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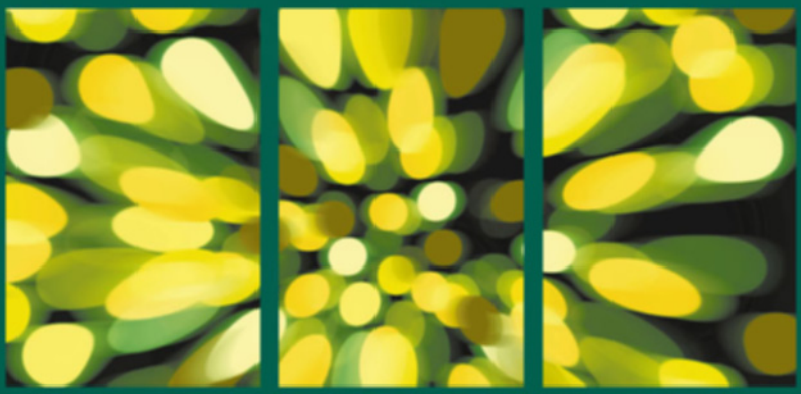
Bank Risk, Governance and Regulation



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Bank Risk, Governance and Regulation

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Preface and Acknowledgements

Bank Risk, Governance and Regulation offers studies pertaining to three interconnected, relevant areas of research in banking: the analysis of banking risks and their determinants, both at micro- and macro-level of investigation; the exploration of the existing relations among bank risk management, governance and performance; and the regulation of systemic risks posed by banks and the effects of novel regulatory sets on bank conduct and profitability. The research findings in this volume relate predominantly to European banking systems, but there are also stimulating contrasts with the US banking system. The chapters were originally presented as papers at the annual conference of the European Association of University Teachers of Banking and Finance (Wolpertinger 2014), which was held during 3–6 September 2014 at Università Cattolica del Sacro Cuore in Milan, Italy.

In Chapter 1, Josanco Floreani, Maurizio Polato, Andrea Paltrinieri and Flavio Pichler investigate the impact of loan loss provisioning (LLP) together with a wide array of credit-risk exposure and performance variables on systematic risk measured by betas. The study is based on a sample of European banks over the period 2006–11. The authors develop a model for assessing whether management behaviour, accounting policies, such as LLP, and the quality of loan portfolio play a significant role in explaining the banks' systematic risk exposure. The results suggest that financial performances do not have a direct, significant relation with betas; rather, measures of risk exposures (risk-weighted assets on total assets) substantially affect systematic risk. During the crisis, systematic risk is significantly responsive to provisions and their impacts on performances. Such results have several implications, in particular in light of changing European regulation on non-performing exposures reporting and forbearance practices along with regulators forcing banks to strengthen their capital bases.

In Chapter 2, Federico Beltrame, Daniele Previtali and Luca Grassetti propose an application of the Capital at Risk Model (CaRM) for banks' cost of capital estimation. CaRM, which belongs to the Implicit Cost of Capital (ICC) methodology, is particularly suited for banks as it is based on an asset side approach and makes use of a Value at Risk model. CaRM is based on the theory of investors' under-diversification and enables the pricing of both the systematic and specific risk. The authors test the

model over 141 European listed banks, and their findings confirm that the CaRM is robust and able to perform significantly in the banking industry. CaRM could represent a useful alternative metric to banks' cost of capital estimation for all those investors who are not fully diversified.

Chapter 3, by Elisa Giaretta and Giusy Chesini, deals with the regulation of deposit guarantee schemes (DGSs) during the recent financial crisis. In the aftermath of the crisis DGSs have become more common and implemented in countries where the schemes did not exist, such as Australia and New Zealand. On the other hand, in countries in which the schemes were already adopted there began an overhaul of the main characteristics of these schemes. In this chapter the authors aim to answer two main research questions. The first one aims to analyse the main characteristics of a prospective harmonized European DGS by comparing how the US Federal Deposit Insurance Corporation (FDIC) works. More importantly, the second research question considers the fact that the new European directive requires that the funding arrangements of DGSs are risk-based pricing systems able to minimize the moral hazard risk. This is something new, which tends to make banks evaluated/supervised by the DGSs similarly to the firms evaluated by the banks when the latter lend money to the former. In particular, this requires taking into consideration the risk of each individual bank and, so, bank riskiness becomes very relevant in the funding arrangements of each national DGS.

In Chapter 4, Rosa Cocozza analyses the recent managerial and supervisory concerns on credit risk by means of consistent allowances and impairments. The analysis offered by the author aims at verifying this focus perception, as well as at verifying whether the supervisory suasion can be effectively regarded as proactive within European banking. The main findings reveal an effective and widespread focus on credit risk as leading risk driver, both from an institutional perspective and a market appraisal. Another result concerns the focus on a "coverage" risk management by means of allowances and impairments. The evidence seems to be confirmed even by the listed banks' dataset, thus supporting the hypothesis that a credit risk focus is not only a question of banks exposed to proper asset-quality review, but it is a sort of proactive target within the market. The results give rise to a major consideration: the focus on credit risk could create a disregard of other fundamental risk drivers with reference to both managerial practices and recovery devices. The sustainability in the long run of a credit-risk control by allowances and impairments could really be extremely difficult, especially when

profits are not high. As a consequence, prospective risk management could not be really sustainable risk management.

In Chapter 5, Francesca Arnaboldi and Bruno Rossignoli study the main characteristics of financial innovation in 81 listed commercial banks in Europe and the United States from 2005 to 2008. They use annual reports to identify six broad innovation categories, from the launch of a new product to the implementation of a new organizational structure. The authors document the relationship between bank-specific features and innovation. Higher market share in less concentrated and less traditional banking systems is positively related to innovation. In addition, banks with a lower quality of loan portfolio exhibit a significantly higher level of innovation. The impact relationship between market share and innovation is stronger for banks incorporated in the United States, while a lower quality of loan portfolio is positively related to innovation for European banks. When the financial crisis hits, less-risky banks take the lead on innovation.

Chapter 6, by Magnus Willeson, aims to empirically evaluate the challenges for banks due to the new detailed regulation of the "management body", which predicts a reduced bank risk at low cost. In this chapter, the author determines the relevance of the above statement, testing whether the corporate governance of banks influences banking risk and banking efficiency. The results reveal a relationship between efficient banks and risk. However, the corporate governance variables considered in this chapter reveal limited evidence of the effect on risk, although corporate governance attributes can explain banking efficiency.

In Chapter 7, Elisabetta Gualandri and Mario Noera offer a survey of the state of the art of macroeconomic policies (MAP) with a focus on the case of the European Union (EU). The authors provide a detailed description of the institutional and operative frameworks of MAP. The operational framework, targets and toolkit are specifically analysed in relation to the case of the European Union and the introduction, in 2011, of a macro prudential supervisory pillar based on the European Systemic Risk Board, ESRB. Finally, there is an interesting focus on the main challenges facing the new European supervisory system and the MAP after the introduction in 2014 of the Single Supervisory Mechanisms (SSM).

Chapter 8, by Franco Tutino, Giorgio Carlo Brugnoni and Maria Giovanna Siena, analyses and tests the strategies adopted by Italian banks to face the new capital requirements imposed by Basel 3. Higher profitability, lower risk-weighted assets, higher retained earnings and lower loans to customers represent some of the strategies that could be adopted by banks in addition to a shareholders' equity increase.

Each one of them, however, could exhibit different cost and benefits in terms of costs and benefits themselves and could produce different impacts on the financial system and the real economy. In this chapter, the authors adopt an accounting model based on a sample of ten Italian banking groups and analyse each of these possible strategies, making a comparison between what should have been done to achieve higher capital requirements, what banks actually did between 2011 and 2013 and what they are going to do in the upcoming years, as pledged in their business plans. The aim is to investigate how banking strategies have recently evolved and how they could or should change in perspective in the context of an already weak performance. The research shows that in order to achieve higher capital requirements banks analysed in this chapter would need to increase their profitability by, on average, at least 1 percentage point or, alternatively, to deeply reduce the riskiness and their assets' growth or to decrease their dividend payout ratios. Above all, however, the economic conditions have made, and will inevitably make, the required adjustment process extremely difficult.

As editors we would like to thank all the authors in this volume for their contributions. We are also grateful to all the referees who acted as reviewers for the chapters published in this volume. We also want to thank all the conference participants for their active and constructive discussions during the presentations.

Special thanks to Philip Molyneux, series editor for Studies in Banking and Financial Institutions, for the opportunity to edit this volume, and to the staff at Palgrave Macmillan, especially Aimee Dibbens and Grace Jackson, for helpful comments and guidance.

Finally, as conference organizers, we would like to thank Anthony Saunders, Professor at Stern School of Business, for giving a plenary speech at the conference on "Don't forget the fees", and the speakers at the Jack Revell Session on "Towards the European Banking Union" (Paolo Angelini, Bank of Italy; Federico Ghizzoni, CEO at Unicredit; and Philip Molyneux, Bangor Business School).

