non-interest income in total operating revenue and the share of fee and commission in total non-interest income. HHI_GEO measures geographical diversification. The following bank specific controls are included in the regression: SIZE is the natural logarithm of total assets in thousands of euro, SIZE_SQ is the squared term of SIZE, COST_INCOME is the ratio between personnel and other administrative expenses over intermediation margin, CAPITAL_RATIO is the ratio of equity to total asset, LLP is the ratio of loan loss provisions to net loans, LOAN is the ratio of total loans to total assets. Two macroeconomic controls are included as follows: GDP_INDEX is the annual growth rate of GDP weighted for branches and provinces and BREAK a dummy variable equal to zero for the years 2006, 2007 and 2008 and equal to one otherwise (2009, 2010 and 2011). For a definition of the variables, see Table 9.1. The observation period is 2006–2011.

***, **, * indicates statistical significance at 1%, 5% and 10% respectively.

the non-interest income component (PRP_NON) the results appear consistent with the previous ones (see Table 9.4) except for the case of the crisis break (column 5). The positive effect linked to the non-interest component in the post-crisis period is mainly absorbed by the size effect, suggesting and reinforcing the idea that large banks are better equipped to manage the crisis effect because of a greater functional diversification strategy (see Table 9.5 – column 5).

Considering the model with the break dummy (column 5) the bank profitability is, in fact, strictly related to the non-interest component while the interest margins are substantially nil and the volumes drastically reduced.

Similar results hold as we consider the interactive effect of the commission share of the non-interest income component (PRP_COM) and bank size. As a bank increases the share of the commission component as well as its size the impact in terms of risk-adjusted profitability is positive, whether or not the break crisis effect is taken into account. While the direct effect of the commission component appears to have a negative impact in terms of risk-adjusted profitability it becomes positive if the bank size increases. Once again, larger banks appear to be better equipped to manage non-traditional product diversification strategies.

Finally, as for the interactive effect between geographical variables and size it seems that geographical diversification benefits are not linked to the size of institutions. Once the size component is taken into account the diversification index considered both individually and interactively with size becomes statistically insignificant suggesting that the bank dimension crowds out the positive effect linked to the geographical diversification. As a bank becomes larger it may exploit the benefits of the spatial diversification directly inside its organizational structure, at least in terms of risk-adjusted profitability.

9.5 Conclusions

Both theoretical and empirical literature on diversification effects on bank performance appear to be critical and inconclusive. This is because many dimensions of diversification have to be taken into account and the relative effects on bank performance could be different during the financial crisis period investigated here. In this respect, the main results suggest that revenue and geographical diversification play a role in determining bank performance. The relative effects appear, however, to be different between larger and smaller banks suggesting different business strategies for different banks. As a bank increases its non-traditional

diversification strategy, as well as its size, the impact in terms of risk-adjusted profitability is positive whether or not the break crisis effect is taken into account. The result could be connected to the fact that larger banks are better equipped to manage risk linked to non-interest income activities than smaller ones.

Taking away bank attitudes towards the non-traditional segment also appears as important in the post-crisis period. During the turmoil period bank profitability is, in fact, strictly related to the non-interest components while the interest margins are substantially nil and the volumes drastically reduced. In other words traditional business strictly linked to lending activity becomes riskier given the current economic crisis.

Also geographical diversification appears to play a relevant role in affecting both risk and profitability; however, if the bank increases its geographical diversification approach as well as its size the final effect in terms of risk-adjusted profitability disappear. For the first time, we have tried to investigate both product and geographical diversification strategies on bank performance, taking into account the pre and post-crisis period. Our findings suggest that both functional and geographical dimensions play a role in determinaing bank performance. However, the geographical dimension benefits are internalized as the bank becomes larger.

Further interesting and innovative results come from the analysis of the recent financial crisis. The fact that bank profitability is, during the financial crisis, strictly related to the non-interest income components suggests that in the post-crisis period banks have to make efforts to find alternative business strategies, other than the traditional lending and trading activities. Further benefits are connected to bank size and geographical diversification suggesting some considerations for possible strategies of merger and acquisition during financial crisis periods.

These findings have, as expected, strategic implications for bank managers, regulators and supervisors in terms of the consequences on banks' performance and stability.

Notes

1. See Stiroh (2009) for a recent review of the literature.
2. Gross interest revenues are computed as: interest and similar income; interest and similar income on financial assets held for trading; interest and similar income on hedging derivatives.
3. Net results from financial operations include: net result from trading activities that principally comprise profits (losses) on trading and interest and similar

income on financial assets held for trading; net result from hedging activities which includes fair-value adjustments in hedge accounting and the net interest income from hedging derivatives; profits from sale of activities and repurchase of liabilities which is equal to the profits (losses) on disposal or purchase of loans, of financial assets available for sale and of financial liabilities; and net results from financial assets and liabilities designated at fair value.

4. In Acharya et al. (2006) the HHI index measures the degree of concentration/diversification among the sectors; differently the HHIGeo used in our paper measures the degree of concentration/diversification among the geographical Italian provinces. In Acharya et al. (2006) the sectorial index of concentration was measured in terms of loans. In absence of data on loans and deposits other authors (Alessandrini, Croci and Zazzaro, 2005) introduce a measure of market power based on the average value of the bank's market share in terms of branches in the provinces where it operates. We further modify this measure in terms of HHI so that the index is parameterized between 0 (maximum diversification) and 1 (maximum concentration). Similarly because of the lack of data on local deposits and loans Coccorese (2008) computes the HHI index on the basis of the geographical distribution of branch networks. A similar revised measure of the geographical diversification is then recently proposed by Cotugno and Stefanelli (2012).
5. Defined as the ratio of net results from ordinary activities to total assets.
6. The variables introduced are concatenated and if we insert them altogether a multicollinearity problem arises. In this sense, as underlined in Chiorazzo et al. (2008), the reason to excluded one component share is justified in order to avoid perfect collinearity. On this topic, see also Mercieca et al. (2007).
7. Note that our results are based on an unbalanced dataset so the number of observation varies over the investigated period.

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10

Intermediation Model, Bank Size and Lending to Customers: Is There a Significant Relationship? Evidence from Italy: 2008–2011

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10.1 Introduction

The global financial crisis started in 2007, the economic downturn which followed and, the effects of the sovereign debt crisis, caused a relevant slowdown in banks' lending in Italy. As reported by the Bank of Italy (2008, 2009, 2010, 2011) banks' lending to customers slowed down consistently between 2008 and 2011, in spite of a slight recovery registered in 2010. Although basically widespread, this phenomenon was more intense for the larger banks than for the smaller ones, mainly reflecting different funding constraints. In particular, large intermediaries generally faced more difficulties in wholesale funding on the interbank market, especially after the start of the global financial crisis in 2007 (Bank of Italy, 2008) and cause of the effects of the sovereign debt crisis (Bank of Italy, 2011; Albertazzi et al., 2012).

The heterogeneity by bank size which emerged from the trend of loans to customers is suitable for a more in-depth analysis. Understanding how the financial crisis affected banks' lending to customers, by investigating the main differences shown between banks of different sizes and looking at how they are characterized by different intermediation model features, it could be useful to think over the main constraints and determinant factors which contribute to influence the supply of loans to customers. In this chapter we will use data from the financial statements of about 500 Italian banks for the period between 2008 and 2011 to examine whether the heterogeneity

by bank size shown in the trend of loans to customers is significant and to what extent this heterogeneity can be explained by the differences identified in the main features of the intermediation model adopted by banks. The underlying idea is that credit supply policies adopted by banks are influenced by the specificities of the intermediation models of reference and by the related underlying management strategies. Different funding and lending policies, as well as different balance sheet assets and liability composition strategies, correspond to different vulnerabilities regarding the exogenous conditions and also different financial and capital constraints on the credit supply. Therefore, the heterogeneity in how the loans to customers develop could also be explained by differences in terms of intermediation model features.

Although the empirical literature on the lending activity of banks is ample, in our opinion the relationship between the trend of loans to customers by bank size and the intermediation model features of banks has not been fully investigated yet. At this stage, we have not found any comprehensive literature that looks at the intermediation model as a whole. In this paper we look at the intermediation model in a complete and systemic way, considering the assets composition, the liabilities composition, the financial structure and the income composition and investigating their relationship with the trend of loans to customers.

The research deepens the analysis conducted by Tutino, Colasimone and Brugnoni (2013), by extending the time frame to 2011, improving the sample of banks quantitatively and qualitatively, and implementing an econometrical methodology in order to determine if the evidence that emerged through the descriptive analysis can be confirmed and if the econometrical approach strengthens and adds significance to the results achieved from the analysis. The research differs from other contributions in terms of the following aspects: the size, the composition and the representativeness of the sample; the way we designed the sample; our focus on bank size; the way we identify the intermediation model; and the methodology adopted. Looking at the Italian banking reality, both the analysis of the credit development by bank size and the investigation of the significance of the intermediation model features, seem to be of significant relevance. First of all, the Italian financial system is notoriously bank-based. Therefore, distortions in the credit supply may have a sizeable impact on the economy (Gambacorta and Mistrulli, 2011). Second, the Italian banking system is characterized by evident size heterogeneity, as many small and minor local banks coexist with a significantly lower number of larger and multinational banks. Third, as already highlighted, the crisis had a different impact on banks according to their different size, with the top five banking

groups suffering relatively more from the drying-up of wholesale funding markets than smaller intermediaries (De Mitri, Gobbi and Sette, 2010).

The chapter is structured as follows. Section 10.2 reviews the main recent studies carried out on lending to customers, banking intermediation and business models. Section 10.3 illustrates the dataset and the sample of banks analysed. Section 10.4 specifies the methodology. Section 10.5 shows the main descriptive empirical evidence by bank size, focusing on the loan trend to customers and on the main characteristics of the intermediation models adopted by banks over the period analysed. Section 10.6 reports and comments the results of the econometrical estimations. Section 10.7 concludes the chapter, summarizing the main findings and expressing some closing remarks.

10.2 Literature review

The lending activity of banks has always attracted the interest of researchers keen to analyse its main features and determinant factors. Strahan (2008) provides an interesting international literature review on the relationship between the bank structure and the way it affects the lending provision of banks. In particular, he looks at the main contributions published before the financial crisis started in 2007, dealing with the significance of the role played by bank size and deposit-lending synergies in affecting the lending activity of banks. Therefore, for a comprehensive overview of the main international empirical literature published before the financial crisis started in 2007, Strahan (2008) certainly represents a point of reference.

From the beginning of the financial crisis in 2007, studies on the lending activity of banks have caused increasing interest among authorities, regulators, scholars and practitioners wishing to investigate its main features and determinant factors, including the characteristics of the intermediation and business model adopted by banks and their ability in affecting lending policies, risk profile and the profitability of banking intermediaries. In this section we look in particular at the empirical literature published after the beginning of the financial crisis in 2007, mainly focusing on papers investigating the Italian banking system, while some of the papers deal with European banks. As our analysis specifically focuses on Italian banks and does not aim to make any comparison with foreign intermediaries, we believe it is more important to include and consider our paper among studies mainly regarding the Italian banking system, as the lending activity of banks is, inevitably,

strongly affected by country-specific economic environments and by the specificities of the banking system under consideration.

Panetta and Signoretti (2010) and Del Giovane et al. (2011) focus on the role played by demand and supply factors in affecting the trend of loans to customers in Italy between 2007 and 2009. Other studies investigate the significance of certain banks' specific features in terms of financial structure, capital constraints, business models and the intensity of the customer relationship in affecting the credit supply policies adopted by Italian banks during the financial crisis that started in 2007 (Albertazzi and Marchetti, 2010; De Mitri et al., 2010; Di Battista, Nieri and Patarnello, 2010; Di Battista and Nieri, 2011; Gambacorta and Mistrulli, 2011; Bonaccorsi di Patti and Sette, 2012). For a detailed review on these contributions see Tutino et al. (2013).

Di Battista and Nieri (2012) extend the analysis conducted in Di Battista and Nieri (2011) and in Di Battista et al. (2010) by using data from a sample of 40 banking intermediaries (including 29 banking groups and 11 independent banks) representative of 84 per cent of the Italian banking system, to compare the credit policies adopted by banks over the period between December 2009 and June 2011 (second period) with the previous 18 months, from June 2008 to December 2009 (first period). Although the homogeneity among the sample increases compared with the heterogeneity that emerged in the first period, banks found to be more dynamic in providing loans in the second period show similar characteristics to the most dynamic banks in the first period. In particular, banks whose loans increased at higher rates than the average, are basically characterized by smaller size (approximated by the total assets volume), by higher capitalization, by a financial structure more oriented towards funding from customers and by a business model more oriented to credit intermediation. Moreover, in contrast to the first period, the most dynamic banks show a better quality of loans portfolio (approximated by the incidence of the non-performing loans on the total amount of loans). To verify if, in a period characterized by funding difficulties and financial constraints, banks preferred lending to customers in spite of other investments, as in financial assets, the authors compared the growth rate of loans to customers with the incidence of loans on total assets. They found that, while in the first period few banks show simultaneously positive growth rates of loans and decreasing loans to total assets ratios, in the second period their number increases, suggesting that banks started focusing their growth more and more on investments other than on loans. Finally, the authors use data from a sample of 160 individual banks, representative

of 65 per cent of the Italian banking system in terms of total amount of loans, to verify the relationship between loan growth, riskiness of loan portfolios and profitability between 2007 and 2010. The analysis basically shows that banks, which registered higher loans growth rates between 2007 and 2009, were affected by more intense quality deterioration in loans portfolios, with no significant advantages in terms of profitability. This evidence leads to the assumption that the most dynamic intermediaries in lending, over the period analysed, continued supporting their customers, providing loans without rigorously incorporating the credit risk taken on the price charged on provided loans. Alternatively, they could have adopted more aggressive pricing policies in order to capture a stronger market share in the context of a generalized slowdown of lending activity.