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1

Credit Quality, Bank Provisioning and Systematic Risk in Banking Business

Josanco Floreani, Maurizio Polato, Andrea Paltrinieri and Flavio Pichler

1.1 Introduction

Managerial behaviour and accounting policies have a huge impact on corporate earnings and their information content. Reporting of non-performing loans and loan-loss provision (LLP) practices are among the major concerns in the banking industry. Asset quality, exposure to credit risk and provisioning bear great implications in relation to earnings volatility and capital adequacy. Managers may rely on discretionary provisioning as a means of smoothing earnings. While there is a large debate in literature about the incentives to discretionary LLP, there is no doubt that such a practice might hinder the true riskiness of the bank and distort market perceptions. In the same vein, discretionary provisioning may be regarded as a tool for optimizing a bank's capital.

The aim of this chapter is to investigate the impact of the loan-loss provisioning and other significant credit-risk exposure variables on the banks' cost of capital proxied by betas. The issue is of great interest for at least three reasons.

The first reason is related to the peculiar nature of banking industry's business. A chain of influences stemming from the social and economic environment, together with managerial strategies, significantly impact on earnings and exposure to risk. Since banks stand at the heart of the transmission mechanism of monetary policy, they play an important role in spreading or absorbing shocks. The structure of the financial system together with monetary authorities' policies and the regulatory framework affects banks' stability more extensively than other financial and non-financial firms. Structural changes in the macroeconomic

framework, financial system and political institutions affect the banking business and relations with shareholders.

The second reason is that international competition, differences in the economic cycle and various industrial arrangements might be accountable for differences in the cost of capital across countries. The issue has obvious practical implications in an era when banks across countries are forced to substantially rise their capital bases, both by regulatory requirements and as a result of capital assessment exercises. Within this framework, differences in the cost of capital might alter competition among banks.

The third reason is tightly related to the new proposed EU regulations referring to LLP and non-performing loans reporting. A convergence in reporting standards across European banks is expected to lead to a levelling of the playing field in assessing banks' stability and the conditions of accessing capital markets. This leads to obvious implications as regards the pricing of risks, eventually overcoming distortions in the allocation of funds across the banking sector.

This chapter makes an important contribution in this field, as there is a lack of literature assessing the impact of LLP on the cost of capital.

Although several studies have individually analysed these two factors, this is the first study trying to evaluate the influence of a particular accounting policy on a risk indicator in the banking sector. Indeed, much of the literature has investigated the LLPs as a tool for income-smoothing to reduce earnings volatility or to manage regulatory capital. But it has not focused on the potential effect on banks' overall risk.

Furthermore, many studies focus on US banks (Wetmore and Brick, 1994, and Bhat 1996, among others) and emerging markets (Ismail et al., 2005), but only a few of them analyse European banks, mostly investigating single countries, such as Spain or the Netherlands (Pérez et al., 2008; Norden and Stoian, 2013). Instead, our sample includes 59 European banks in 10 countries.

Our study has several implications, in particular considering the change of European regulation on non-performing exposures reporting and forbearance practices, the adoption of the Basel III capital accord and in light of regulators forcing banks to substantially reinforce their capital base.

This chapter is organized as follows. Section 2 provides an overview of bank-manager behaviour and its impact on earnings quality and capital endowments in light of prominent literature. Section 3 defines the theoretical framework with reference to the determinants of betas. Section 4 describes sample, data and methodology. Section 5 summarizes the

main results, while section 6 discusses policy implications. Section 7 concludes.

1.2 Literature review

The topic of loan-loss provisions (LLPs) has been broadly investigated in the literature, but a consensus is still lacking on whether bank managers use LLPs for income-smoothing, capital management or with a signalling effect. An important feature of the literature on LLPs is that it is mainly focused on the US banking system, since only in recent years have researchers also started investigating non-US banks. Moreover, there are studies that focus solely on one hypothesis – either income-smoothing, capital management or signalling – and studies that test for all.

Our review is divided into four parts. In the first part we analyse the most important contributions related to the income-smoothing hypothesis only. In the second part we review the studies related to capital management only. In the third part we analyse the literature on both the income-smoothing and capital management hypotheses. Finally, we review the studies on the role of LLPs as signals of the current as well as of the future economic financial situation of banks.

The rationale for the income-smoothing hypothesis lies in the fact that LLPs can be used to reduce the volatility of earnings. The early studies in the income-smoothing literature date back to the end of the 1980s, and the first contributions were those by Greenawalt and Sinkey (1988) and Ma (1988), who find evidence of earnings management in the US banking industry. Greenawalt and Sinkey (1988) use a sample of 106 large bank holding companies for the period 1976–84 and find that bank managers effectively tend to use LLPs to reduce reported earnings through an increase in LLPs when income is high, while they tend to reduce LLPs when earnings are low. Moreover, they show that regional banking companies smooth their income more than money-centre banks. Ma (1988) uses data on the 45 largest US banks in the period 1980–84 and finds strong evidence of bank managers using LLPs to reduce (raise) their earnings when the operating income is high (low). Wahlen (1994) tests the income-smoothing hypothesis on a group of 106 commercial banks for the period 1977–88 and finds that when future cash flows are expected to be positive, bank managers increase LLPs. On the contrary, Wetmore and Brick (1994) find no evidence of income-smoothing practices in the analysed sample of 82 US banks for the 1986–90 period. Bhat (1996) tests the income-smoothing hypothesis for 148 large US

banks in the period 1981–91 and finds banks that manage their earnings through LLPs have low growth, low book-to-asset and market-to-book ratios, high loan-to-deposit and debt-to-asset ratios, low ROA and total assets. In other words, income-smoothing is typical of small, badly capitalized banks and those with poor financial conditions. More recently, Kanagaretnam et al. (2003) use a sample of 91 public listed US banks for the period 1987–2000 and find that bank managers reduce current income through LLPs to "save" income for the future when earnings are high and vice versa when current income is low. Liu and Ryan (2006) investigate whether banks' income was lower during the 1991–2000 period, which covers also the so-called 1990s boom. The results show that profitable banks tended to decrease their income in the sample period using LLPs, in particular on homogenous loans.

In the most recent years, studies also have been conducted for non-US banks. Ismail et al. (2005) base their analysis on a sample of Malaysian banks, including bank-specific as well as macroeconomic factors peculiar to the Malaysian economy. They find that Malaysian banks do not smooth their incomes through LLPs. Norden and Stoian (2013) investigate a group of 85 Dutch banks in the period 1998–2012. They find that banks tend to increase (decrease) their LLPs when their income is high (low), thus giving strong supporting evidence to the income-smoothing hypothesis.

The second hypothesis used to explain the use of LLPs is the need to manage regulatory capital. The changes in regulation at the end of the 1980s may have indeed modified the incentives for bank managers to use LLPs for capital adequacy reasons. This stream of literature can be dichotomized into two categories, pre- and post-1989 capital adequacy regulation. In 1989 the US regulatory agencies changed the capital ratio computation to adhere to the then newly adopted Basel I framework excluding loan-loss reserves from the numerator of the capital ratio. Two main contributions (Moyer, 1990 and Kim and Kross, 1998) focus solely on the capital management hypothesis.

Moyer (1990) finds evidence that prior to 1989 US bank managers tended to increase LLPs to raise the capital ratio and to prevent it falling under the minimum level of 5.5 per cent while, after Basel I entered into force, LLPs were no longer used to manage regulatory capital ratios. Kim and Kross (1998) use a sample of 193 US bank holding companies for the period 1985–92, which is then divided into two sub-periods according to the entrance into force of the Basel I regulatory framework, namely 1985–88 and 1990–92. The results show that banks with low capital ratios used LLPs in the 1985–88 period more than in the 1990–92

period, since incentives to use them in the latter period were non-existent. However, regulation after 1989 seemed to have no effect on banks that, in the 1985–88 period, had higher capital ratios.

A growing body of literature has focused on both hypotheses, thus investigating whether bank managers use LLPs to smooth income and/or manage the regulatory capital ratios. These contributions can be divided into those studying US banks and those studying non-US banks, the latter being the most recent literature on LLPs. As regards the former, Collins et al. (1995) use data from 160 US banks in the 1971–91 period and find supporting evidence of the income-smoothing hypothesis, while no relationship exists between LLPs and capital ratios, meaning that bank managers do not use loan-loss reserves to manage their regulatory capital. Beatty et al. (1995) and Ahmed et al. (1999) find contrasting evidence to that of Collins et al. (1995). Beatty et al. (1995) use a slightly different sample from that of Collins et al. (1995). Their sample is made up of a smaller number of banks (148) and covers a shorter period (1985–89). The results show no use of LLPs by bank managers to smooth income, while LLPs are used in the management of capital ratios. Ahmed et al. (1999) also use a smaller sample that Collins et al. (1995), made up of 113 banks, but test a shorter, even though more recent, time period (1986–95). They find no supporting evidence for the income-smoothing hypothesis, but find that bank managers use LLPs for capital management purposes, since in the pre-1989 analysis banks showed a higher level of LLPs than in the post-1989 period.

In recent years studies have focused on non-US banks, in particular from Australia (Anandarajan et al., 2006), Europe (Curcio and Hasan, 2008 and Curcio et al., 2012), Spain [Pérez et al. 2008]), Taiwan (Chang et al., 2008) and the Middle East region (Othman and Mersni, 2014).

Anandarajan et al. (2006) focus their attention on a sample of 50 Australian commercial banks, ten of which are listed, for the period 1991 to 2001. The results show that bank managers use LLPs to manage their regulatory capital, but only in the pre-1996 period. The year 1996 is considered the cutoff date for the implementation of the Basel I framework in Australia, even though some banks may have adopted it earlier: still, the authors say that in 1996 all Australian banks had adopted the Basel I rules. Moreover, results indicate that Australian banks and, in particular listed ones, use LLPs to smooth their income. European banks' attitude towards using LLPs has been investigated both in 2008 and in 2012.

Curcio and Hasan (2008) compare the earnings- and capital-management incentives of 907 banks belonging to different countries,

all geographically part of the European continent, and in particular: (1) the 15 EU/pre-2004 countries; (2) the 10 EU/2004 countries; and (3) 23 non–EU/2006 countries. The time period is 1996–2006. The results show that both EU and non-EU banks use LLPs for income-smoothing purposes. Moreover, EU banks, both pre- and post-2004, use LLPs to manage regulatory capital, while non-EU banks do not.

Curcio et al. (2012) use a sample of commercial, cooperative and savings banks belonging to 19 out of the 21 European countries of origin of the credit institutions subject to the 2010 and 2011 EBA's stress tests, for the period 2006–10. The results support the hypothesis of income-smoothing through LLPs for the sample banks, in particular for listed banks, but reject the hypothesis of capital management, only for non-tested banks. Indeed, the authors find that banks that were tested under the EBA's 2010 and 2011 stress tests use LLPs more to manage their regulatory capital than to reduce the volatility of their earnings. Pérez et al. (2008) focus their attention on Spanish banks. The importance of this banking system relates to the strict rules the Banco de España had on loan-loss provisions, which were expected to prevent bank managers from using LLPs for either income-smoothing or capital management purposes. The results show that in the period from 1986 to 2002 Spanish banks effectively used LLPs to reduce the volatility of their income, but they did not manage their regulatory capital ratio through loan-loss provisions.

Chang et al. (2008) study the income-smoothing and capital management hypotheses for a group of banks listed in the Taiwan Stock Exchange for the period 1999–2004. Their results provide support to the income-smoothing hypothesis, since bank managers effectively use LLPs to manage their earnings while there is no evidence to the capital management hypothesis. Othman and Mersni (2014) conduct a comparative study between banks belonging to the Middle East region. These banks differentiate, because 21 are Islamic banks, 18 are conventional banks but with Islamic windows and 33 are conventional banks. The results show no important differences in bank managers' use of LLPs: indeed, Islamic banks use LLPs to smooth their income and to manage their regulatory capital in the same ways as conventional banks, both with and without Islamic windows.

Another reason for using LLPs is the signalling hypothesis under which bank managers are supposed to increase LLPs, so to indicate the financial strength or the market value of banks. In other words, LLPs contain both bad and good news: the former relates to the fact that increasing LLPs signals a higher default risk. The latter indicates the

willingness of the bank managers to deal with problematic loans as well as with performing ones.

This stream of literature yields conflicting results, as in the cases of income-smoothing and capital management; indeed, some authors point to the existence of the signalling effect, whilst others support the opposite. Again, the literature is mainly US-based and is particularly focused on market reactions to the Citicorp announcement of LLPs increases in 1987. Beaver et al. (1989) use a sample of 91 US banks for the period 1979–83 and show banks that report higher loan-loss provisions have higher market-to-book values and thus support the idea that bank managers use LLPs to signal the financial strength of their banks. Wahlen (1994) reaches the same conclusion, though by using abnormal returns. Elliot et al. (1991) and Griffin and Wallach (1991) conduct an unusual analysis to test the signalling hypothesis. Elliot et al. (1991) use the announcements of increased loan-loss reserves by Citicorp and other US banks as well as the write-off announcement of the Bank of Boston in 1987 related to problematic loans in less-developed countries, Brazil in particular, and look at the market reactions in the two days before and after the announcements date. Their analysis shows that the Citicorp, as well as other than Bank of Boston banks, notice was assessed positively by investors: they thought Citicorp had to increase its LLPs to better deal with the problematic loans. The write-off announcement made by the Bank of Boston was interpreted negatively due to the fact that it would decrease the capital adequacy ratio.

Griffin and Wallach (1991) also focus on Brazil. They analyse the stockholders' returns of 13 large US banks to test whether they were affected by the increase in LLPs due to the bad credit situation in Brazil. The results show that the stock markets effectively appreciated the decision of bank managers to raise the amount of loan-loss reserves, for it meant they wanted to resolve Brazil's debt situation.

Liu and Ryan (1995) and Liu et al. (1997) investigate a sample of 104 US banks for the period 1983–91. They distinguish loans for which banks make the provisioning on a timely basis (small and infrequently renegotiated loans) and those for which provisioning is made on a less timely basis, thus loans that may show default problems (large and frequently renegotiated loans). Their results point to the fact that increases in LLPs are positively assessed for the latter loans, while the financial markets give a negative interpretation to increases in the LLPs of loans that are usually provisioned on a timely basis.

Liu et al. (1997) deepen their previous analysis by investigating whether there is a difference in the signalling role of banks' LLPs between badly

capitalized and well-capitalized banks and across fiscal quarters. They find that stock markets value in a positive manner the LLPs only for banks with low regulatory capital levels and in the fourth quarter. Beaver and Engel (1996) distinguish between the two components of LLPs, the non-discretionary or specific and the discretionary or general ones. The former are strictly related to the assessment of the expected losses of a bank's loan portfolio. The latter are set aside against not yet identified losses, for prudential purposes. Their analysis shows that financial markets give different values to these two components; in particular, increases in the discretionary component are viewed positively, while increases in non-discretionary LLPs are seen as negative signals.

Ahmed et al. (1999) are the first to extend the period of analysis of the role of LLPs to after the Citicorp announcement in 1987. They investigate not only the income-smoothing and capital management hypotheses, but also the signalling one. They find conflicting evidence to that of previous studies. Indeed, for their sample of 113 US bank holding companies over the 1986–95 period, LLPs do not entail any signalling effect.

Hatfield and Lancaster (2000) add to the growing literature on LLPs by analysing the effects of LLPs increases for seven different reasons (general domestic loans, adverse economy, commercial loans, less-developed countries loans, combination of domestic and foreign loans, combination of real estate and energy loans, real estate only loans) of 33 US bank holding companies in the 1980–92 period, thus allowing for the examination of market reaction after the Citicorp announcement. They use data relating to 121 announcements of increases to LLPs. Their analysis is aimed at testing the market reaction in the –15/+15 days window from the announcement date. The results show that the markets react negatively in the days before the announcement is made, while the reaction turns positive once the announcement is made. However, the markets' response is not the same for all types of loans: in particular, only for the lesser developed countries and combinations of domestic and foreign as well as real estate and energy loans categories is the positive market reaction after the announcement significant.

Recently, the signalling hypothesis has been tested also for non-US banks. Anandarajan et al. (2006) find that Australian banks do not seem to use LLPs to signal to outsiders their intentions of higher earnings in the future. Curcio and Hasan (2008) find conflicting results for European and non-EU banks. In particular, they show that LLPs have a signalling role for non-EU banks, while provisioning policies have no signalling purpose for EU banks. Leventis et al. (2012) examine a sample

of 91 listed commercial banks, both financially sound and unsound, originating from 18 EU countries for the period 1999–2008 – doing so in order to test for the use of LLPs, in particular after the implementation of the International Financial Reporting Standards (IFRS) reporting standards in 2005. In their analysis they find no strong evidence of the signalling hypothesis. In particular, their results suggest that the managers of less financially sound banks engage in stronger signalling than financial healthy banks. Moreover, the implementation of the IFRS reporting standards affected the signalling behaviour of unsound EU bank managers, in that they make stronger use of LLPs after 2005 relative to the previous period in which they had to adhere to national accounting principles.

1.3 Determinants of beta and hypothesis development

Risk assessment and management are two of the major building blocks of finance in general and the banking business in particular. In today's banking industry banks are required to strengthen their core capital base, either for complying with regulatory requirements or as a result of supervisory pressures. More generally, new pieces of regulation force banks to rely more heavily on stable sources of funding in order to better manage liquidity risk. These capital needs cast two main problems: that of the cost of rising new equity funds and that of the relative convenience of alternative sources of funds such as subordinated debt.

The cost of capital and its determinants have been widely investigated both in corporate finance and bank-specific literature. The idea that the cost of capital is to a large extent determined by the value that the stock market assigns to corporate's earnings is well established. According to the CAPM the cost of capital is function of the market-risk premium and the firm's beta, where the latter is determined regressing stock returns on market returns. A variety of factors – such as different time spans, frequency of observations and proxies for the market portfolio – can lead to significant differences in betas provided by various sources.