Felici et al. (2012), used data on around 1.9 million mortgages to households granted between 2004 and 2007 and between 2008 and 2011 to investigate the effects of the crisis on this segment of the credit market. The analysis shows that between 2008 and 2011 the number of mortgages provided by banks to households reduced by over 20 per cent compared to the previous four years between 2004 and 2007, with more relevant effects for younger borrowers and borrowers originally from countries not belonging to the European Union. The analysis suggests that, after the crisis, banks, when providing mortgages, adopted more selective lending policies, especially with riskier borrowers. This assumption is confirmed by the lower incidence of non-performing loans in the first two years after the granting of the loan for mortgages provided in 2009 and 2010, compared to those provided between 2006 and 2008. Finally, the analysis shows that the contraction of mortgages was more intense for larger intermediaries, which were more affected by the wholesale funding difficulties and by the increasing financial and capital constraints than smaller intermediaries.

Albertazzi et al. (2012) and Bofondi, Carpinelli and Sette (2013) focus on the effects of the sovereign debt crisis in terms of the development of loans to customers. Albertazzi et al. (2012) use aggregate data on funding and loans rates, lending quantities and income statements, for the period between 1991 and 2011, in order to quantify the effects of sovereign debt market tensions on the banking activity in Italy. In particular, they investigate the effects of changes in the BTP-Bund spread on the cost of funding for intermediaries, on the cost and availability of loans to firms and households, and on the main items on banking income and loss statements. With regard to funding costs, the analysis shows that an increase in the spread is associated with a sizeable rise in

the remuneration on longer-term deposits, on repurchase agreements and on bonds, but not on overnight deposits. In particular the cost of funding seems to be affected with at least a one quarter lag and with strengthened effects during crises. Also for interest rates on loans, the authors find that an increase in the spread determines significant positive effects on the interest rates charged on loans to firms and on mortgages to households. As for the cost of funding, effects on interest rates for loans are one quarter lagged and results are stronger during the crises, while transmission is quantitatively larger than that observed on passive interest rates. In particular, the recent sovereign tensions contributed to an increase in interest rates on loans to firms and households by, respectively, 170 and 220 basis points. According to the authors, these effects basically reflect the increase in the marginal cost of funding for intermediaries, with the interest rate on term deposits as a proxy. Regarding the development of loans, the analysis shows that an increase in the spread caused a significant direct effect on the dynamics of lending to both firms and households, in addition to the indirect effect occurring through higher interest rates and the consequent lower demand for credit. In particular, the recent sovereign tensions contributed to a reduction in the annual growth of loans of about 2 percentage points. Finally, the authors find that tensions in the sovereign debt market have a significant negative impact on the profitability of the five largest Italian banking groups, affecting all the main items on the income and loss statements. For the Italian banking system as a whole, however, the analysis shows a negative effect only for loan loss provisions, a mildly positive effect for the net interest income and no effect on the other revenues. According to the authors, this finding is likely to reflect the lesser importance of wholesale funding for the smaller intermediaries and the weaker responsiveness of their non-interest income to market conditions.

Bofondi et al. (2013) study the impact of the recent sovereign debt crisis on the lending activity of Italian banks for a sample of 670,000 bank-firm relationships between December 2010 and December 2011, drawn from the Italian Central Credit Register. In particular they investigate the heterogeneous impact of the crisis across Italian and foreign banks operating in Italy in terms of: loan provision, interest rates charged, willingness to accept new applications and to terminate existing relationships during the transition between the pre-crisis and the crisis periods. The analysis shows that Italian banks tightened their supply of credit after the sovereign crisis erupted, both in terms of quantities and prices. Lending by Italian banks grew by 3 percentage points less and the interest

rates charged were 15 to 20 basis points higher with respect to foreign banks operating in Italy. As firms were not completely able to fully substitute for the decrease in lending of Italian banks during the crisis by increasing lending by foreign banks, the sovereign crisis exerted a significant aggregate effect on credit supply. Moreover, the analysis shows that the heterogeneities that emerged between Italian and foreign banks do not seem to be due to differences in banks' balance sheet characteristics. They also find that Italian banks increased the growth of credit to a lesser extent than subsidiaries of foreign banks, while it emerges that there was no significant difference in credit granted between domestic banks and branches of foreign banks, despite the fact that the latter enjoyed better access to funding than domestic banks. In contrast, both subsidiaries and branches appear to increase the cost of credit less than Italian banks. Looking at the differential behaviour of Italian and foreign banks in accepting new loan applications and terminating existing relationships as the sovereign crisis erupted, the analysis shows that foreign banks, while tightening credit less with respect to Italian banks, did not relax their selectivity criteria, but increased it, being more likely to cut credit and maintain very high rejection rates. The authors interpret this finding by assuming that foreign banks basically flew to quality during the crisis, by concentrating on supporting less fragile borrowers.

Other studies contribute to identifying the main features of the banking business model and investigating the significance of its relationship with bank risk and performance (Altunbas, Manganelli and Marqués-Ibáñez, 2011; Ayadi, Arbak and De Groen, 2011, 2012; Birindelli and Patarnello, 2012). Altunbas et al. (2011) analyse a sample of over 1,100 listed banks from Europe and the United States, for the period between 2007 and 2009, to investigate how risk relates to bank business models. Their analysis shows that institutions with higher risk exposure had less capital, a larger size, greater reliance on short-term market funding and aggressive credit growth. Moreover, business models related to significantly reduced bank risk were characterized by a strong deposit base and greater income diversification. According to the authors, this evidence supports the Basel III prudential regulatory initiatives and the call for supervisors to enhance their knowledge of the impact of different business models on bank risk. Ayadi et al. (2011) analyse a sample of 26 large European banks and banking groups, for the period between 2006 and 2009; these are divided by business model (*retail bank*, *investment bank*, *wholesale bank*) through a cluster analysis, and the main characteristics and differences in terms of capitalization, risk and performance are investigated. They show that the *retail* banks

were more capitalized, less exposed to risks and more profitable, while *wholesale* banks had the worst profit, mainly due to the relevant trading losses. Meanwhile, *investment* banks show high leverage and volatile profitability. The authors conclude that the characteristics shown by the riskiest intermediaries justify the recent regulatory reforms concerning leverage, stable funding and capital of better quality. Ayadi et al. (2012) develop the research conducted in Ayadi et al. (2011) by expanding the sample to 70 European banks and banking groups between 2006 and 2010 and considering the *retail-focused bank* business model and the *retail-diversified bank* business model in place of the *retail bank* business model analysed in their previous research. The differences between these two retail models concern the funding: more stable and mainly focused on deposits from customers for the *retail-focused bank* business model; more market-focused for the *retail-diversified bank* business model. The analysis demonstrated different exposures to risk in the four cases analysed. For example: the *wholesale* banks and the *investment* banks show leverage lower than the Basel III requirement of 3 per cent; the *wholesale* banks and the *retail-focused* banks show higher risk in a downturn period, therefore they have a higher capital requirement. For the authors, the analysis suggests a better alignment of the regulatory initiatives with the implicit risk of the different business models, contradicting the '*one-size-fits-all regulatory paradigm*'. Birindelli and Patarnello (2012) investigate whether some of the features of the business model adopted by banks are significantly related to their risk. The sample analysed includes the 71 European banks subjected to the capital exercise conducted by the European Banking Authority in 2011. In particular, the authors identify the intermediation model with the following variables: bank size as total assets volume; interest expenses on deposits from customers to net income ratio; net loans to bearing assets ratio; net loans to banks to bearing assets ratio; financial assets and derivatives to bearing assets ratio; long-term funding to total funding ratio; tangible common equity to tangible assets ratio; equity to total assets ratio, interbank assets to interbank liabilities ratio; non-performing loans to loans ratio; loan loss provisions to net income ratio. The risk of banks is identified by the shortfall required by the European Banking Authority, from the banks in the sample, in order to increase their Core Tier 1 ratio to 9 per cent. The analysis shows that bank size, the interest expenses on deposits from customers to net income ratio, the long-term funding to total funding ratio, the tangible common equity to tangible assets ratio and the non-performing loans to loans ratio are negatively significant: as they increase, the bank risk decreases. Otherwise, the net loans to

bearing assets ratio, the net loans to banks to bearing assets ratio, the financial assets and derivatives to bearing assets ratio, the equity to total assets ratio, the interbank assets to interbank liabilities ratio and the loan loss provisions to net income ratio are positively significant: as they increase, the bank risk increase.

10.3 Data and sample

The analysis has been conducted on data from the financial statements of around 500 Italian banks for the period between 2008 and 2011.

Data has been extracted from *ABI Bilanci Fast*. This database, supplied by the Italian Banking Association, collects individual and consolidated financial statement data from almost all the banks and the banking groups belonging to the Italian banking system, except for data related to foreign banks' branches operating within the Italian banking system. Once extracted, data has been verified by several checks in order to test its correctness. Identified mistakes have been corrected by comparing data included in the database with that published by banks on their official financial statements. The aim has been to guarantee the quality of the input data of the analysis as much as possible, therefore making its final results more significant.

In order to conduct the analysis by bank size, the sample has been divided into five size classes – *major banks, large banks, medium banks, small banks, minor banks* – according to the classification designed by the Bank of Italy following the criteria reported in Table 10.1.[1]

Table 10.1 Bank-size classification

		Average intermediated funds (1)
BANK SIZE	Major banks	More than 60 billion euro.
	Large banks	Between 26 and 60 billion euro.
	Medium banks	Between 9 and 26 billion euro.
	Small banks	Between 1.3 and 9 billion euro.
	Minor banks	Less than 1.3 billion euro.

(1) Weighted average of the intermediated funds from the last five quarter before the valuation date, assigning weight 1 to the final quarters and weight 2 to the middle quarters. The lower weighting assigned to the final quarters of the year enables us to mitigate the influence of distortions related to the typical seasonality of the data in December (Bank of Italy, 2010, Appendix, Methodological Notes, Table a17.7, p. 218). Volume of intermediated funds means volume of total assets.

Source: Bank of Italy (2010), Appendix, Methodological notes, Table a17.7, p. 218.

The sample has been designed by considering the same intermediaries throughout the four years analysed, while trying to manage as best as possible any event of change (mergers and acquisitions, placement under special administration[2], transformations from banks into financial intermediaries[3]). In this way, it is basically homogeneous over time and, therefore, more significant for the purposes of the research. Moreover, we paid particular attention ensuring that the incidence of the different classes of banks, in terms of the number of intermediaries included in the sample, would be as consistent as possible with respect to the Italian banking system. Table 10.2 reports information about the composition and the representativeness of the sample. Table 10.3 splits the composition of the sample by bank size.

The sample represents around 60 per cent of the Italian banking system in terms of number of intermediaries and total assets volume. The number of banks, equal to 496 in 2008 and 2009, falls to 490 in 2010 and to 476 in 2011. These variations are due to the mergers and acquisitions

Table 10.2 Sample representativeness by number of banks and total assets volume (in million/euro)

	Italian banking system	**Sample**	**Sample representativeness (1)**
	2011	**2011**	**2011**
Total number of banks	741	476	64.24%
Total assets volume	4,042,243	2,250,647	55.68%
	2010	**2010**	**2010**
Total number of banks	761	490	64.39%
Total assets volume	3,750,113	2,222,793	59.27%
	2009	**2009**	**2009**
Total number of banks	789	496	62.86%
Total assets volume	3,690,692	2,420,248	65.58%
	2008	**2008**	**2008**
Total number of banks	800	496	62.00%
Total assets volume	3,634,564	2,371,156	65.24%

(1) Ratio, respectively, between the number of banks included in the sample and the total number of banks in the banking system, and between the total assets volume of the banks from the sample and the total assets volume of the banks in the banking system.

Source: Own elaboration; data on the sample of banks is collected from *ABI Bilanci Fast*; data on the number of banks that are part of the Italian banking system are collected from Bank of Italy (2008, 2009, 2010, 2011), Appendix, Glossary, Banks; data on the total assets volume relating the Italian banking system is collected from Bank of Italy (2011), Appendix, 17. The activity of banks and financial intermediaries, Table a17.1, p. 144.

Table 10.3 Sample composition by bank size and comparison with the banking system

	Italian banking system				Sample			
	2011		2010		2011		2010	
Major banks	6	0.81%	5	0.66%	5	1.05%	4	0.82%
Large banks	9	1.21%	11	1.45%	4	0.84%	6	1.22%
Medium banks	31	4.18%	34	4.47%	19	3.99%	22	4.49%
Small banks	135	18.22%	142	18.66%	81	17.02%	85	17.35%
Minor banks	560	75.57%	569	74.77%	367	77.10%	373	76.12%
Total	741	100.00%	761	100.00%	476	100.00%	490	100.00%
	2009		2008		2009		2008	
Major banks	8	1.01%	8	1.00%	7	1.41%	7	1.41%
Large banks	12	1.52%	12	1.50%	7	1.41%	7	1.41%
Medium banks	35	4.44%	36	4.50%	22	4.44%	22	4.44%
Small banks	148	18.76%	151	18.88%	86	17.34%	86	17.34%
Minor banks	586	74.27%	593	74.13%	374	75.40%	374	75.40%
Total	789	100.00%	800	100.00%	496	100.00%	496	100.00%

Source: Own elaboration; data on the sample of banks is collected from *ABI Bilanci Fast*; data on the number of banks part of the Italian banking system is collected from Bank of Italy (2008, 2009, 2010, 2011), Appendix, Glossary, Banks; data on the total assets volume relating the Italian banking system is collected from Bank of Italy (2011), Appendix, 17. The activity of banks and financial intermediaries, Table a17.1, p. 144.

which involved some of the selected intermediaries through the period analysed, to the movement of some banks from one size group to another, to the placement under special administration of an intermediary in 2011 and to the transformation of a bank into a financial intermediary in 2011.