A growing body of literature develops alternative methods for determining betas against a firm's fundamentals. The rationale lying behind fundamental betas is to use financial data in order to capture systematic risk. A wealth of contributions (among others see Rosenberg and McKibben, 1973; Fama and French, 2004; Chance, 1982; Dyl and Hoffmeister, 1986 and Gahlon and Gentry, 1982) advocate the merits of fundamental betas over historical betas, arguing that the latter provide better indications of the sources of systematic risk. Moreover, the

analysis of fundamental betas reveals that while all firms are sensitive to systematic risk, they differ in their sensitivity to macroeconomic conditions due to their different characteristics. A firm's strategic policies are expected to significantly affect such sensitivity. Relationships between market-based risk and corporate-risk variables might help managers and investors to better understand how changes in corporate policies affect the firm's systematic risk.

However, while systematic risk is related to risk factors in the underlying corporation, it is far from clear which factors are actually relevant. Prominent contributions find significant correlations between betas and payout ratios, financial leverage and earnings yield volatility (Beaver, Kettler and Scholes, 1970); other studies account for a significant explanatory power asset size and profitability (Logue and Merville, 1972). Such studies, in particular, conclude there is a negative relation between profitability and systematic risk, which is coherent with the idea that successful firms reduce the chance of systematic risk.

While such an intuition might make sense in general, there are good reasons for arguing for an inverse relation in certain industries. Borde et al. (1994) found a positive relationship between profitability and systematic risk in insurance companies. Arguably, such a relation should be regarded as coherent with the nature of business in financial firms, given that they actually earn greater returns by taking higher risks.

Arguably, relevant underlying risk factors have a significant industry-specific nature. Certain businesses are particularly exposed to systematic events and macroeconomic conditions. Specifically, while being highly exposed to systematic events, the banking business triggers such events itself. These features make banks' betas particularly interesting to analyse and call for a thorough discussion of the factors that can plausibly be assumed to explain systematic risk.

Our study is grounded on standard corporate finance theoretical models and on bank-specific research as well. To our knowledge there is a lack of contributions investigating banks' cost of capital against fundamental variables, while there is some research examining the influences on the cost of capital of systematic and macroeconomic variables, such as taxes, households' saving behaviours, macroeconomic stabilization policies and financial policies. There are strong reasons for systematic variables having a significant impact on earnings volatility and, thus, on banks' riskiness. Banks run a procyclical business. During expansions they experience higher returns but build up risks that can lead to sharp losses during recessions. Sovereign budgetary tensions might cause strains to the banking sector, as we learned from the crisis, and

trigger systematic losses. In many countries banks heavily invest in sovereign debt and are forced to high impairments during a crisis. The link between sovereigns and banks makes the banking sector responsive to macroeconomic and fiscal stabilization policies.

Although one could attempt to find the most significant macroeconomic variables for capturing the exposure of banks to systematic risk, almost all the possible measures are potentially subject to criticism and fallacies. For example, a useful proxy of procyclical behaviour is given by the credit-to-GDP ratio. Regulators themselves became aware of systematic risks associated with excessive credit expansion when they impose countercyclical buffers. However, what the most appropriate GDP measure for an internationally active banking group is, could be a matter of debate. A feasible way to overcome this problems is determining banks' betas against an average sectorial beta and investigating which risk factors differentiate each bank from the sectorial average. This approach is equivalent to saying that sectorial betas capture the impact of macroeconomic and systematic variables over the riskiness of the sector, while each institution differs from the average riskiness by its peculiar characteristics.

As a major implication there could be significant differences in banks' cost of capital across countries and institutions. Banks can be differently exposed to systematic risk as a result of strategic corporate policies, different business models and different sources of funding. Given the complex nature of the banking business, especially when looking at major, highly diversified cross-border groups, finding the relevant factors affecting systematic risk is not an easy task.

Several market-based and corporate-risk based variables might be assumed to affect of betas and, in particular, to explain heterogeneity among banks. Market-based variables are related to trends in share prices. Aggressive stocks could be deemed to have a higher sensitivity to systematic risk. Corporate-risk based variables could be grouped in several blocks of variables, a wealth of which characteristic the banking business or, at least, have paramount implications for banks.

Major risk factors are obviously related to the asset side of the balance sheet. Assets' composition, however, depends on the specific bank's business model and its diversification. Banks largely operating according to a traditional business model are supposedly exposed to different risk events than are banks having a more market-oriented business model.

Depending on the business model are, then, a group of variables capturing the exposure on credit risk. Although banks, at least major groups, are highly exposed to market risks, in the present work we focus

on risks related to the core business. In an attempt to predict risk one can draw on a variety of information. Good indicators of risk can be found in the balance sheet, income statement and other disclosures (that is, disclosures on asset quality), such as ratios in different asset categories and margins. Relevant categories could be: net loans, gross loans, impaired loans, reserves for impaired loans, loan-impairment charges, risk-weighted assets, operating margins and interest on loans. Such categories have been identified as determinants of betas, especially by a pioneering work of Rosenberg and Perry (1978). In particular, the authors identified a wide array of possible explanatory variables grouped in categories capturing the asset mix, the liability mix, operating characteristics (income, cash flows), size, growth and variability in stock prices.

A more recent study on the Italian banking system (Di Biase and D'Apolito, 2012) use as explanatory variables the size (total assets), a leverage ratio (debt/book value of equity), a loan-to-asset ratio, a liquidity ratio (cash/total assets), an intangibles ratio, a loan-loss ratio and earnings per share. They find, in particular, a negative relation of EPS and loan-loss ratio with betas.

Given the aim of our study, we are interested especially in investigating betas against the quality-of-loans portfolio with a wide array of specifications regarding specifically the provisioning behaviour, the riskiness of loans and the impact on performance.

As is known, managers have some choice in provisioning, and they use discretionary provisioning as a mean of income-smoothing, as recognized in the literature. Some authors argue (see Kanagaretnamet et al., 2005) that managers have the incentive to adjust banks' current performance to an average performance of a group of benchmark banks. Should this hold, we would expect stock-process volatility of banking institutions converging toward sectorial volatility, with differences being due to specific characteristics of each institution, in particular business models. Arguably, while such form of "benchmarking" could make sense during normal times, it would prove more difficult for banks to track an average sectorial performance during crisis periods.

However, the procyclical behaviour of banks significantly accentuates swings in earnings and is expected to have significant implications as regards the responsiveness of systematic risk exposure. In particular, procyclicality casts the question of whether betas are actually responsive to performance measures or, rather, are reactive to risk-taking behaviour, which affects future losses and performance. As noted, other studies account for a positive relation between risk-weighted assets and betas.

Loan-loss provisions play a relevant role within this framework. On the one hand they have an impact on earnings fluctuations. Since they represent provisions set aside to cover expected losses (which represent the cost of lending) an underestimation of the expected losses during benign times will lead to an increase in profits and lending activity due to overconfidence. The opposite, of course, will hold during recession or financial distress. Recall that provisions comprise specific provisions that are related to credit losses (they cover expected losses) and general provisions that are set aside against no yet identified losses (they are therefore discretionary provisions). To some extent, therefore, provisions can be used for earning management purposes and, in particular, earnings smoothing (reducing volatility in earnings). On the other hand, provisioning, together with capital requirements, has to do with the coverage of credit risk. There are convincing arguments, therefore, to think of provisioning as having an impact on systematic risk. Capital requirements themselves, which are designed to cover unexpected losses, are expected to have an impact on systematic risk and this might be particularly true during a crisis given the shortage of reserves that is due to the procyclical behaviour of provisioning. We develop the following hypotheses.

Hypothesis 1 – Betas are responsive to risk exposure and risk-coverage policies rather than to current performances. Loan-loss provisions have a significant impact on systematic risk.

Hypothesis 2 – The relation between a bank's betas and sectorial betas weakens during crisis periods as the impact of a bank's fundamentals is expected to increase and widely affect volatility.

Hypothesis 3 – In crisis times, capital adequacy turns to assume a significant role in driving betas due to increasing concerns regarding bank soundness.

1.4 Data and methodology

1.4.1 Description of the sample

Our study is based on a sample of 59 major European banking groups covering 10 countries. Our selection strategy is based on a total-asset criterion. More precisely, for each country we select those groups above ten billion in total assets. In order to avoid duplications we rely on consolidated financial information. We collect consolidated balance-sheet data from the Bankscope database on a timeframe spanning the

Table 1.1 The sample

Country	Number of banks	Total assets 2011 (billion €)
Italy	12	2,365.4
Germany	7	3,925.9
Spain	11	2,570.7
Portugal	4	337.2
France	6	5,593.5
Netherland	2	2,010.9
Belgium	2	698.1
Austria	3	265.5
UK	9	7,421.9
Ireland	3	347.1
Total	59	

Source: Bankscope database.

period 2005-=–11. We have, therefore, a total of 413 observations. Table 1.1 summarizes our sample. It reports the number of banks for each country and the average total assets over the selected time span. Unfortunately, not all the banks in our sample are listed. On balance we have 38 listed banks for which betas are available.

We then collect from the Bloomberg database the betas for each bank in our sample. Since we are interested in testing the impact on bank's betas of macro factors, we relied on the Bloomberg database to calculate sectorial betas which, in our setting, are entrusted to capture systematic events. Instead of collecting banking-sector betas we had to rely on the broader financial sector beta for each country under investigation. Such a simplification is due to the fact that we were not able to find the narrower banking sector beta for all the countries in our sample. We do not, however, expect this simplification to bias the results of our analysis. We get for each year the betas over a ten-year time horizon. Sectorial betas are derived from each country MSCI indexes.

Figure 1.1 depicts the dispersion of betas across countries and banks together with the median value for each category. Evidence shows a great degree of variability among banks and within each country, with betas ranging from near zero values and values above two. At a first glance, looking at distributions and median values, it appears Dutch, Belgian and UK banks having higher betas while Italian, Spanish and Portuguese banks presenting lower levels. Figure 1.1 reveals a great time dispersion as well, with the last three years showing a substantial increase in betas' volatility.

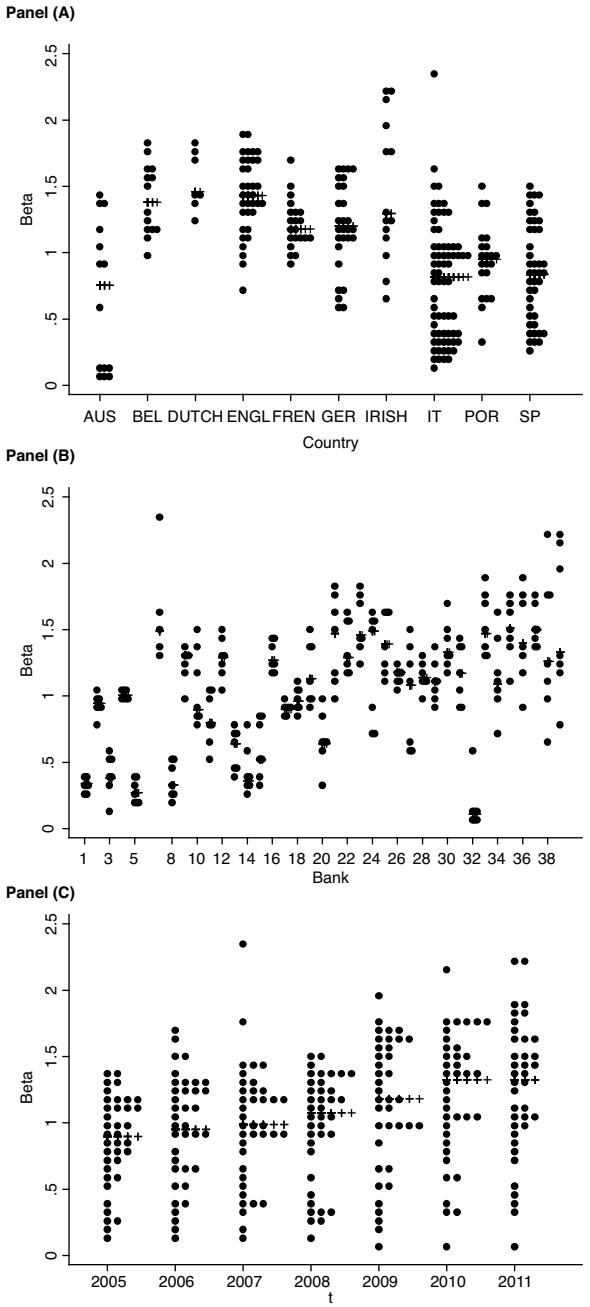

Figure 1.1 Dispersion of betas across countries, banks and time

Notes: Panel A depicts the dispersion of betas across countries. Panel B represents the dispersion across banks while Panel C depicts time dispersion. The plus symbol (+) depicts median values.

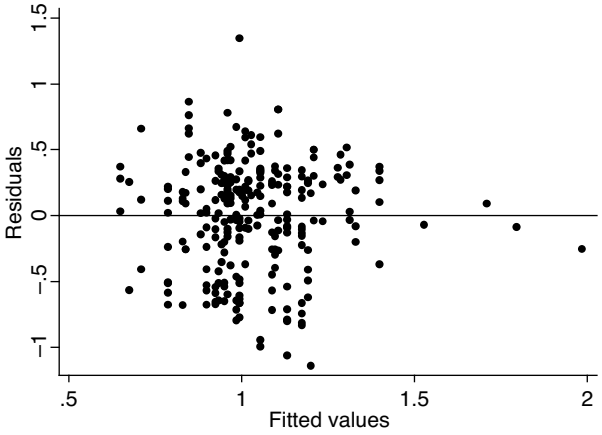

Figure 1.2 Banks' betas and sectorial betas: residual vs fitted plot

As previously pointed out, we assume banks' betas capture the exposure to macro events which, in our setting, are captured by sectorial betas. Our hypothesis is systematic risk, which is largely driven by firm characteristics. A way to check whether sectorial factors fit well in our sample of banks betas is to perform an analysis of residuals after regressing the latter on the former. Figure 1.2 depicts the residual versus fitted plot.

At a first glance we can observe that residuals are not randomly distributed. There should, therefore, be other variables explaining betas.

1.4.2 Explanatory variables

We build on previous studies in choosing our variables but expand our array of variables since we wish to capture the impact on systematic risk of different specifications, in particular relating to credit risk. We predict banks' betas across a set of basic variables describing various banks' profiles of performance and risk exposure and, namely, credit-risk exposure and risks associated with financial fragility. Contrary to other studies, we employ also sectorial betas in our model (see discussion in the previous section). We also employ a set of control variables. Table 1.2 describes our variables together with the respective predicted sign of the relation with betas.

Profitability variables (ROE and PIMOPTA) are expected to be positively related to betas. We recall the discussion in the previous section for such a relation. For similar reasons we expect there should be a positive

Table 1.2 Description of the variables

Category	Variable	Description	Predicted sign
Market-based risk	P/BV	Price-to-book value	(+)
Credit risk variables	GL/TA	Ratio of gross loans on total assets	(+)
	IMPL/GL	Ratio of impaired loans on gross loans	(+)
	LLP/GL	Ratio of loan impairment charges on gross loans	(–)
	RIL/GL	Ratio of reserves for impaired loans on gross loans	(–)
	RIL/IMPL	Ratio of reserves for impaired loans on impaired loans	(–)
	LLP/IOL	Ratio of loan impairment charges on interest on loans	(+)
	LLP/ PIMOP	Ratio of loan impairment charges on pre-impairment operative profit	(+)
	RIL/TE	Ratio of reserves for impaired loans on total equity	(–)
	RIS/ECAP	Ratio of reserves for impaired loans on economic capital	(–)
	LLP/IMPL	Ratio of loan impairment charges on impaired loans	(–)
	RWA/TA	Ratio of risk-weighted assets on total assets	(+)
Liquidity	DMMS/TE	Domestic money market and short term funds on total equity	(+)
Performance variables	ROE	Net income on total equity	(+)
	PIMOP/TA	Pre-impairment operative profit on total assets	(+)

Note: The table below describes the variables we employ in our study (grouped by different categories capturing different profiles of banks' risk exposure) and the respective predicted sign of the relation with betas.

relation of RWATA and IMPLGL to systematic risk and a negative relation of RISECAP, RILGL and RILIMPL to systematic risk. Higher risk-taking behaviour, in fact, leads to higher risk-weighted assets, higher economic capital and, potentially, a higher fraction of impaired loans on gross loans, which is a measure of the magnitude of non-performing loans.

We expect a negative relation with RILGL, RILIMPL and RISECAP. The former, in particular, is a significant ratio for banks as it represents the so-called coverage ratio measuring the ability of banks to absorb potential losses from non-performing loans. Related to the riskiness of the credit portfolio is the ratio of risk-weighted assets on total assets for which we expect a positive relation with betas. By the way, such a relation has been already investigated (although in the opposite way) in other studies (Beltratti and Paladino, 2013). The higher the ratio the higher the funds that the bank sets aside for covering losses; therefore, we expect a lower exposure to systematic risk. Another relevant variable is LLP (loan-loss provisions), which is the difference between the stock of reserves in two subsequent period.

The expected sign of LLPGL is similar to RILGL. This is another relevant ratio for banks since it represents the cost of loans on total gross loans. It is another measure of trouble on loan portfolio. Higher loan provisions on loans implies that a greater fraction of risk has been already factored in current profit-and-loss accounts, smoothing therefore earnings patterns. Managers that adopt honest and all-encompassing loan impairment decisions should be seen more favourably by the market.

Finally, RISECAP is a measure of adequacy of provisions relative to the capital requirement. The lower the ratio, the higher the risk of banks eroding their capital base. Potentially, a low ratio implies greater fragility.