10.4 Methodology

To verify if a significant relationship between the development of loans to customers, the bank size and the main characteristics of the intermediation model does exist, we specified the following regression [10.1]. The dependent variable is the loans to customers growth rate ($LCGR_1$). The explanatory variables are the bank-size dummy variables (BS_{it}), the dummy variable identifying cooperative banks (CB_t), the assets composition variables (AC_{jt}), the interbank position variables (IP_{kt}), the liabilities composition variables (LC_{lt}), the financial structure variables (FS_{mt}) and the income composition variables (IC_{nt}).

$$\overbrace{LCGR_t}^{\text{Loans to customers growth}} = a_t + \underbrace{b_{it}BS_{it}}_{\text{Bank size}} + \overbrace{c_tCB_t}^{\text{Juridical connotation}} + \underbrace{d_{ji}AC_{jt} + e_{kt}IP_{kt} + f_{it}LC_{it} + g_{mt}FS_{mt} + h_{nt}IC_{nt}}_{\text{Intermediation model characteristics}} + \varepsilon_t \quad (10.1)$$

A bank's $LCGR_1$ for a specific year t has been calculated as follows [10.2].

$$LCGR_t = \frac{\text{Loans to customers}_t - \text{Loans to customers}_{t-1}}{\text{Loans to customers}_{t-1}} \quad (10.2)$$

In some cases, in order to manage mergers and acquisitions, $LCGR_1$ has been calculated differently. For example if in year t bank B has been incorapted into bank A. $LCGR_t$ in t has been calculated as follows [10.3].

$$LCGR_t = \frac{\text{Loans to customers}^A_t - \left(\begin{matrix}\text{Loans to customers}^A_{t-1} + \\ \text{Loans to customers}^B_{t-1}\end{matrix}\right)}{\left(\text{Loans to customers}^A_{t-1} + \text{Loans to customers}^B_{t-1}\right)} \quad (10.3)$$

The bank-size dummy variables (BS_t) identify banks by size according to the classification designed by the Bank of Italy following the criteria reported in Table 10.1. In particular, we included in the model the following five bank-size dummy variables: the major bank dummy variable (BS_MA_t); the large bank dummy variable (BS_LA_t); the medium bank dummy variable (BS_ME_t); the small bank dummy variable (BS_SM_t); the minor bank dummy variable (BS_MI_t). These variables could help to verify if the heterogeneity by bank size in the trend of loans to customers is significant, therefore confirming whether lending to customers was more intense, during the financial crisis, in the smaller banks or in the larger ones.

The cooperative bank dummy variable (CB_t) identifies the juridical connotation of banks as cooperative intermediaries. This variable could add elements of analysis by explaining the heterogeneity in the development of loans to customers. Cooperative banks are generally characterized by smaller sizes, traditional intermediation models and typically strong relationships with the surrounding environment. These characteristics could have positively influenced the trend of loans to customers

during the financial crisis. However, these features could also be caught by other variables.

The assets composition variables (AC_{jt}), the interbank position variables (IP_{kt}), the liabilities composition variables (LC_{lt}), the financial strucure variables (FS_{mt}) and the income composition variables (IC_{nt}) – specified in more detail in Table 10.4 – enable to identify the main characteristics of the intermediation model of banks, therefore distinguishing those more traditionally focused on credit intermediation with customers from those characterized by more diversified intermediation structures. In this way it could be possible to verify if the intermediation model matters in explaining the heterogeneities in the trend of loans to customers.

The analysis has been conducted separately on for each year in order to verify if the relationship investigated between the growth rate of loans to customers, the bank size and the characteristics of the intermediation model changes significantly over time according to different general economic scenarios and specific banking sector conditions. In particular, special attention has been given to 2009 – representative of the main impacts of the financial crisis on the real economy and on the trend of loans to customers; to 2010 – significant in demonstrating the first main effects caused by the recovery strategies adopted by banks; and to 2011 – affected by the impact of the sovereign debt crisis.

The regression [10.1] has been estimated adopting a standard OLS technique. We used the OLS technique because in this paper we do not aim to look at the causal relationship between the dependent variable and the independent ones, but we investigate the significance of the relationship between the loans to customers growth rate and the selected explanatory variables, considering the overall behavior of banks as a consequence of the management strategies adopted by banks. On the contrary, our findings would be biased by endogeneity problems. In general, the intermediation model characteristics – especially the assets composition, the financial structure, but also the income statement composition variables – are typically endogenous to the loans to customer decision process. For instance, the loans to customers on total assets variable is endogenous with the loans to customers growth rate.

The regression has been estimated adopting both a *stand-alone approach* and a *consolidated approach*, in order to verify if a consolidated approach of analysis enables us to add significance to the analysis and to reach different results[4]. However, although it shows marginal differences, the *consolidated approach* does not seem to add more significance to the research, nor does it find new and different evidence. Therefore, in the sections which follow we focused on the results from the estimations conducted adopting the

Table 10.4 Intermediation model variables

BALANCE SHEET COMPOSITION	Asset composition	AC_{jt}	LC_TA_t	$\frac{LC_t}{TA_t} = \frac{\text{Loans to customers}_t}{\text{Total assets}_t}$	Intermediation structure from the investment side
			LB_TA_t	$\frac{LB_t}{TA_t} = \frac{\text{Loans to banks}_t}{\text{Total assets}_t}$	
			FA_TA_t	$\frac{FA_t}{TA_t} = \frac{\text{Financial assets}_t}{\text{Total assets}_t}$	
	Interbank position	IP_{kt}	$NPIP\_TA_t$	$\frac{NPIP_t}{TA_t} = \frac{\text{Net positive interbank position}_t}{\text{Total assets}_t} = \frac{LB_t - DB_t}{TA_t} = \frac{\text{Loan to banks}_t - \text{Deposits from banks}_t}{\text{Total assets}_t}$ if $LB_t > DB_t$	
			$NNIP\_TA_t$	$\frac{NNIP_t}{TA_t} = \frac{\text{Net negative interbank position}_t}{\text{Total assets}_t} = \frac{DB_t - LB_t}{TA_t} = \frac{\text{Deposits from banks}_t - \text{Loan to banks}_t}{\text{Total assets}_t}$ if $LB_t < DB_t$	Intermediation structure from the funding side
	Liabilities composition	LC_{lt}	DB_TA_t	$\frac{DB_t}{TA_t} = \frac{\text{Deposits from banks}_t}{\text{Total assets}_t}$	
			DC_TA_t	$\frac{DC_t}{TA_t} = \frac{\text{Deposits from customer}_t}{\text{Total assets}_t}$	
			DS_TA_t	$\frac{DS_t}{TA_t} = \frac{\text{Debt securities in issue}_t}{\text{Total assets}_t}$	

FINANCIAL STRUCTURE	FS_{mt}	FL_TA_t	$\frac{FL_t}{TA_t}=\frac{\text{Financial liabilities}_t}{\text{Total assets}_t}$	
		LC_DFC_t	$\frac{LC_t}{DFC_t}=\frac{\text{Loans to customers}_t}{\text{Direct funding from customers}_t}=\frac{LC_t}{DC_t+DS_t}=\frac{\text{Loans to customers}_t}{\text{Deposits from customers}_t+\text{Dedt Securieties in issue}_t}$	Loan to customers to funding ratio
		FA_DFC_t	$\frac{FA_t}{DFC_t}=\frac{\text{Financial assets}_t}{\text{Direct funding from customers}_t}=\frac{FA_t}{DC_t+DS_t}=\frac{\text{Financial assets}_t}{\text{Deposits from customers}_t-\text{Debt securieties in issue}_t}$	Financial assets to funding ratio
		LR_t	$\frac{EQ_t}{TA_t}=\frac{\text{Equity}_t}{\text{Total assets}_t}$	Leverage ratio
INCOME STATEMENT COMPOSITION	IC_{n1}	NIM_OI_t	$\frac{NIM_t}{OI_t}=\frac{\text{Net interest margin}_t}{\text{Operating income}_t}$	Operating income composition
		NF_OL_t	$\frac{NF_t}{OI_t}=\frac{\text{Net fees}_t}{\text{Operating income}_t}$	
		OOI_OI_t	$\frac{OOI_t}{OI_t}=\frac{\text{Other operating income}_t}{\text{Operating income}_t}$	

Source: Own elaboration.

stand-alone approach. In our view, although the use of individual data from banks' financial statements does not enable to take into account the consolidated business policies and strategies which actually affect the lending policies adopted by banks that belong to banking groups, it enables to extend the study to a sample of intermediaries which are more representative of the Italian banking system's composition by bank size, making possible to conduct a more significant analysis by bank size. Moreover, as highlighted in Di Battista and Nieri (2012), considering individual financial statement data may give more significance to the econometric estimation, as the number of observations increases.

Before estimating the regression some of the explanatory variables have been excluded *ex ante,* in order to avoid evident multicollinearity problems. Regarding the bank-size dummy variables, we insert only four of the five bank-size dummy variables, skipping the medium bank dummy variable (BS_ME_t). Regarding the intermediation model explanatory variables specified in Table 10.4, as some of them relate to the same side of the balance sheet or to the same margin of the income statement, we excluded the loans to banks on total assets variable (LB_TA_t) and the deposits from banks on total assets variable (DB_TA_t) (as they include information already incorporated in the net positive interbank position on total assets variable ($NPIP\_TA_t$) and in the net negative interbank position on total assets variable ($NNIP\_TA_t$)), the financial liabilities on total assets variable (FL_TA_t) and the other operating income on operating income variable (OOI_OI_t). Therefore, after these *ex ante* exclusions, the explanatory variables effectively considered for the estimation of the regression [10.1] are the ones reported in Table 10.5. Although reduced, some multicollinearity problems – detected by the variance inflation factors (VIF) – could still persist. Therefore, to avoid these problems, we first estimated the regression on all the explanatory variables reported in Table 10.5. Then we performed a backward iteration to omit the less statistically significant variables. In particular, this iteration deletes at each step the less significant variable (the one with the highest p-value) until only variables with a p-value below 10 per cent remain. Moreover, we deleted from the sample a few outliers detected with the use of the *influence tool* (for details see Davidson and MacKinnon, 1993).

10.5 Main descriptive evidence

10.5.1 Loans to customers

Over the period analysed, the trend of loans to customers slowed down significantly, in spite of a slight recovery in 2010 (Table 10.6). The slowdown in the trend of loans to customers, started in 2008 and sharply

Table 10.5 Selected explanatory variables

BANK SIZE			BS_{it}	BS_MA_t	Major bank dummy
				BS_LA_t	Large bank dummy
				BS_SM_t	Small bank dummy
				BS_MI_t	Minor bank dummy
JURIDICAL CONNOTATION			JC_t	CB_{jt}	Cooperative bank dummy
INTERMEDIATION MODEL CHARACTERISTICS	BALANCE SHEET COMPOSITION	Asset composition	AC_{jt}	LC_TA_t	Loans to customers on total assets
				FA_TA_t	Financial assets on total assets
		Interbank position	IP_{kt}	$NPIP\_TA_t$	Net positive interbank position on total assets
				$NPIP\_TA_t$	Net negative interbank position on total assets
		Liabilities composition	LC_{lt}	DC_TA_t	Deposits from customers on total assets
				DS_TA_t	Debt securities in issue on total assets
	FINANCIAL STRUCTURE		FS_{mt}	LC_DFC_t	Loans to customers to direct funding from customers ratio
				FA_DFC_t	Financial assets to direct funding from customers ratio
				LR_t	Leverage ratio
	INCOME STATEMENT COMPOSITION		IC_{nt}	NIM_OI_t	Net interest margin on operating income
				NF_OI_t	Net fee on operating income

Source: Own elaboration

Table 10.6 Change in loans to customers between 2007 and 2011 by bank size – restated data[1]

	2011–2010 (%)	2010–2009 (%)	2009–2008 (%)	2008–2007 (%)
Major banks	–1.63	1.55	–1.66	–1.42
Large banks	–0.98	4.45	–0.50	2.23
Medium banks	–2.89	2.50	2.91	6.80
Small banks	–2.61	4.48	5.23	8.34
Minor banks	–1.03	7.62	6.52	12.30
Total	–0.26	7.77	1.14	8.28

[1] Data on the growth rates of loans to customers by bank size have been suitably restated, taking into account the changes which involved some of the banks included in the sample, as mentioned in Section 10.4. Restated data are highlighted in grey.

Source: Own elaboration on data from *ABI Bilanci Fast*

increased in 2009, when the effects of the financial crisis had manifested themselves more significantly on the real economy (Bank of Italy, 2009). After a slight recovery in 2010, reflecting the increased demand for loans due to the improved conditions in the productive sector (Bank of Italy, 2010), the lending to customers activity by banks contracted in 2011, mainly because of the economic downturn which followed the sovereign debt crisis (Bank of Italy, 2011).