As for leverage, a high DMMSTE ratio underpins a high level of maturity transformation. While casting concerns regarding financial fragility it implies, at the same time, higher expected spreads on loans, given the lower cost of short-term funds and the predicted sign is positive.

1.4.3 Control variables

Assuming share prices as the representation of future expected profits, the Tobin's q (PBV) could be deemed as expressing the convenience of expanding investments. Specifically to the core banking business, it is expected to underpin the convenience of an aggressive behaviour in issuing loans and lead us to predict a positive sign of the relation with betas.

Another control variable is GLTA, which could be assumed as a proxy of the business model and for which we expect a positive sign. Inflating the loan portfolio implies heightening the exposure of banks to credit risk, eventually leading to systematic events. Recall that due to procyclicality of bank business leads to expanding the portfolio during buoyant times (when the appetite for risk is higher), which leads to losses in

future periods. The attitude to risk-taking, then, leads to higher risk-weighted assets on total assets.

1.4.4 Descriptive statistics

Table 1.3 reports the main descriptive statistics (that is, the mean and the coefficient of variation calculated as the ratio of mean on the standard deviation) for each variable and for each year under investigation.

Descriptive statistics reveal a plunge in PBV and profitability measures with high coefficients of variation. As regards credit-risk variables, what emerges is an increase in loan impairment charges on gross loans over time, in particular during the peaks of the financial crisis (although with a reversion of the trend in the latest year of observations). However, not surprisingly, there emerges great variability, especially in 2009 and 2010, unveiling a certain heterogeneity in provisioning behaviours across the European banking industry during the crisis. By contrast, the incidence of impairment charges on impaired loans shows a decreasing trend but with higher coefficients of variation during pre-crisis years while variability has been declining starting with 2008. What is worthwhile to point out are the high levels of economic capital relative to total equity during the pre-crisis periods and the sharp decline in the ratio, which reflects the efforts of the banking industry to strengthen capitalization. Concerns, then, arise looking at the ratio of impairment charges on the interests on loans, which shows a sharp upward trend during the crisis years.

We turn, then, to the analysis of correlations among the selected variables. Table 1.4 reports the Pairwise correlations at a 5 per cent significant level.

Overall, the correlations among variables are generally low, with the exception of the correlation of PBV with RILIMPL, that of RWATA with PIMOPTA and of RWATA with NLTA, which is not so surprising. In particular, such results imply that higher economic capital on total equity (higher capital requires given risks compared to the bank's capitalization) results in the market incorporating higher than expected profits in share prices. At the same time, greater operational performance mirrors greater risks (reflected in higher risk-weighted assets). IMPLGL is, finally, strongly correlated with RISECAP. We therefore, exclude it from the regression analysis.

1.4.5 Methodology

When testing the impact of both sectorial betas and loan quality on banks' betas, a concern comes to the forefront having to do with

Table 1.3 Descriptive statistics

		SECTBETA	P/BV	ROE	PIMOP/ TA	DMMS/ TE	GL/TA	IMPL/ GL	RIL/GL	RIL/I MPL	LLP/ IOL	LLP/ PIMOP	RIS/ ECAP	LLP/ IMPL	RWA/ TA
2005	Mean	1.033	322.237	12.938	0.010	0.671	0.571	0.026	0.018	1.473	0.079	0.208	24.318	0.544	0.006
	St. Dev.	0.096	2.377	0.506	0.443	0.263	0.327	1.088	0.786	1.258	0.727	1.002	0.926	3.431	0.369
2006	Mean	1.041	336.743	15.723	0.010	0.663	0.564	0.022	0.016	1.356	0.068	0.185	20.948	0.167	0.005
	St. Dev.	0.111	2.532	0.426	0.427	0.269	0.357	0.944	0.695	1.090	0.666	0.623	0.676	6.604	0.387
2007	Mean	1.144	349.771	14.220	0.010	0.651	0.576	0.022	0.016	1.093	0.060	0.181	20.991	0.270	0.006
	St. Dev.	0.054	2.506	0.427	0.491	0.264	0.354	0.891	0.647	0.857	0.768	0.793	0.611	1.165	0.389
2008	Mean	1.179	238.686	2.194	0.008	0.641	0.582	0.029	0.018	0.690	0.100	4.900	27.219	0.254	0.005
	St. Dev.	0.125	2.511	10.861	0.756	0.285	0.356	0.562	0.548	0.480	0.642	6.612	0.480	0.786	0.367
2009	Mean	1.281	165.496	–11.235	0.009	0.656	0.581	0.047	0.024	0.607	0.286	0.887	35.951	0.297	0.005
	St. Dev.	0.156	2.644	–8.301	0.540	0.250	0.339	0.806	0.772	0.587	1.567	5.157	0.473	0.962	0.391
2010	Mean	1.440	139.423	–3.619	0.008	0.671	0.577	0.056	0.029	0.582	0.452	1.432	45.002	0.186	0.005
	St. Dev.	0.148	2.520	–15.207	0.540	0.233	0.350	1.281	1.241	0.594	3.189	4.306	0.973	0.739	0.402
2011	Mean	1.352	5.857	–4.746	0.007	0.669	0.566	0.068	0.035	0.569	0.261	0.326	57.581	0.170	0.005
	St. Dev.	0.118	3.256	–6.249	0.669	0.249	0.350	1.281	1.425	0.657	1.586	10.461	1.254	0.758	0.398
Total	Mean	1.210	221.628	3.145	0.009	0.660	0.574	0.038	0.022	0.901	0.193	1.169	33.529	0.266	0.005
	St. Dev.	0.171	2.853	14.448	0.554	0.258	0.345	1.270	1.202	1.151	3.226	10.881	1.112	3.080	0.388

Table 1.4 Pairwise correlations of the variables (* represents significance at 5 per cent level)

	SECTBETA	P/BV	ROE	PIMOP/TA	DMMS/TE	GL/TA	IMPL/GL	RIL/GL	RIL/IMPL	LLP/IOL	LLP/PIMOP	RISECAP	LLP/IMPL	RWA/TA
SECTBETA	1													
P/BV	–0.1881*	1												
ROE	–0.0888	0.1037*	1											
PIMOP/TA	–0.1920*	0.2754*	0.2722*	1										
DMMS/TE	0.0242	0.0249	–0.0096	0.318	1									
GL/TA	–0.0526	0.2201*	0.0543	0.4231*	0.3319*	1								
IMPL/GL	0.1557*	0.0179	–0.0028	–0.0066	0.051	0.0023	1							
RIL/GL	0.0406	0.0176	–0.0025	–0.0077	0.0413	–0.0005	1*	1						
RIL/IMPL	–0.2201	0.4229*	0.0939	0.2132*	0.1666*	0.0249	0.0156	0.0157	1					
LLP/IOL	0.0919	–0.0406	–0.2711*	–0.0384	0.0836	–0.1203*	–0.0042	–0.0046	–0.00796	1				
LLP/PIMOP	–0.0156	–0.0236	–0.1207*	–0.0965	0.0561	–0.0375	0.0029	0.0028	–0.0308	0.0617	1			
RIS/ECAP	0.1757*	–0.1668*	–0.3227*	–0.0256	0.0259	0.0378	0.9147*	0.9642*	–0.0911	0.2758*	0.2813*	1		
LLP/IMPL	–0.0424	0.0961	–0.022	0.0877	0.0942	–0.0246	0.0105	0.0105	0.4561*	0.2190*	0.0044	–0.0414	1	
RWA/TA	–0.2605*	0.2517*	0.0373	0.6357*	0.2742*	0.6736*	0.0063	0.0048	0.1919*	0.0177	0.0981	0.0428	0.0542	1

potential autocorrelation and endogeneity. Autocorrelation is likely to occur when dealing with market variables like stock market prices as documented in several studies. Endogeneity occurs when the dependent variable – while being responsive to an independent variable – affects the latter itself. In our setting, the candidate variable to produce endogeneity is SECTBETA. In fact, while banks' betas are to a greater or lesser extent responsive to the dynamics of the sector to which they belong, it is reasonable to assume the former affect the latter, since sectorial indices are constructed on basis of the stocks included in the basket. Another variable that arguably can display endogeneity is ROE. Higher performances are expected to affect betas but can be themselves affected by systematic risk, to the extent that higher risk exposure leads to higher costs of external funds. Finally, there could be exogeneity with risk-weighted assets (see Beltratti and Paladino, 2013 for evidence and discussion).

To address some concerns, we start with a static approach. We start by employing a GLS fixed-effects panel data model for predicting our dependent variable. The general model we employ is as follows:

$$\begin{aligned}\beta_{i,t} = \alpha + b_1 sectbeta_{i,t} + b_2 llpgl_{i,t} + b_3 rilimpl_{i,t} + b_4 roe_{i,t} + \\ b_5 risecap_{i,t} + b_6 rwata_{i,t} + b_7 llpimpl_{i,t} + b_8 llppimop_{i,t} + \\ b_9 dmmste_{i,t} + b_{10} glta_{i,t} + b_{11} rilgl_{i,t} + b_{12} llpiol_{i,t} + \\ b_{13} pbv_{i,t} + b_{14} pimopta_{i,t} + b_{15} rilte_{i,t} + v_{i,t}\end{aligned} \tag{1.1}$$

Where *i* denotes the *i-th* bank and *t* identifies time.