Looking at the development of loans to customers by bank size, interesting heterogeneities emerge. In 2008 and in 2009 small and minor banks showed higher performance than larger intermediaries, in terms of lending to customers. In 2010 a relevant heterogeneity by bank size seems to exist, especially between major banks and minor banks, while in 2011 it does not emerge as clearly as in the previous years.

10.5.2 Intermediation model: assets composition, interbank position, liabilities composition, financial structure and income composition

Assets composition, interbank position and liabilities composition

Data on the balance sheet composition (Table 10.7) shows that the intermediation model adopted by the banks included in the sample is basically characterized by the prevalence of the funding–lending credit intermediation activity with customers, although with significant differences by bank size. The mainly traditional way of practising banking in Italy is therefore confirmed. Regarding intermediation with customers, data shows that loans to customers represent more than 50 per cent of the assets until 2009, increasing to around 60 per cent in 2010 and 2011, and deposits from customers represent around 34 per cent until 2009, increasing to around 40 per cent in 2010 and decreasing to 37 per cent in 2011. As for interbank intermediation, data shows a significant turnaround in the trend compared to previous years, when banks invested in the interbank market more than the amount they raised. This evidence emerge clearly from data on the net interbank position: until 2009 the interbank position is negative, while in 2010 and 2011 it becomes positive. The instability of the interbank market and the contingent issues related to liquidity management caused banks to reduce their exposure to other intermediaries, due to a general confidence crisis.[5]

Looking at the differences in terms of bank size, the data seems to identify fundamental specificities for the intermediation model: the smaller the bank, the more it looks oriented towards funding – lending credit intermediation activity with customers. Loans to customers and

Table 10.7 Balance sheet composition (percentage values)[1]

		Assets				Liabilities and Equity				
		2011	2010	2009	2008	2011	2010	2009	2008	
FINANCIAL ASSETS		Financial assets / Total assets								
	Major banks	9.74	10.12	7.24	6.01					
	Large banks	11.29	7.02	4.53	5.22					
	Medium banks	9.71	9.67	7.92	6.96					
	Small banks	12.40	11.27	10.66	10.47					
	Minor banks	16.07	15.18	15.88	15.30					
	Total	10.68	10.29	8.13	7.26					
INTERBANK		Loans to banks / Total assets				Deposits from banks / Total assets				INTERBANK
	Major banks	18.97	15.87	33.54	33.03	22.47	18.57	28.77	29.39	
	Large banks	15.85	12.57	20.16	22.18	28.45	20.49	16.19	17.19	
	Medium banks	10.86	17.84	20.13	22.99	23.51	21.67	19.52	23.44	
	Small banks	15.16	13.16	17.33	18.96	18.79	17.34	14.27	15.19	
	Minor banks	6.61	6.48	8.36	8.76	9.27	5.00	2.91	3.00	
	Total	16.09	14.89	26.31	26.91	21.55	18.17	22.51	23.73	
		Net positive interbank position / Total assets				Net negative interbank position / Total assets				
	Major banks	0.00	0.00	4.77	3.63	3.49	2.70	0.00	0.00	
	Large banks	0.00	0.00	3.97	4.99	12.60	7.92	0.00	0.00	
	Medium banks	0.00	0.00	0.61	0.00	12.64	3.83	0.00	0.45	
	Small banks	0.00	0.00	3.06	3.76	3.64	4.18	0.00	0.00	

Continued

Table 10.7 Continued

		Assets				Liabilities and Equity			
	Minor banks	0.00	1.48	5.45	5.76	2.66	0.00	0.00	0.00
	Total	0.00	0.00	3.80	3.18	5.46	3.28	0.00	0.00
		Loans to customers / Total assets				**Deposits from customers / Total assets**			
CUSTOMERS	Major banks	55.43	56.63	42.63	44.84	31.63	35.79	26.95	27.55
	Large banks	65.88	73.85	67.64	65.66	30.39	39.04	40.73	36.63
	Medium banks	72.38	62.65	62.40	59.90	42.36	39.64	38.41	36.63
	Small banks	65.33	69.05	65.64	64.01	47.26	48.67	50.62	48.03
	Minor banks	72.66	74.38	71.77	71.85	46.18	48.58	48.85	47.82
	Total	61.40	62.33	53.12	53.61	36.50	39.58	34.67	33.95
						Debt securities in issue / Total assets			
	Major banks					26.59	26.15	27.05	25.32
	Large banks					23.34	24.98	28.14	29.89
	Medium banks					17.48	15.61	18.67	19.92
	Small banks					19.92	19.02	19.99	20.78
	Minor banks					29.08	30.31	31.68	30.94
	Total					24.19	23.31	25.05	24.52

CUSTOMERS

	Financial liabilities / Total assets				**FINANCIAL LIABILITIES**
Major banks	6.26	4.42	3.40	3.63	
Large banks	6.82	4.81	4.67	5.74	
Medium banks	4.89	10.28	10.62	7.45	
Small banks	2.54	2.78	2.97	3.87	
Minor banks	3.37	3.32	3.49	4.63	
Total	5.34	5.26	4.70	4.59	
	Equity / Total assets				**EQUITY**
Major banks	9.16	11.27	10.14	9.89	
Large banks	6.93	7.05	6.43	5.89	
Medium banks	8.10	9.67	9.70	8.78	
Small banks	7.73	8.59	8.49	8.29	
Minor banks	9.75	10.38	10.78	10.85	
Total	8.68	10.15	9.56	9.17	

[1] This table has been specifically designed in order to highlight the composition of assets and liabilities by operating sectors: financial assets, interbank, customers; interbank, customers, financial liabilities, equity.

Source: Own elaboration on data from ABI Bilanci Fast.

deposits from customers represent an increasing proportion of assets and liabilities the more the bank size reduces. Loans and deposits on the interbank market generally represent a larger proportion, the more the bank size increases.

As for the other items on the balance sheet: financial assets, which represent a minority part of the total assets, look more relevant in the case of small and minor banks; debt securities in issue, that represent around one quarter of the liabilities, do not show any clear difference by bank size; the relevance of financial liabilities, although particularly limited, slightly increases as the bank size increases; regarding equity, no clear heterogeneity by bank size emerges.

Financial structure and income composition

Regarding the financial structure, a clear heterogeneity by bank size does not emerge (Table 10.8). On the other hand, income composition shows some heterogeneity by bank size (Table 10.9). The incidence of the net interest margin on the loans to customers seems to be relatively higher as the bank size decreases, while the other operating income increases as the bank size increases. Regarding net fees, no relevant heterogeneities emerge, except for minor banks, for which the ratio between net fee and operating income is systematically lower. The traditional connotations of the assets and liabilities structure seem to correspond with a prevalence in the income components attributable to the interest margin, rather than of the components related to other financial and securities intermediation activities and services provided by banks.

A positive relationship between the more or less traditional characteristic of the intermediation model adopted and the dynamism in the lending to customers seems to emerge. Larger banks, generally characterized by intermediation models less traditionally oriented towards credit intermediation with customers, registered a more relevant slowdown in the trend of loans to customers. Smaller banks, on the other hand, characterized by intermediation models more traditionally focused on credit intermediation with customers, registered a less intense slowdown. The difficulties found in terms of funding affected banks in varying intensities during the financial crisis, and this surely played a significant role in influencing their credit supply. The liquidity crisis and the operational difficulties which characterized the wholesale interbank market in the most acute years of the financial crisis undoubtedly affected the business of larger intermediaries, whose financing significantly depends on this funding channel[6]. On the other

Table 10.8 Financial structure (percentage values)

	2011	2010	2009	2008	2011	2010	2009	2008
	Loans to customers/Direct funding from customers				**Leverage ratio**			
Major banks	95.22	91.42	78.96	84.80	9.16	11.27	10.14	9.89
Large banks	122.61	115.36	98.22	98.71	6.93	7.05	6.43	5.89
Medium banks	120.97	113.40	109.30	105.92	8.10	9.67	9.70	8.78
Small banks	97.24	102.00	92.97	93.01	7.73	8.59	8.49	8.29
Minor banks	96.55	94.28	89.12	91.23	9.75	10.38	10.78	10.85
Total	101.16	99.10	88.94	91.68	8.68	10.15	9.56	9.17
	Financial assets/Direct funding from customers							
Major banks	16.72	16.33	13.41	11.37				
Large banks	21.01	10.96	6.58	7.85				
Medium banks	16.23	17.50	13.87	12.30				
Small banks	18.46	16.65	15.10	15.22				
Minor banks	21.36	19.25	19.72	19.43				
Total	17.60	16.36	13.62	12.42				

Source: Own elaboration on data from ABI Bilanci Fast.

Table 10.9 Income statement composition (percentage values)

	2011	2010	2009	2008	2011	2010	2009	2008
	Net interest margin/Operating income				**Net fee/Operating income**			
Major banks	46.46	48.70	53.43	57.44	33.10	32.37	31.24	30.34
Large banks	57.36	56.44	59.67	70.74	35.55	40.20	35.36	27.46
Medium banks	63.08	59.66	62.07	68.87	30.82	31.29	28.29	26.27
Small banks	61.22	58.88	60.49	69.13	35.27	35.11	31.42	28.45
Minor banks	73.42	71.52	70.68	82.34	24.97	25.86	21.75	18.25
Total	55.22	55.34	58.72	65.10	32.46	32.69	30.20	27.90
	Other operating income/ Operating income							
Major banks	20.44	18.94	15.33	12.22				
Large banks	7.09	3.35	4.98	1.80				
Medium banks	6.09	9.05	9.64	4.86				
Small banks	3.51	6.01	8.09	2.42				
Minor banks	1.61	2.62	7.57	–0.59				
Total	12.32	11.97	11.07	7.00				

Source: Own elaboration on data from ABI Bilanci Fast.

hand, smaller banks, which typically collect most of their funds from retail customers, were able to support their lending activity thanks to an availability of funds less affected by the consequences of the international financial turmoil[7]. As the incidence of credit intermediation activity increases in comparison to the other operating areas (financial and securities intermediation, provision of services, interbank intermediation) the availability and the interest to provide loans in times of crisis increases, with the likely intent of preserving the core business maintaining unchanged the relationships with customers. Similar considerations are also outlined in Di Battista et al. (2010) and in Di Battista and Nieri (2011).

10.6 Results of the estimations

Table 10.10 reports a synthesis of the results of the estimations. It compares the expected signs of the relationship between the investigated explanatory variables and the loans to customers' growth rate – accordant with the descriptive evidence that emerged in Section 10.5 – with the sign of the relationship as it results from the estimations, once excluded the less significant variables through the backward iteration as specified in Section 10.4. The results are reported in in detail in Tables 10.11–14. In general, the standard errors of the estimations conducted are robust, given that the White test strongly rejects the homoscedasticity hypothesis for 2008, 2009 and 2010, but not 2011.

10.6.1 Bank size

Bank size (BS_{it}) seems to be significant in explaining the development of loans to customers. In 2008 minor banks performed better in providing loans to customers. In 2009 banks characterized by smaller size (small banks and minor banks) registered more intense loans to customers growth rates ($LCGR_t$). Moreover, although marginally not statistically significant, the coefficients of the major bank dummy variable (BS_MA_t) and the cooefficient of the large bank dummy variable(BS_LA_t) were negative. This evidence could lead us to conclude that in 2009, while banks of smaller size (small banks and minor banks) continued to provide loans to customers relatively intensely, banks of larger size (major banks and large banks) performed less strongly in lending to customers. In 2010 minor banks continued to provide loans to customers more intensely. Moreover, although marginally not statistically significant, the coefficients of the small bank dummy variable (BS_SM_t) were positive. Therefore, also in 2010, banks of smaller size (small banks and

Table 10.10 Results of the estimation (synthesis 2008–2011)

				Expected	2008	2009	2010	2011
Bank size		BS_MA_t	Major bank dummy	–				
		BS_LA_t	Large bank dummy	–				–
		BS_SM_t	Small bank dummy	+		+		
		BS_MI_t	Minor bank dummy	+	+	+	+	
Juridical connotation		CB_{jt}	Cooperative bank dummy	+	–			–
Intermediation model characteristics	Assets composition	LC_TA_t	Loans to customers on total assets	+	–			
		FA_TA_t	Financial assets on total assets	–			+	
	Interbank position	$NPIP\_TA_t$	Net positive interbank position on total assets	+/–	–			–
		$NNIP\_TA_t$	Net negative interbank position on total assets	+/–				
	Liabilities composition	DC_TA_t	Deposits from customers on total assets	+		+		+
		DS_TA_t	Debt securities in issue on total assets	–				
	Financial structure	LC_DFC_t	Loans to customers to direct funding from customers ratio	+/–				+
		FA_DFC_t	Financial assets to direct funding from customers ratio	–	–	–		
		LR_t	Leverage ratio	+			–	–
	Income composition	NIM_OI_t	Net interest margin on operating income	+			–	+
		NF_OI_t	Net fee on operating income	–	–			–

Source: Own elaboration.

Table 10.11 Results of the estimations for 2008

Estimation including all the explanatory variables

		Coefficient	Std. Error	t-ratio	p-value
C	Constant	0.445369	0.277705	1.6037	0.10943
BS_MA	Major bank dummy	0.0789988	0.192996	0.4093	0.68248
BS_LA	Large bank dummy	–0.024484	0.122954	–0.1991	0.84225
BS_SM	Small bank dummy	0.050773	0.0435909	1.1648	0.24470
BS_MI	Minor bank dummy	0.10414	0.0513941	2.0263	0.04329**
CB	Cooperative bank dummy	–0.0591797	0.029229	–2.0247	0.04346**
LC_TA	Loans to customers on total assets	–0.541238	0.23484	–2.3047	0.02161**
FA_TA	Financial assets on total assets	–0.121555	0.220185	–0.5521	0.58117
NPIP_TA	Net positive interbank position on total assets	–0.988133	0.287054	–3.4423	0.00063***
NNIP_TA	Net negative interbank position on total assets	0.0673116	0.210199	0.3202	0.74894
DC_TA	Deposits from customers on total assets	0.337492	0.14942	2.2587	0.02436**
DS_TA	Debt securities in issue on total assets	0.276706	0.12609	2.1945	0.02868**
LC_DFC	Loans to customers to direct funding from customers ratio	0.0532332	0.0495731	1.0738	0.28344
FA_DFC	Financial assets to direct funding from customers ratio	–0.207968	0.147899	–1.4062	0.16033
LR	Leverage ratio	–0.171774	0.286689	-0.5992	0.54935
NIM_OI	Net interest margin on operating income	–0.122508	0.137847	–0.8887	0.37460
NF_OI	Net fee on operating income	–0.255062	0.110594	–2.3063	0.02152**

Mean dependent var.	0.105169	S.D. dependent var.	0.02152
Sum squared resid.	10.20971	S.E. of regression	0.146609
R-squared	0.161807	Adjusted R-squared	0.133573
F(16, 457)	2.842074	P-value(F)	0.000193
Log-likelihood	255.1665	Akaike criterion	–476.3331
Schwarz criterion	–404.9589	Hannan-Quinn	–448.3067

Estimation excluding the less significant explanatory variables

		Coefficient	Std. Error	t-ratio	p-value
C	Constant	0.565115	0.201461	2.8051	0.00523***
BS_MI	Minor bank dummy	0.0603392	0.0315828	1.9105	0.05666*
CB	Cooperative bank dummy	–0.0568471	0.0277068	–2.0517	0.04073**
LC_TA	Loans to customers on total assets	–0.434113	0.226026	–1.9206	0.05536*
NPIP_TA	Net positive interbank position on total assets	–0.864312	0.279514	–3.0922	0.00210***
FA_DFC	Financial assets on total assets	–0.288702	0.152837	–1.8890	0.05949*
NF_OI	Net fee on operating income	–0.200325	0.100791	–1.9875	0.04743**

Mean dependent var.	0.105169	S.D. dependent var.	0.157505
Sum squared resid	10.56488	S.E. of regression	0.147591
R-squared	0.132648	Adjusted R-squared	0.121918
F(8, 465)	3.530104	P-value(F)	0.001979
Log-likelihood	246.7544	Akaike criterion	–479.5089
Schwarz criterion	–450.1195	Hannan-Quinn	–467.9686

Source: Own elaboration on data from *ABI Bilanci Fast*.

Table 10.12 Results of the estimations for 2009

Estimation including all the explanatory variables

		Coefficient	Std. Error	t-ratio	p-value
C	Constant	0.20199	0.232271	0.8696	0.38494
BS_MA	Major bank dummy	–0.0376943	0.0579689	–0.6503	0.51585
BS_LA	Large bank dummy	–0.00553907	0.040013	–0.1384	0.88996
BS_SM	Small bank dummy	0.0527497	0.031879	1.6547	0.09865*
BS_MI	Minor bank dummy	0.0980653	0.038983	2.5156	0.01221**
CB	Cooperative bank dummy	0.00544604	0.0179527	0.3034	0.76175
LC_TA	Loans to customers on total assets	–0.289101	0.181301	–1.5946	0.11147
FA_TA	Financial assets on total assets	–0.0513404	0.209266	–0.2453	0.80630
NPIP_TA	Net positive interbank position on total assets	–0.243428	0.201422	–1.2085	0.22744
NNIP_TA	Net negative interbank position on total assets	0.0891064	0.118412	0.7525	0.45212
DC_TA	Deposits from customers on total assets	0.125604	0.10396	1.2082	0.22758
DS_TA	Debt securities in issue on total assets	–0.0149415	0.100706	–0.1484	0.88212
LC_DFC	Loans to customers to direct funding from customers ratio	–0.00197017	0.0115344	–0.1708	0.86445
FA_DFC	Financial assets to direct funding from customers ratio	–0.182438	0.049643	–3.6750	0.00027***
LR	Leverage ratio	0.0735551	0.270723	0.2717	0.78597
NIM_OI	Net interest margin on operating income	–0.0540462	0.114367	–0.4726	0.63674
NF_OI	Net fee on operating income	0.0650136	0.133564	0.4868	0.62666

Mean dependent var.	0.066376	S.D. dependent var.	0.107965
Sum squared resid	4.840911	S.E. of regression	0.099906
R-squared	0.150720	Adjusted R-squared	0.143715
F(8, 465)	10.15994	P-value(F)	6.62e-08
Log-likelihood	435.9592	Akaike criterion	–861.9185
Schwarz criterion	–840.9464	Hannan-Quinn	–853.6820

Estimation excluding the less significant explanatory variables

		Coefficient	Std. Error	t-ratio	p-value
C	Constant	–0.0847016	0.0289068	–2.9302	0.00355***
BS_MI	Minor bank dummy	0.0537418	0.0205873	2.6104	0.00932***
CB	Cooperative bank dummy	0.0829634	0.0183981	4.5093	<0.00001***
LC_TA	Loans to customers on total assets	0.190173	0.0427432	4.4492	0.00001***
NPIP_TA	Net positive interbank position on total assets	–0.0757515	0.0286038	–2.6483	0.00835***
FA_DFC	Financial assets on total assets	–0.0847016	0.0289068	–2.9302	0.00355***
NF_OI	Net fee on operating income	0.0537418	0.0205873	2.6104	0.00932***

Mean dependent var.	0.066376	S.D. dependent var.	0.107965
Sum squared resid	4.840911	S.E. of regression	0.099906
R-squared	0.150720	Adjusted R-squared	0.143715
F(8, 465)	10.15994	P-value(F)	6.62e-08
Log-likelihood	435.9592	Akaike criterion	–861.9185
Schwarz criterion	–840.9464	Hannan-Quinn	–853.6820

Source: Own elaboration on data from *ABI Bilanci Fast.*

Table 10.13 Results of the estimations for 2010

Estimation including all the explanatory variables

		Coefficient	Std. Error	t-ratio	p-value
C	Constant	0.225492	0.217229	1.0380	0.29978
BS_MA	Major bank dummy	0.08256	0.093466	0.8833	0.37752
BS_LA	Large bank dummy	0.0675	0.0548575	1.2305	0.21914
BS_SM	Small bank dummy	0.0794541	0.049163	1.6161	0.10673
BS_MI	Minor bank dummy	0.149773	0.0775069	1.9324	0.05391*
CB	Cooperative bank dummy	–0.0790976	0.0572648	–1.3813	0.16785
LC_TA	Loans to customers on total assets	0.0163464	0.192237	0.0850	0.93227
FA_TA	Financial assets on total assets	0.23837	0.243829	0.9776	0.32877
NPIP_TA	Net positive interbank position on total assets	–0.160978	0.219059	–0.7349	0.46279
NNIP_TA	Net negative interbank position on total assets	–0.0112647	0.14657	–0.0769	0.93877
DC_TA	Deposits from customers on total assets	0.047523	0.166286	0.2858	0.77516
DS_TA	Debt securities in issue on total assets	–0.082187	0.157619	–0.5214	0.60231
LC_DFC	Loans to customers to direct funding from customers ratio	–0.00192212	0.00210421	–0.9135	0.36146
FA_DFC	Financial assets to direct funding from customers ratio	–0.00424208	0.015084	–0.2812	0.77866
LR	Leverage ratio	–0.63065	0.222263	–2.8374	0.00474***
NIM_OI	Net interest margin on operating income	–0.189649	0.127744	–1.4846	0.13832
NF_OI	Net fee on operating income	–0.20885	0.175526	–1.1899	0.23470

Mean dependent var.	0.080932	S.D. dependent var.	0.163547
Sum squared resid.	11.46953	S.E. of regression	0.155884
R-squared	0.121302	Adjusted R-squared	0.091516
F(16, 457)	6.771858	P-value(F)	5.43e-14
Log-likelihood	223.6665	Akaike criterion	–413.3329
Schwarz criterion	–342.0628	Hannan-Quinn	–385.3402

Estimation excluding the less significant explanatory variables

		Coefficient	Std. Error	t-ratio	p-value
C	Constant	0.204626	0.0596516	3.4303	0.00065***
BS_MI	Minor bank dummy	0.0389909	0.0218267	1.7864	0.07466*
CB	Cooperative bank dummy	0.243659	0.100509	2.4242	0.01571**
LC_TA	Loans to customers on total assets	–0.550019	0.205191	–2.6805	0.00760***
NPIP_TA	Net positive interbank position on total assets	–0.184494	0.0800742	–2.3040	0.02164**
FA_DFC	Financial assets on total assets	0.204626	0.0596516	3.4303	0.00065***
NF_OI	Net fee on operating income	0.0389909	0.0218267	1.7864	0.07466*

Mean dependent var.	0.080932	S.D. dependent var.	0.163547
Sum squared resid	12.00806	S.E. of regression	0.157512
R-squared	0.080045	Adjusted R-squared	0.072442
F(8, 465)	4.312692	P-value(F)	0.001946
Log-likelihood	212.4478	Akaike criterion	–414.8956
Schwarz criterion	–393.9338	Hannan-Quinn	–406.6624

Source: Own elaboration on data from *ABI Bilanci Fast*.

Table 10.14 Results of the estimations for 2011

Estimation including all the explanatory variables

		Coefficient	Std. Error	t-ratio	p-value
C	Constant	0.0241976	0.11344	0.2133	0.83118
BS_MA	Major bank dummy	–0.016187	0.0320083	–0.5057	0.61330
BS_LA	Large bank dummy	–0.0282293	0.0274258	–1.0293	0.30388
BS_SM	Small bank dummy	0.00670572	0.0226547	0.2960	0.76737
BS_MI	Minor bank dummy	0.0263951	0.0286862	0.9201	0.35799
CB	Cooperative bank dummy	–0.0313834	0.0182708	–1.7177	0.08653*
LC_TA	Loans to customers on total assets	–0.0663643	0.115082	–0.5767	0.56445
FA_TA	Financial assets on total assets	–0.252933	0.13846	–1.8268	0.06839*
NPIP_TA	Net positive interbank position on total assets	–0.362717	0.124474	–2.9140	0.00374***
NNIP_TA	Net negative interbank position on total assets	0.0659659	0.0796773	0.8279	0.40815
DC_TA	Deposits from customers on total assets	0.299426	0.0670429	4.4662	0.00001***
DS_TA	Debt securities in issue on total assets	0.000467337	0.0782852	0.0060	0.99524
LC_DFC	Loans to customers to direct funding from customers ratio	0.00104212	0.00088394	1.1789	0.23903
FA_DFC	Financial assets to direct funding from customers ratio	0.084031	0.0475834	1.7660	0.07807*
LR	Leverage ratio	–0.350327	0.219261	–1.5978	0.11079
NIM_OI	Net interest margin on operating income	0.0430081	0.0161659	2.6604	0.00808***
NF_OI	Net fee on operating income	–0.236477	0.0845141	–2.7981	0.00536***

Mean dependent var.	0.029574	S.D. dependent var.	0.118455
Sum squared resid.	5.327157	S.E. of regression	0.107967
R-squared	0.197353	Adjusted R-squared	0.169252
F(16, 457)	7.635466	P-value(F)	4.71e-16
Log-likelihood	391.1715	Akaike criterion	–748.3429
Schwarz criterion	–677.6024	Hannan-Quinn	–720.5217

Estimation excluding the less significant explanatory variables

		Coefficient	Std. Error	t-ratio	p-value
C	Constant	–0.000767459	0.0298046	–0.0257	0.97947
BS_MI	Minor bank dummy	–0.0363684	0.0176274	–2.0632	0.03965**
CB	Cooperative bank dummy	–0.0308364	0.0116001	–2.6583	0.00812***
LC_TA	Loans to customers on total assets	–0.294006	0.0912884	–3.2206	0.00137***
NPIP_TA	Net positive interbank position on total assets	0.252206	0.0468677	5.3812	<0.00001***
FA_DFC	Financial assets on total assets	0.00153695	0.000531879	2.8897	0.00404***
NF_OI	Net fee on operating income	–0.37849	0.218905	–1.7290	0.08447*

Mean dependent var.	0.029574	S.D. dependent var.	0.118455
Sum squared resid	5.414947	S.E. of regression	0.107912
R-squared	0.184126	Adjusted R-squared	0.170089
F(8, 465)	5.668954	P-value(F)	6.92e-07
Log-likelihood	387.2976	Akaike criterion	–756.5952
Schwarz criterion	–719.1444	Hannan-Quinn	–741.8663

Source: Own elaboration on data from ABI Bilanci Fast.

minor banks) continued to provide loans to customers relatively more intensely. In 2011, the significance of bank size in affecting the growth rate of loans to customers emerges less clearly. The large bank dummy variable (BS_LA_t) was negatively related to the loans to customers growth rate. As for the other bank-size dummy variables, the estimations do not show anything significant. As highlighted also by the descriptive evidence (Section 5), while in the first part of the crisis the heterogeneity by bank size emerges clearly, later on it does not. Between 2008 and 2010, larger banks performed less intensely in providing loans to customers: they faced significant wholesale funding constraints and the need to reduce their level of risk-weighted assets in order to increase their capital ratios (Bank of Italy, 2008 and 2009). Meanwhile, smaller banks, characterized by better initial capital position and by stronger relationships with the surrounding local economy, gave higher priority to safeguarding long-term relationships with firms, even at the cost of taking on greater risks (Bank of Italy, 2008 and 2009). In 2011, while the effects of the sovereign debt crisis affected large banks the most, the real economy downturn and the consequent credit quality deterioration caused a widespread contraction in the loans to customers provision of banks (Bank of Italy, 2011), therefore attenuating the heterogeneity by bank size, as emerged before.