In order to investigate the impact of the crisis we then introduce a dummy (CRISIS) which takes value one for years 2008–11 and zero for others. We test for the effects of the interaction of such variables with LLPGL (CRISIS*LLPGL) and LLPPIMOP (CRISIS*LLPPIMOP) in order to assess whether the crisis alters the riskiness of the loan portfolio and hurdles financial performances.

After that, we control for endogeneity and run an instrumental variables regression model, which is generally employed in econometrics for dealing with endogenous variables. In order to check for endogeneity we follow Wooldridge (2002) and estimate a fixed-effect version of equation 1.1 that includes future values (i.e., we create leading variables) of some regressors (see next section). We then run a dynamic Arellano Bond regression for dealing with endogeneity and check for differences with our fixed-effects static panel model. Finally we check for the robustness of our results through the Hansen statistic designed to verify test the overidentifying restrictions.

1.5 Results

In a static approach we explain banks' betas in our sample and for the reference time frame on the basis of a set of variables, including the sectorial betas and other variables capturing banks' fundamentals. Table 1.5 presents the results. Column 1 summarizes the results including our base variables. Column 2 adds the effect of financial fragility (DMMSTE); column 3 adds the effects of interactions, while column 4 comprises control variables. We apply a paned data model with fixed effects. The F-test allow us to reject the null hypothesis that individual effects are uncorrelated with regressors.

Evidences are quite mixed. The first model shows a positive and significant relation between banks' betas and sectorial betas. We find, then, a 5 per cent significant relation between betas and RISECAP. However, contrary to expectations, the sign of the relation is positive. Arguably, this outcome is a joint effect of a poor forward-looking behaviour of banks in provisioning and a misevaluation of future risks by the market.

The other explanatory variables are not significant in explaining systematic risk. Nor do performance measures (in particular the ROE) or credit risk measures seemingly play a significant role. Arguably, risks were not factored into balance sheets in the years preceding the crisis.

It is worth noting that as regards ROE, the sign of the relation is unexpectedly negative, meaning that higher profitability reduces exposure to systematic risk. It is possible that the sign is strongly influenced by the trends during the crisis, characterized by sharp increases in betas and plunges in banks' profitability. Put it in other terms, the fall in equity returns due to a more conservative attitude of managers is the result of excessive risk-taking in previous years, which heightened the risks of systematic events. Eventually, this could explain the "absorption" in betas of wider macro risks captured by the sectorial index. Actually, there is potentially an endogeneity problem with sectorial variables, to which we will turn later. LLPPIMOP and LLPIOL are the other variables entering the relation with an opposite than expected sign.

The inclusion of DMMSTE does not alter significantly the outcomes of the model. When we investigate the effects of impairment charges in the period 2008–11 (see regression 3 in Table 1.5) we find that the sign of the coefficient CRISIS*LLPGL turns negative, coherently with prediction, and significant at the 1 per cent level, meaning that the market factors an improvement in systematic risk exposure as banks increase impairment charges on their loan portfolio. Surprisingly, however, the

Table 1.5 Fixed effects panel data model

BETA	**1**	**2**	**3**	**4**
LAG BETA	.2582***	.2568***	.1864***	.1789***
	(0.000)	(0.000)	(0.000)	(0.000)
SECTBETA	.2430**	.2440**	.3901***	.3753***
	(0.014)	(0.014)	(0.000)	(0.000)
LLPGL	−4.3444	−4.3862	87.8578***	97.9181***
	(0.670)	(0.668)	(0.000)	(0.000)
RILIMPL	−.0338	−.0338	.0658*	.1007**
	(0.373)	(0.374)	(0.070)	(0.013)
ROE	−.0884	−.0902	−0.0968	−.1092
	(0.244)	(0.241)	(0.150)	(0.208)
RISECAP	.0030**	.0030**	.0005	−.0014
	(0.036)	(0.036)	(0.699)	(0.367)
RWATA	3.27	3.2452	−13.9976	−50.8286*
	(0.904)	(0.905)	(0.571)	(0.074)
LLPIMPL	0.1421	.1433	−.1992	−.3640**
	(0.389)	(0.387)	(0.199)	(0.029)
LLPPIMOP	−.0117	−.0114	−1.6344***	−1.5674***
	(0.345)	(0.357)	(0.000)	(0.000)
LLPIOL	.2520	.2500	.0827	−.0470
	(0.447)	(0.452)	(0.777)	(0.880)
DMMSTE		−.0508	−.1835	−.0840
		(0.864)	(0.486)	(0.755)
CRISIS*LLPGL			−79.1637***	−80.5372***
			(0.000)	(0.000)
CRISIS*LLPPIMOP			1.6190***	1.5464***
			(0.000)	(0.000)
GLTA				.8668***
				(0.009)
PBV				.00001
				(0.989)
PIMOPTA				−3.2825
				(0.549)
CONS	.3122*	.3454	.4484	.1505
	(0.098)	(0.203)	(0.060)	(0.560)
F-test (model)	10.70***	9.67***	14.61***	12.67***
R^2 within	.4054	.4055	.5522	.5730
R^2 between	.7931	.7978	.6820	.4195
R^2 overall	.5817	.5886	.5415	.3387
F-test (fixed effect)	5.08***	4.90***	7.50***	7.30***

Note: Regressions are estimated using a panel data model with fixed effects. The dependent variable is BETA. We include a dummy variable, which is CRISIS taking value one for years comprised in the timeframe 2008–11 and zero otherwise.

sign of LLPGL and RILIMPL turns to be positive and significant at the 1 per cent and at 10 per cent levels, respectively.

Finally, the sign of CRISIS*LLPPIMOP is positive and significant at the 1 per cent level, meaning that the reduction in profitability that higher values of the ratio imply leads to higher perception of systematic risk. The sign here is coherent with the negative sign attached to ROE. It is interesting to see, however, that LLPPIMOP is again negative and significant at the 1 per cent level. On balance, the introduction of our dummy highlights a significant effect of crisis with risk loan quality variables playing a significant role in driving betas and a change in market perceptions.

When introducing the control variables we find a positive and 1 per cent significant relation between GLTA and betas, implying that systematic risk is responsive to the business model and increases with the exposure of banks to credit risk. Moreover, the introduction of GLTA leads RWTA to become significant (10 per cent) level. The level, however, is negative, contrary to expectations.

Looking at R-square values it is interesting to note that by adding the dummy crisis we have a slight reduction in the goodness of fit of our model to between group variance. The R-square (in particular between and overall) becomes reduces significantly when introducing control variables.

We then check whether, and to what extent, things change when dealing with autocorrelation and endogeneity. In Table 1.6 we check for strict exogeneity running a fixed-effect version of equation 1.1 introducing leading values of our variables. While sectorial betas do not provide evidence of endogeneity, ROE, LLPGL, LLPIMOP and LLPIOL are significant. We, therefore, reject strict exogeneity of such variables and consider them as endogenous. Endogeneity of loan-loss provisions on margins might seem somewhat straightforward. A possible explanation is that while loan quality affects systematic risk exposure of banks, the latter has an effect on the yields that the market requires when supplying funds to credit institutions, thus affecting margins.

We employ an Arellano Bond dynamic model in order to deal with endogeneity concerns. Table 1.7 summarizes the results of our regressions, the design of which is the same as in Table 1.5. We introduce a lag for the dependent variable and for all the variables that we treat as endogenous according to the results summarized in Table 1.6.

Contrary to the previous regression analysis, we find no significant impact of sectorial betas on banks' betas, neither in the basic model nor when controlling for our CRISIS dummy variable.