10.6.2 Juridical connotation

As for the juridical connotation (JC_t),the cooperative bank dummy variable(CB_t) is significant in explaining the loans to customer growth rate ($LCGR_t$) only in 2008 and 2011. However, the sign of the relationship is in contrast with our expectation. Empirical evidence suggests that cooperative banks are negatively related to the $LCGR_t$. Anyway, as the cooperative bank dummy variable (CB) could be strongly correlated with the minor bank dummy variable, as most of the minor banks are cooperatives, the significance of the juridical connotation variable could be affected by this aspect. Overall, the juridical connotation does not seem to be as relevant as expected: lending strategies could go beyond being or not a cooperative bank.

10.6.3 Intermediation model characteristics

Assets composition

Regarding the assets composition (AC_{jt}), the incidence of loans to customers on total assets (LC_TA_t) is negatively significant only in 2008. Otherwise, it emerges as non-statistically significant. This evidence is in contrast with our assumption, according to which banks whose assets

composition is more oriented to the loans to customers, showing a more traditionally customer-oriented intermediation model, would be performing better in providing loans to customers.

The incidence of financial assets on total assets (FA_TA_t) emerges as positively related in 2010, even if only after the backward iteration, given that it is not significant in the regression with all the variables.

Overall, the asset composition structure results are not significantly related to $LCGR_t$. What really matters are the lending strategies adopted by banks. Similar asset composition structures would not necessarily lead to similar lending policies. Banks with high levels of loans to customers to total assets might not wish to supply more loans to customers. Other banks, however, could be interested in stressing the asset composition towards a higher relevance of loans to customers as a competitive strategy. As already highlighted, in the first part of the crisis, some banks (mainly the smaller ones) performed better in providing loans to customers than others (mainly the larger ones), maybe in order to increase their market power. On the other hand, in the last part of the crisis, when the sovereign debt crisis took place and the real economy was strongly depressed, all the banks looked to act more similarly. Different assets composition structures did not correspond with differences in lending policies, but all the banks generally restricted their loans to customers provision.

Interbank position

In terms of the interbank position (IP_{kt}), the net positive interbank position ($NPIP\_TA_t$) is negatively significant in relation to the loans to customers growth rate ($LCGR_t$) in 2008 and in 2011. Otherwise, its results are not significant. Banks which invested more resources in the interbank market than the ones they borrowed provided loans to customers less intensely. The more financial resources are invested in the interbank market, the less are inevitably available for lending to customers.

On the other hand, the net negative interbank position ($NNIP\_T_t$) is not significant.

Liabilities composition

Regarding the liabilities composition (LC_{lt}), the estimation shows that banks characterized by a more customer-oriented funding composition – a higher incidence of deposits from customers on the total assets (DC_TA_t) –performed better in providing loans to customers both in 2009 and in 2011.

Nothing significant emerges about the incidence of debt securities in issue on total assets (DS_TA_t).

The more traditionally focused the funding structure, the more stable its results in sustaining the loans to customers provision.

Financial structure

In terms of the financial structure (FS_{mt}), banks characterized by lower leverage ratios (LR_t) registered more intense loans to customers growth rates ($LCGR_t$) in 2010 and 2011. In other words, banks with a higher level of equity compared to the total assets volume performed less intensely in providing loans to customers. However, the leverage ratio (LR_t) itself typically looks at the quantitative aspect of the financial structure, without dealing with its quality. What is really relevant is not the level of equity compared to the total assets volume, but the whole structure of the funding: its composition, its vulnerability and its stability in sustaining the lending activity of banks. Similar considerations are expressed in Tutino (2011).

Consistent with our expectations, the financial assets to funding ratio (FA_DFC_t) is negatively related to the loans to customers growth rate ($LCGR_t$), but only in 2008 and in 2009.

The loans to customers to funding ratio (LC_DFC_t) emerges as positively related in 2011: this evidence contrasts with our expectation, which was that the higher the loans to customers to funding ratio, the more stressed the structural liquidity equilibrium, and the lower the growth rate of loans to customers ($LCGR_t$).

Income composition

About the income composition (IC_{nt}), banks characterized by higher net fee on operating income (NF_OI_t) performed less intensely in providing loans to customers in 2008 and in 2011. In other words, banks whose operating income derive more from the business segment of the services providing, result as less performing in providing loans to customers. This evidence brings two possible alternative interpretations. On one hand, net fee could result relatively higher compared to the net interest margin, just because the reduction of the net interest margin lead by the lower lending providing. On the other hand, income based on fees from services providing could be so relevant to enable the bank not to increase the loans to customers supply and, therefore, to reduce their risk exposures.

As for the net interest margin on operating income (NIM_OI_t), evidence from the estimation are less clear.

In 2010 banks characterized by lower incidence of the net interest margin on operating income provided loans to customers more intensely. This evidence could lead to think over the possible adoption by banks

of pricing policies aimed to reduce the interest rates as a competitive strategy to capture a strongest market share in a context of a relevant slowdown of the lending activity of larger banks. In other words, the so called *interest rate effect* could have negatively affected the net interest margin. In this regard, Gambacorta and Mistrulli (2011) show that between the second quarter of 2008 and the first quarter of 2010 smaller banks and characterized by a business model more oriented to the lending activity increased the spread on loans to customers less than other intermediaries, maybe in order to preserve their customer relationship. At the same time, however, it should be considered that smaller banks may have not been able to correctly incorporate in the price charged on provided loans the credit risk effectively taken.

Otherwise, in 2011 banks characterized by higher incidence of net interest margin on operating income (NIM_OI_t) provided loans to customers more intensely. In this case, the incidence of the net interest margin on operating income could have been affected the most by the so called *volume effect*, deriving by the increase of the loans to customers. These considerations inevitably need future developments of the research.

10.7 Conclusions

In this chapter, based on a sample of around 500 Italian banks, we investigated if the bank size and the main intermediation model features are significant in explaining the development of loans to customers between 2008 and 2011. To a lesser degree, we also looked at the relationship between the juridical connotation of banks and the trend of loans to customers.

Regarding bank size, the descriptive evidence (Section 10.5) and the econometrical estimations (Section 10.6) show that it was significant in explaining the development of loans to customers. Over the period analysed, smaller banks performed better than the larger ones in providing loans to customers, although the heterogeneity by bank size in the development of loans to customers is less clear in 2011. While in the first part of the crisis larger banks performed less intensely in providing loans to customers, facing relevant wholesale funding constraints, in 2011, although, the effects of the sovereign debt crisis strongly affected larger banks because of their relevant exposure to the wholesale markets, the economic downturn and the strong quality deterioration which followed caused a widespread contraction in the loans to customers supply, reducing the heterogeneity by bank size in the lending behaviour of banks.

The relationship between juridical connotation and the trend of loans to customers is not relevant, suggesting that lending strategies could go beyond being or not a cooperative bank.

In terms of the intermediation model, the main descriptive evidence (Section 10.5) shows that smaller banks are generally characterized by a more traditionally customer-oriented intermediation model than the larger ones. As for the econometrical estimations (Section 10.6), results look much more diversified. The assets composition structure is not significantly related to the growth of loans to customers. As considered in Section 10.6, similar assets composition structures would not necessarily lead to similar lending policies. What really matters are the lending strategies adopted by banks: banks with high levels of loans to customers to total assets might not wish to supply more loans to customers; other banks, however, could be interested in pushing their asset composition towards a higher relevance of loans to customers, as a competitive strategy. Regarding the interbank position, the empirical evidence shows that the more banks invest in the interbank market, the less they provide loans to customers. As for the liabilities composition, deposits from customers on total assets are positively related to the loans to customers growth rate, suggesting that banks characterized by a more customer-oriented funding structure were more performing better in providing loans to customers. The financial structure appears to be related to the trend of loans to customers: banks characterized by lower leverage ratios registered more intense growth rates of loans to customers. As the equity increases compared to the total assets, financial resources available for lending decrease. Finally, in terms of income composition, banks whose operating income is derived more from the business segment of their services perform less well in providing loans to customers, while results on the incidence of net interest margin on operating income look less clear.

This evidences leads us to conclude that the heterogeneity in the development of loans to customers could also be explained by differences in the intermediation models, although less consistently. From intermediation models more traditionally oriented to credit-funding with customers activity there seems to emerge a stronger dynamism in the lending to customers activity of banks.

As pointed out in the introduction, credit supply policies adopted by banks could be – and effectively are – influenced by the specificities of the intermediation models and by the related underlying management strategies. Different funding and lending policies, as well as differentiated balance sheet assets, liabilities and income composition

strategies and financial structures, correspond to different vulnerabilities regarding the exogenous conditions and also different financial and capital constraints on the credit supply. At the same time, however, the banking management strategies and the business policies themselves are inevitably conditioned by the intermediation model feature and by the opportunities and constraints which follow. Moreover, even bank size could matter, affecting the intermediation model feature and the management strategies adopted by banks. For instance, in spite of their willingness, smaller banks could face more difficulties than larger intermediaries in terms of taking a consistently negative position on the interbank market. Therefore, the heterogeneity in the development of loans to customers can also be explained by differences in terms of intermediation model features and bank size, but it is affected by several endogenous and exogenous factors and their interactions.

Notes

Luca Riccetti's contribution to this chapter regards the methodological aspects concerning the application of the econometrical techniques.

1. For further information on the banks size classification designed by the Bank of Italy, see Bank of Italy (2011), Appendix, Methodological Notes, Table a17.7, p. 224; Bank of Italy (2010), Appendix, Methodological Notes, Table a17.7, p. 218; Bank of Italy (2009), Appendix, Methodological Notes, Table a17.7, p. 221; and Bank of Italy (2008), Appendix, Methodological Notes, Table a16.7, pp. 228–229. For a detailed list of the banks included in the different size groups see Bank of Italy (2008), Appendix, Glossary, Banks, pp. 305–307; Bank of Italy (2009), Appendix, Glossary, Banks, pp. 287–289; Bank of Italy (2010), Appendix, Glossary, Banks, pp. 288–290; and Bank of Italy (2011), Appendix, Glossary, Banks, pp. 307–309.
2. As specified by article 70 of the Legislative Decree 385/1993 and subsequent amendments (the Italian Consolidated Law on Banking) among the norms on the crisis management procedures (Title IV).
3. As specified by article 107 of the Legislative Decree 385/1993 and subsequent amendments (the Italian Consolidated Law on Banking) among the norms on the entities operating in the financial sector (Title V).
4. According to the *stand-alone approach* we estimated the regression on individual financial statements data for each bank included in the sample. According to the *consolidated approach* we estimated the regression on consolidated financial statement data for bank holdings of banking groups and on individual financial statement data for subsidiaries of banking groups whose holding is not included in the sample and for individual banks not belonging to any banking group, excluding data from subsidiaries of banking groups whose holdings are already included in the sample.
5. See La Ganga and Vento (2012).
6. See Mieli (2010) and Bonaccorsi di Patte and Sette. (2012).

7. «Banks which supported the development in loans to customers with a greater intensity during the financial crisis are also those generally characterized by a net positive position on the interbank market, a higher incidence of deposits from retail customers on total assets and a higher growth rate of this component of the liabilities» (Di Battista et al., 2010). «Banks that have a consistent and robust credit intermediation basis and are less dependent on wholesale funding have been less affected by the crisis» (Mottura, 2011).

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11

Good News, Bad News: A Proposal to Measure Banks' Reputation using Twitter

Vincenzo Farina, Giampaolo Gabbi and Daniele Previati

11.1 The need for new management practices for corporate reputation and reputational risk in the banking industry

The amount of literature and the research produced about reputational risk in banking has grown rapidly (some of the contributions are: Fiordelisi, Soana and Schwizer, 2012; Gillet, Hubner and Plunus, 2010; Sturm, 2013) due to the obvious responsibilities of the banking and financial industry in the economic crises that have emerged since 2007. In banking studies attention has been paid to reputational damage stemming from operational risk events and losses: as often, when debating risks in banking, more effort has been dedicated to *measuring* effect rather than understanding the real determinants of risks and losses, and offering suggestions about how to *manage* risks and their causes. Having noticed a lack of or insufficient information on corporate reputation (CR) and reputational risk (RR) in the banking industry in the mainstream literature, we try to go *back to basics* and justify, both theoretically and practically, the need for new approaches and practices. We think that it can be useful to pick up information on how stakeholders observe and exchange opinions about reputational facts and events connected with decision-making processes and actions inside the banks.

The roots of CR are to be found precisely in the decisions made and the actions undertaken by banks: facts and events being the consequences (i.e., the reputational objects evaluated by stakeholders). The evaluation may be positive or negative. Therefore reputation may be good or negative, to different degrees. Consequently, RR is not a pure risk, but

a speculative one, as market and credit risks are. It may be useful for all stakeholders involved in the banking industry to understand more clearly the gains and the losses than can arise from reputation level and volatility, their causes and the role of stakeholders themselves in influencing reputation, and the consequent rise of gains and losses.

Our research question can be expressed as follows: how can we go beyond traditional risk-management practices widespread in the banking industry and, using public information available from social media, how can we give a voice to different sections of the public and stakeholders?

In introducing the next two core sections of our paper, we would like to illustrate some theoretical and practical reflections that explain our research question and also to clarify thatat this stage of our research only some of these reflections have empirical consequences in our pilot study. We summarize our reflections in two points:

(a) the reasons why reputation (and reputational risk) in banking must not be limited to the risk-management framework, following a critical perspective of widespread risk-management practices (Power, 2004 and 2009; Mikes, 2009);
(b) the need to build new approaches and tools to measure reputation from a stakeholder perspective.

(a) The landscape of CR-research is very wide (Barnett and Pollock, 2012) and we can find different theoretical constructs (Rindova and Martins, 2012) and different ways to operationalize and measure CR (Dowling and Gardberg, 2012). There are different reputation models and different measures (Money and Hillenbrand, 2006) that help managers to decide what kind of reputation-building activities can be adopted for different stakeholders. There is a clear link between CR and RR, on one side, and stakeholder management (SM) and corporate social responsibility (CSR) on the other side. In SM and CSR (and, more generally speaking, in management) we find the key elements and drivers of reputation: in fact, stakeholders are among the real determinants of CR. Banks have a historically fundamental role in the economic and social development of society, and so their social responsibility is clear: if they evade it, there can be many negative consequences for the whole economy and society. In the banking industry SM and CSR in are developing more and more, as a reaction to reputation loss and an increase in RR. In the regulatory framework of the Basel Accord, attention is paid to specific risks (market, credit, operational): some of these are traditionally measurable (market and credit risks), some are more difficult to measure

(operational) but are subdued to capital requirements (first pillar of the Basel II Accord). The enterprise risk management (ERM) is a more general (and managerial) framework that was developed for focusing attention on risks that cannot be easily quantified or aggregated, but that are strategic for the bank. These non-quantifiable risks include the risks of strategic failure, environmental risks, reputational risks and operational risks that materialize only rarely. By enlarging the risk-management framework and incorporating non-quantifiable risks, ERM links typical risk management approaches with internal auditing, compliance and governance perspectives: in this manner, a new risk-management ideal (holistic risk management) is born (Mikes, 2009:25–26). The management of non-quantifiable risks must have different metrics and measurement approaches and tools to market and credit risks: for reputation and reputation risk we need more social-science-based approaches and tools and fewer statistics and mathematics. In any case, we think it is useful to listen carefully to some of the interesting criticisms stemming from managerial literature, which is not traditionally included in risk-management studies, and therefore avoids two opposite risks: the risk management of nothing (Power, 2009) and the risk management of everything (Power, 2004).[1]

CR literature and the risk-management regulatory framework have, of course, different cultural roots. It is interesting to compare a very well-known definition of CR (Fombrun, 1996:72), with that illustrated by Basel II Accord (Basel Committee on Banking Supervision, 2009:19). In both definitions we see that CR is a perceptual concept based on past actions; it can influence the company's (bank's) future; it is rooted in rational and emotional perspectives of analysis followed by stakeholders, filtered through their own experiences, expectations and perceptions with reference to the company (bank); it is fundamental for business continuity and competitive advantage. The main difference with the Basel definition is that only the negative side of reputation is emphasized, as investments in building reputation were an insurance policy against future losses.

A fall in reputation is likely to have asymmetric effects compared to an increase in reputation, most of all if, as often happens in the banking and financial world, there are contagion phenomena and a systemic diffusion of reputational effects. It is common wisdom that it takes years to build up reputation but that it can be lost in a very short time. With reference to banks, it seems that limiting the field of inquiry to risk-management frameworks, risk-management and internal control functions, when analysing CR and RR, can contribute to a narrowing

of the effective and strategic view of these topics. Therefore, we must look into *who*, *what* and *how* is relevant when we manage reputation in a company (bank). We cannot ignore – from a managerial perspective – the real determinants of reputation in the eyes of banks' internal and external actors, limiting our efforts to measure degrees of correlation between financial data (losses, size, liabilities to assets ratio, and so on) deriving from the banks' past decision and actions. We must expand our theoretical views and adopt wider perspectives, metric and measurement tools, that may be useful to try to prevent losses, to build good reputation and consequently to obtain gains.

(b) The business of banks and financial institutions is firmly built on reputation and trust, given the many potential information asymmetries and moral hazard behaviours. Effective reputation management in a bank must think of stakeholders in a very focused way, identifying experiences with the bank, needs and expectations and the resulting perceptions of each group of stakeholders (or segments within the group). To build effective reputation (and to prevent negative events and facts concerning reputation) the dialogue with stakeholders is fundamental: not only are communications, public relations and brand image useful, but it is also beneficial to gather opinions and take care and note of them when designing the products, services and organizational processes of the bank. Only with a focused stakeholder approach it is possible to identify opinions that have different weight on general reputation, judgement and ratings, and on the firm-level and systemic effects of corporate reputation and on its volatility. In our opinion, considering the current state of CSR and SM in the banking industry (Di Antonio, 2012), there is large possibility of improvement of CR and RR management practices, at macro (regulatory and control) and micro (firm, strategic) levels. Consequently, once the usefulness of CR is defined and RR management practices are *stakeholder-focused*, the question is how to pick up perceptions and opinions on many topics from many different sections of the public in an effective and efficient way? In addition, how many banks or financial institutions can invest money in dialogue channels with different stakeholder groups? Few large and medium-sized banks in the world have developed customer-relationship management (CRM) systems, customers and employees satisfaction surveys, focus groups, complaint tracking systems, integrated (internal and external) communication systems and departments, public relations, corporate social media (i.e., newsletters, radio, television, interactive websites, intranet, mail boxes for suggestions, communities of practice), departments specialized in managing relationships with

society and public authorities, and so on. Nonetheless, some of these testify that RR management is focused more on customers and products than on other stakeholders (Xifra and Ordeix, 2009).

Therefore, it is our opinion that with regard to CR and RR management, we have to cope with two issues in the banking industry at firm-level and at a macro-regulation level: the prevailing management culture orientation (still not in favour of concrete practices of stakeholder management) and the availability of effective methodology and tools for listening to different kinds of stakeholders.

11.2 Measuring reputational risk and social media

Reputation and trust are the hallmarks of good business, particularly for financial institutions. This is confirmed today not only as the banking credit and liquidity crisis unfolds globally – affecting all manner of financial institutions worldwide – but also by international surveys. This approach derives its rationale from the idea that corporate reputation is a 'public opinion for corporations' but with multiple 'publics' (i.e., constituencies or stakeholders, such as customers, employees, investors, regulators and the like). While plausible at first, the approach had initially limited practical use, both for companies and researchers, because of the complexity of reaching the complete audience involved. At first, public opinion was measured by surveys which only the largest companies could afford (see Fortune's Most Admired Companies and Global RepTrack Pulse). Some laboratory studies (Uhlmann et al., 2008; Jordan, Diermeier and Galinsky, 2008) have provided empirical support for the impact of reputational issues on customer perceptions and behaviour. Companies' response strategies do have an effect on customer perception and behaviour. Responses that focus on showing empathy, transparency, and commitment all have positive effects. Finally, evidence of past virtuous behaviour, a moral bank account, also has a positive effect, in the absence of other factors (Uhlmann et al., 2008).

These findings suggest an indirect approach to measuring reputation. Rather than using surveys or focus groups to assess the state of mind of constituencies, one can measure their 'input'. The behavioural link between media influence and stakeholder attitudes can be provided by the experimental micro-data on how stakeholder perception is formed. This was done by Uhlmann et al. (2008) for the case of customers. This leads to the next question on how to measure the 'input'.

Recent developments in information retrieval, machine learning, and natural language processing technologies provide a promising

path in this direction. A standard approach is to rely on annotated opinion corpora to train and test opinion retrieval, classification, and aggregation models. This approach has been used with considerable success in the classification of customer opinions. With these applications, the goal is to correctly classify reviews as 'positive' or 'negative'. These methods provide a natural approach to classifying corporate sentiment.

Another issue consists of the absence of existing texts related to corporate reputation that could be used to reliably train classifiers. To investigate these issues Yu, Diermeier and Kaufmann (2009) built a new corporate opinion corpus. The goal of the corpus was to facilitate future algorithm development, allowing the reliability and validity of human annotation of corporate opinions. Often, the classification-based approach to reputation metrics is challenging because distinguishing positive from neutral or negative news is difficult. Further marginal distribution analysis results demonstrated that individual coders have unique personal biases towards the polarity category distribution. Even when they annotated different data subsets, the coders exhibited similar marginal category distributions. In other words, some coders are just more positively or negatively inclined than others. This phenomenon poses another challenge to classification methods in that the 'ground truth' or 'gold standard' is hard to obtain for algorithm training and evaluation purposes.

More recently, the diffusion of internet-based information, particularly social media, has dramatically changed and increased the quantity and quality of information available from stakeholders.

This phenomenon requires different methodologies to find out how customers react to positive and negative news affecting the companies. Within marketing processes, monitoring web pages has become a strategy to reach targets, collect customers' preferences and calibrate advertising. Stavrakantonakis et al. (2012, p. 52) demonstrate that using a number of major monitoring tools and platforms it is possible to 'access to real customers' opinions, complaints and questions at real time'. These advantages appear to offer more precise, faster and more economical tools than traditional expert panel analysis.

More recently, social media monitoring has been applied to event detection, issue and crisis management; competitor analysis; trend and market research; influencer detection and customer-relationship management; and product and innovation management (Kasper et al., 2010). Social media offers new opportunities for enterprises, both in monitoring conversations and in actively participating and providing

content on social media platforms. Social media monitoring tools support these activities, but an enterprise also needs social media management, that means the definition of strategies, roles and processes in this new field. A very interesting example of the building of this strategy is the case known as 'Dell Hell',[2] when the enterprise Dell started, early on, to set up structures to deal with the new communication paradigm where organizations not only push information through mass media, but engage in conversations with the customer.

This process is consistent with some of the guidelines of the Cluetrain Manifesto (Levine et al., 2000), a set of theses for all businesses operating within what is suggested to be a newly connected marketplace, particularly those who need reminding that:

1. Markets are conversations;
2. Markets consist of human beings, not demographic sectors;
3. Conversations among human beings sound human. They are conducted in a human voice.

But how to manage a reputation which is affected by a small number of messages, highly interconnected to other nodes? According to Jones, Bowd, and Tench (2009) the most effective process is measuring, monitoring and participating within the social media, with a maximum degree of transparency underlying this activity, as the company is exposed to the social judgement.

The banking industry, being highly exposed to social comments and discussion, should incorporate this process. The Basel proposal to introduce a compliance office within banks was partly explained by this principle, since the mission of compliance is minimizing the compliance effects in terms of (a) administrative penalties, (b) the financial costs, and (c) reputational effects (Musile Tanzi et al., 2008).

Pak and Paroubek (2010) study how microblogging can be used for sentiment-analysis purposes. Twitter, like many other microblogging platforms, is used by different people to express their opinions and sentiments about different topics. One of the issues of reputation is that there are many stakeholders to take into consideration. As written by the authors 'Twitter contains an enormous number of text posts and it grows every day. The collected corpus can be arbitrarily large. Twitter's audience varies from regular users to celebrities, company representatives, politicians, and even country presidents. Therefore, it is possible to collect text posts of users from different social and interests groups' (p. 373). In their study they observe the difference in distributions

between positive, negative and neutral sets, concluding that authors use syntactic structures to describe emotions or state facts. The text classification of social messages was the first contribution towards the start of a measurement approach for corporate reputation. An analogous study, comparing Twitter and Google trends to extrapolate the sentiment, can be found in Murphy et al. (2011).

This chaper aims to discuss the first step of the process for banks, showing how measuring the reputational risk within highly interconnected social media such as Twitter could be achieved by applying network approaches, described in the following section.

11.3 Measuring reputation through networks

Measuring reputation is not a simple task. In recent years, various models of measurement have emerged (Barnett, Jermier and Lafferty, 2006; Fombrun and van Riel, 2004; Schwaiger, 2004; Wartick, 2002; Bromley, 2002; Caruana and Chircop, 2000; Fombrun, Gardberg and Sever, 2000).

In further detail, there are at least three approaches when facing this problem. First, we can simply interpret the reputation of an entity as it is the level of notoriety or knowability. Second, reputation could be considered as the general opinion regarding an entity. The concept of general opinion in itself refers to a multitude of actors or stakeholders. As an example, for a certain company, relevant stakeholders include current or potential customers, employees, investors, regulators, and so on.

These two are direct methods, in the sense that they measure the 'states of mind' of the actors that are already or only potentially committed to the entity. At an operational level, usual methodologies to measure public opinion are represented by surveys of individuals.

Third, an alternative and more challenging view is based on an indirect approach according to which beliefs about an entity are significantly shaped by the information and opinion received through the media (both mass media and user-generated media). This approach implies a behavioural link between media influence and stakeholder attitudes, which could be the case for actors that are already or potentially committed to the entity.

As an example, a bank's customer can decide to stop his relationship not because of the unenthusiastic behaviour of the employees but as a reaction to negative mass media news regarding the financial stability of his bank. Indeed, the same news may have a disruptive effect on the reputation of other banks that, in some way, are perceived to be similar

to the bank in question (these characteristics may include nationality, dimension, risk profile, etc.).

Here we propose a new perspective on the measurement of reputation. To this aim we define and systematize the key aspects of reputation measurement:

1. Who is communicating with reference to a certain entity?
2. What are the major influencers?
3. What are the areas of communication? How are the concepts communicated?

We refer the analysis to the case of UniCredit, the largest Italian bank considering total assets, and use data from Twitter.[3] In particular we consider all public tweets containing the term 'UniCredit', geo-located in Italy and collected in the following random period: Friday 14 December 2012 08:17:17 +0000 to Friday 21 December 2012 11:05:31 +0000. In this period 248 actors generated 517 tweets[4] and 197 retweets.[5]

11.3.1 Who is communicating about a certain entity and what are the major influencers?

In order to examine who is communicating with reference to 'UniCredit', we use a social network analysis methodology (Mitchell 1969; Wasserman and Faust 1994) and we use data from our sample of tweets.

First, using the information on the senders and the receivers of the 197 retweets we build the network of the interactions among all actors (Figure 11.1).

Second, we measure the centrality of all actors in the network using their betweenness as an indicator of their relative impact. Betweenness centrality for actor *i* is the sum of the proportions, for all pairs of actors *j* and *k*, in which actor *i* is involved in a pair's geodesic(s):

$$C_B(n_i) = \sum_{j<k} \frac{g_{jk}(n_i)}{g_{jk}} \tag{11.1}$$

As with the other centrality standardizations, we normalized the betweenness centrality scores by dividing them by the maximum betweenness possible.

When increasing the value given to the centrality measure, the likelihood that the plaintiff will be able to influence the interaction between

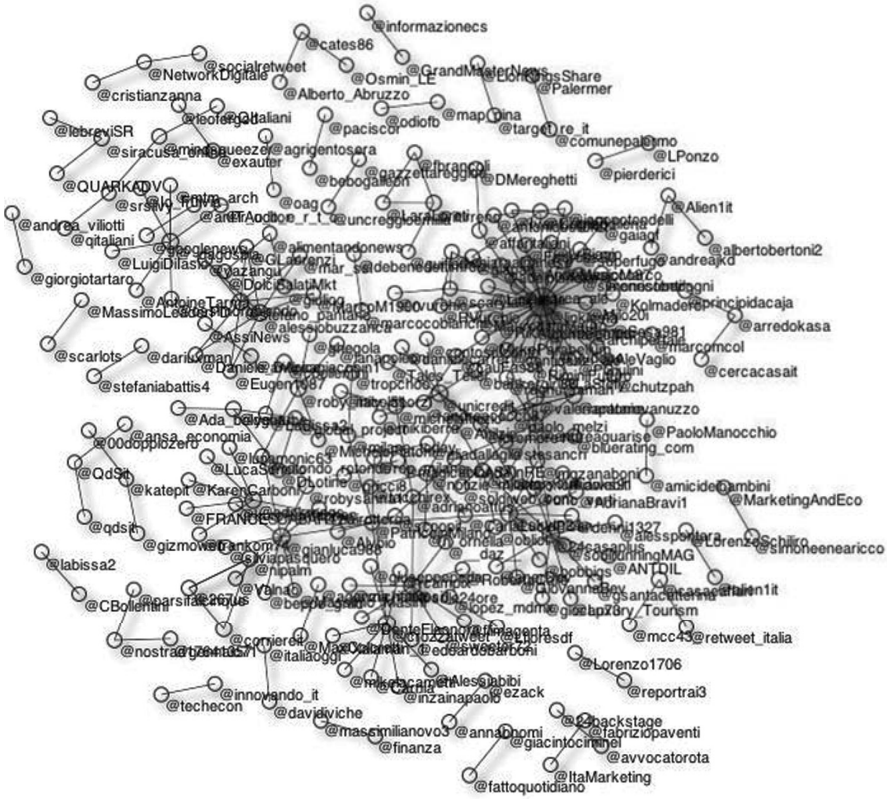

Figure 11.1 Network of actors built on the basis of the retweets

the other players also increases. Actors with high betweenness centrality act as gatekeepers between different sources of information.

Moreover, since the importance of a tweet is based on its originator's betweenness centrality, one could obtain a clearer vision of the reputational effect of a certain actor by multiplying the betweenness centrality of the actor with the average sentiment of its communication.

Next, we classified the nature of the most important actors (first ten actors based on betweenness) by distinguishing three types of players using Twitter: (i) mass media, (ii) blogs and (iii) others.

Finally, we calculated the average betweenness index for each group of players. Results are reported in the following table (Table 11.1).

Table 11.1 Classification of influencers

Type of actor	Average betweenness index
Mass media	0.438350983
Blogs	0.346444781
Others*	0.253295872

* We included the official UniCredit public relations account in this category (betweenness = 0.270153447158).

11.3.2 What are the areas of communication?

In order to analyse the content of the communication regarding UniCredit we use two criteria. The first is made possible using Twitter as a source of data and is based on the analysis of all the hashtags[6] in the tweets mentioning the term 'UniCredit'.

Table 11.2 describes hashtags, with a frequency greater than five, identified in our sample of tweets.

The second criterion is based on latent semantic analysis, a well-established method for extracting relationship information from large collections of text. This technique uses a mathematical procedure, called singular value decomposition, to identify patterns in the relationships between the terms and concepts contained in an unstructured collection of text (in our case the sample of tweets).

As might be expected, words that are used in the same contexts tend to have similar meanings. An important feature of this type of analysis is the ability to extract the conceptual content of our collection of tweets by establishing associations between terms that occur in similar contexts.

To provide further detail, in our sample of tweets we identified the three most important arguments, which made reference to: (i) the opening of the new UniCredit headquarters in Milan, (ii) the performance of a gospel choir at UniCredit's headquarters, (iii) a journalistic inquiry into UniCredit.

11.3.3 How are concepts communicated?

At an operational level, the standard measurement approach of reputation is represented by the analysis of the media sentiment regarding a certain entity.

This approach relies on annotated opinion corpora to train and test opinion retrieval, classification and aggregation models. First, a training set of articles about a certain entity is created. Second, a training set is created by classifying each article as 'positive', 'neutral', and 'negative'.

Table 11.2 Hashtags

Hashtag	Freqency	Description
#UniCredit	45	UniCredit (bank)
#Milano	15	Milan
#economia	13	Economics
#Cervelliamo	10	Blog name
#FirmaDay	10	Petition day organized by an Italian political party
#banche	9	Banks
#Hines	9	Hines (a privately owned, international real estate firm)
#architettura	6	Architecture

Third, classification algorithms on the training set are trained. Finally, indices based on the classification results are created.

This method requires the researchers to face some methodological problems. The first problem, known as the domain dependency problem, refers to the accuracy levels of opinion classifiers (Finn and Kushmerick, 2006). In this respect, news articles report both 'opinions' and 'facts' and many 'facts' may evoke various and ambiguous opinions among coders.

The second problem concerns the way opinions are expressed. In fact, opinions can be expressed directly ('bank X is very good') or/and indirectly (i.e., through some form of argument). As an example, some positive or negative events, such as lawsuits, strikes or increasing/decreasing stock prices, may actually have the same positive or negative effect on direct expressions of opinion.

In order to avoid these problems and compute the sentiments associate with UniCredit, we used LIWC – linguistic inquiry word count (Pennebaker, Booth and Francis 2006). LIWC identifies the linguistic structure of a text by counting the number of words associated with a series of predefined dictionaries reflecting individuals' emotional and cognitive perceptions.

Therefore, we calculated the media sentiment for UniCredit in three steps.

In the first step, we followed the basic 'bag-of-words' approach to determine the sentiment of our sample of tweets on the basis of the number of words that are positive (words matching the category 126 'posemo' as defined in LIWC) and those that are negative (words matching the categories 19 'negate', 127 'negemo', 128 'anx', 129 'anger' and 130 'sad' as defined in LIWC) (Table 11.3).

Table 11.3 Composition of positive and negative word sets drawn from LIWC

Category	Description	Examples
126 – 'posemo'	Positive emotions	cool, ideal*, smil*
19 – 'negate'	Negation	can't, don't, no
127 – 'negemo'	Negative emotions	asham*, hate
128 – 'anx'	Anxiety	panic*, shy*, uneas*
129 – 'anger'	Angry	evil*, terrify, weapon*
130 – 'sad'	Sad / Unhappy	depriv*, grief, missing

Consequently, we can have three situations, depending on the number of positive and negative words in the tweets:

- If the number of positive words is greater than the number of negative words then the score is 1;
- If the number of negative words is greater than the number of positive words then the score is –1;
- If the number of positive and negative words is the same then the score is 0.

In the second step, we calculated the average score of the sentiment for all tweets in the period with the following formula:

$$Sentiment = \frac{Pos - Neg}{Tot} \tag{11.2}$$

where *Pos* is the number of positive tweets in the sample, *Neg* is the number of negative tweets in the sample and Tot is the overall number of tweets of the sample. Therefore we obtained a sentiment score of –0.09 associated to UniCredit, as a result of the presence of 9 positive tweets, 53 negative tweets and 455 neutral tweets.

In the third step, we calculated the betweenness-weighted score of the sentiment by multiplying the betweenness centrality of the ten most influential actors with the average sentiment of their communication:

$$Weightedsentiment = \frac{\sum_{i=1}^{10} Sentiment_i * Betweenness_i}{10} \tag{11.3}$$

where Sentiment_i is the average sentiment of the communication and Betweenness_i is the measure of influence of first ten actors *i*, based on the betweenness centrality. Finally, we obtained a weighted sentiment score of -0.03.

11.4 Conclusions

In this chapter we have shown a practical approach to the measurement of reputation using the web. This is a pilot experiment conducted on a restricted time period and only delimited to one industry. We considered the specific case of financial institutions because of the great pressure they are facing as a consequence of the recent financial crisis. Noticeably, our approach is also extensible to other contexts/industries. Moreover, we used the well-known platform Twitter. Although each tweet is limited to only 140 characters, the aggregate of millions of tweets submitted to Twitter at any given time may provide a representation of public opinion regarding a certain entity.

Is this representation significant? Initially, Twitter started as a micro blog where people (mostly journalists and political extremists at the beginning) sought peer approval by writing short one-liners.[7]

Nevertheless, our choice is due to the following reasons. First it allows customers' opinions to be expressed directly whereas opinions about corporations are frequently expressed indirectly in news articles. Second, currently it is widely used by different categories of media such as traditional media, blogs, etc. Therefore, opinions and facts expressed through traditional information sources are also considered.

However, despite this broad representation of sources and actors two problems still remain unsolved. On one side, our approach is based on the assumption of the representativeness of those who use Twitter compared to the mass of stakeholders of a bank. On the other side, as shown by various cognitive studies (Baumeister et al., 2001; Rozin and Royzman, 2001; Fiske and Taylor, 1991; Brief and Motowidlo, 1986), positive and negative news has different impacts on people' perceptions, so that negative news is more likely to be communicated on Twitter.

Finally, given the possibility of using specific APIs (application programming interfaces)[8] in order to have access to public tweets, data analysis from Twitter feeds may be automatized in order to make a real-time reputation evaluation.

There are several exciting future research directions. At this stage of our analysis, we want to underline five possible developments and challenges.

First, our model could be applied in real situations that may compromise a bank's reputation. This would give us the unique opportunity to test the relationship between our sentiment-weighted score of reputation and shareholder value.

Second, the development of a context or industry-specific dictionary (e.g., using machine learning techniques) could help in reducing the biases of similar analyses. Third, a challenging approach would be the examination of social contagion effects and of how the impact of different network structures of relationships among actors may affect the level of heterogeneity of their opinions.

Fourth, considering the way companies are related on the web, one could analyse the 'systemic effect' of reputation. As an example, researchers could study the effects of reputation on co-entities (i.e., other companies that are mentioned in the same sentence fragment as the entity itself, or on the overall entity's sector). This approach could be particularly useful for the so-called systemically important financial institutions (SIFIs), whose failure could trigger a global financial crisis.

Finally, one can study the reputation changes resulting from corporate actions by using proper game theory methods, in which web users are modelled as 'players' with their well-defined objective function and opinions are modelled as players' beliefs. In this sense it is possible to predict web users' behaviour based on their past responses to specific corporate actions.

Notes

1. We are grateful to one of the editors for drawing our attention to Michael Power's original contributions about risk management
2. On June 21, 2005, Jeff Jarvis posted a single negative blog-post about his experience with one of the top computer and technology companies in the world: Dell Inc. His negative sentences attracted computer buyers from around the globe.
3. Twitter is an online social networking service and micro-blogging platform. As of 2012, it has over 500 million registered users generating over 340 million tweets daily.
4. A tweet is a text-based message of up to 140 characters generated by the users of Twitter.
5. A retweet is simply a reply to a tweet that includes the original message or a tweet that includes a link to a news article or blog post.
6. Hashtags are terms identified with the symbol '#' and represent a way of tracking topics on Twitter.
7. We are grateful to one of the anonymous referees for drawing our attention to this evidence.
8. See the website https://dev.twitter.com for more technical details.

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