Table 1.6 **Test of strict exogeneity**

BETA	**1**	**2**	**3**	**4**	**5**
SECTBETA	.3833***	.3560	.3454***	.4458***	.3681***
	(0.001)	(0.002)	(0.003)	(0.000)	(0.003)
LLPGL	6.1677	7.3024	8.1424	6.0168	16.1345
	(0.282)	(0.231)	(0.184)	(0.296)	(0.219)
RILIMPL	.00002	–.0022	.0001	–.0123	.0665
	(1.000)	(0.957)	(0.998)	(0.785)	(0.229)
ROE	–.1685*	–.3104	–.3209	–.2003**	–.2568**
	(0.075)	(0.127)	(0.114)	(0.028)	(0.033)
RISECAP	.0010	.0004	0.0000	.00005	–.0037
	(0.493)	(0.789)	(0.995)	(0.973)	(0.054)*
RWATA	–10.3272	13.8197	13.7015	–17.8676	–78.941**
	(0.742)	(0.675)	(0.677)	(0.595)	(0.038)
LLPIMPL	.0748	.1046	.0972	.0001	–.1062
	(0.679)	(0.551)	(0.580)	(0.999)	(0.628)
LLPPIMOP	–.0152	–.0249*	–.0268*	–.0142	–.0201
	(0.287)	(0.086)	(0.066)	(0.310)	(0.189)
$SECTBETA_{t+1}$	–.0125	–.0958	–.1607		
	(0.895)	(0.350)	(0.169)		
ROE_{t+1}		–.1872**	–.1673*		
		(0.027)	(0.053)		
$RWATA_{t+1}$		–25.2639	–20.0666		
		(0.163)	(0.281)		
$RISECAP_{t+1}$			.0015		
			(0.244)		
DMMSTE				–.1177	–.1228
				(0.748)	(0.189)
$LLPGL_{t+1}$				20.8962*	
				(0.054)	
$RILIMPL_{t+1}$				–.0313	
				(0.450)	
$LLPIMPL_{t+1}$				.0758	
				(0.622)	
$LLPPIMOP_{t+1}$				–.0014*	
				(0.079)	
$LLPIOL_{t+1}$				–.6861*	
				(0.069)	
$DMMSTE_{t+1}$				–.0634	
				(0.719)	
GL/TA					1.4539***
					(0.002)
PBV					–.00006
					(0.142)
PIMOP/TA					2.5424
					(0.728)
$GLTA_{t+1}$					–.2721
					(0.190)
PBV_{t+1}					0.00001
					(0.691)
$PIMOPTA_{t+1}$					–5.6122
					(0.267)
CONS	.5271	.6948	.7124	.5744	.2770
	(0.027)	(0.006)	(0.005)	(0.094)	(0.422)
F-test (model)	6.08***	5.33***	5.01***	4.59***	4.60***
R^2 within	0.2435	0.2745	0.2809	0.3077	0.3338
R^2 between	0.1592	0.0638	0.0163	0.3012	0.0088
R^2 overall	0.1264	0.0858	0.0517	0.2469	0.0190

Table 1.7 Arellano-Bond regression model

BETA	**1**	**2**	**3**	**4**
BETA (L1)	.6620***	.6766	.5002***	.4591***
	(0.000)	(0.000)	(0.000)	(0.000)
lLPgl	–36.0956**	–33.2117**	28.4554	41.3281
	(0.028)	(0.042)	(0.270)	(0.116)
(L1)	16.7540*	15.2741	15.7896*	16.2685*
	(0.087)	(0.118)	(0.082)	(0.073)
roe	–.0253	.0017	–.0264	.0305
	(0.737)	(0.983)	(0.717)	(0.749)
(L1)	–.2614	–.2311	–.3015	–.3734*
	(0.305)	(0.366)	(0.195)	(0.067)
lLPpimop	–.0257**	–.0292**	–.8092**	–.8993**
	(0.041)	(0.024)	(0.025)	(0.011)
(L1)	.0021***	.0021***	.0018**	.0013**
	(0.006)	(0.007)	(0.013)	(0.034)
lLPiol	1.3858***	1.3448***	.7887*	.5455
	(0.005)	(0.006)	(0.081)	(0.209)
(L1)	–.7670*	–.7067	–.4668	–.5134
	(0.095)	(0.122)	(0.263)	(0.215)
sect_ind	.0161	.0134	.0858	.1332
	(0.890)	(0.908)	(0.445)	(0.236)
rilimpl	–.0731	–.0699	–.0153	–.0059
	(0.155)	(0.175)	(0.740)	(0.904)
risecap	.0035	.0029	.0014	.0022
	(0.202)	(0.288)	(0.490)	(0.336)
rwata	56.7096*	53.6913*	38.1783	36.2678
	(0.063)	(0.078)	(0.181)	(0.305)
lLPimpl	.1980	.1807	–.0189	–.0104
	(0.366)	(0.411)	(0.921)	(0.958)
DMMSTE		.3924	.1155	.1374
		(0.211)	(0.713)	(0.656)
CRISIS*LLPGL			–41.6980**	–47.9465***
			(0.016)	(0.005)
CRISIS*LLPPIMOP			.7854**	.8713**
			(0.031)	(0.014)
GLTA				–.0704
				(0.893)
(L1)				.0135
				(0.977)
PIMOPTA				–6.5422
				(0.267)
PBV				.00001
				(0.722)
cons	–.0038	–.2461	.0637	.0971
Number of instruments	61	62	64	76
Number of observations	139	139	139	139
Number of groups	32	32	32	32
Wald χ^2	152.9***	152.6***	186.90***	189.12***
Sargan Hansen χ^2	33.5011	33.2786	34.4836	47.9323
	(0.9151)	(0.9195)	(0.8939)	(0.7062)

Note: Regressions are estimated using the Arellano Bond model. We include a dummy variable which is CRISIS taking value one for years comprised in the timeframe 2008–11 and zero otherwise. Endogenous variables are lagged.

Surprisingly, we do not find significant differences when introducing the CRISIS variable compared to the basic case where the impact of crisis is not taken into account. The effects of the explanatory variables and the respective signs are quite the same in the two models, marking a major difference compared to the results reported in Table 1.5.

Interestingly, in the basic case loans quality (in particular the LLPGL ratio) becomes significant. At the same time, we find a significant relation between the ratio of LLP on IOL and PIMOP, respectively, and betas. The signs of the coefficients are the same as in Table 1.5. There is another significant difference compared with the static model. Now, the adequacy of provisions relative to the capital requirement (RISECAP) is not significant in explaining betas. By contrast, risk-weighted assets on total asset now have a positive relation with betas (although at a 10 per cent significance level). We find, therefore, support for our Hypothesis 1, that risk exposure plays a significant role in explaining systematic risk while performance measures (in particular, the Roe which enters with a negative sign as in the model) do not play a significant role. Dealing with endogeneity bias, therefore, things change.

Risk-weighted assets are related with future losses. Since the capital requirement on the basis of the current Basel II regulatory framework is a transformation of RWAs by applying to the latter an 8 per cent factor, higher risk-weighted assets imply a higher capital requirement and represent and indirect measure of a bank's exposure to unexpected losses. LLPGL and RILIMPL enter the relation with the expected sign. LLPPIMOP, by contrast, has an opposite-than-expected sign, as in Table 1.5.

Our results suggest that, while risk exposure and fundamentals (represented by loans' quality and, in particular, the ratio of LLP on margins) significantly affect beta, reserves for impaired loans (risk-coverage policies) do not have such a significant impact, arguably due to the fact that in good times loan losses are not a great concern. We, therefore, find partial support for Hypothesis 1 in that coverage policies are not significant in explaining betas. Contrary to the previous panel model, a bank's soundness measures (the DMMSTE ratio) have a positive relation with betas. Again, however, the relation proves not to be significant.

In a CRISIS environment, fundamental factors are again significant in explaining systematic risk as stated in our Hypothesis 2 (column 3 in Table 1.7). However, contrary to what stated in Hypothesis 2, the impact of sectorial betas are not significant in a pre-crisis period nor during crisis, and there is no significant change in the impact of fundamentals.

The major difference compared to the basic case is that risk-weighted assets on total assets do not enter the relation with a significant

coefficient. Nor are betas now responsive to loan-loss provisions on gross loans. However, they are responsive (although at a 10 per cent significance level) to the lagged variable and with a positive coefficient (which is contrary to what was expected).

Actually, traditional performance measures such as ROE again are not significantly related with beta. Rather, we find that a significant role is played by loan-loss provisions and, in particular, the ratios of provisions on gross loans, pre-impairment operative profit and interest on loans. The impact of provisions has, however, an obvious impact on financial performances. The significance of LLPGL and LLPPIMOP resembles the results we found with our static model.

As stated, LLPGL enters with a positive sign which, as noted, is contrary to the predicted sign. The change in sign (which was negative in a non-CRISIS environment) could find a possible explanation in the backward-looking behaviour of banks when dealing with provisioning, relating provisions to problem loans. Underestimation of losses during benign times naturally lead to overcharging when non-performing loans increase, and the magnitude of the effect would be particularly strong during financial turmoil. Therefore, a positive impact of LLPGL (together with the lagged variable) might be due to the failure of provisioning policies (building up reserves during benign times) as a tool of smoothing earnings' volatility. Controlling for our CRISIS variable, both LLPGL and LLPPIMOP themselves enter the relation with betas with the expected sign (see the interactions).

Apparently, we do not find support to our Hypothesis 3 predicting the significance of the ratio of capital requirement on total equity in a crisis environment. However, during crisis periods, while risks turn to heighten risk-weighted assets (and, therefore, capital requirements), higher loan-loss provisions might erode banks' capitalization to the extent that gives rise to bottom-line losses. In that situation, capital adequacy obviously becomes a concern. Finally, we conduct the Hansen test which distributes as a χ^2 under the null hypothesis of the validity of the instruments we employ. Looking at p-values, we do not reject the null hypothesis. Therefore, our test hints at a proper specification.

1.6 Discussion and implications

Our analysis has several implications in light of the extant literature on banks' earning quality, managerial incentives and the current debate surrounding the soundness of the banking industry, accompanied by tighter attention from supervisors on supervised entities. First of all, we

find a positive relation between betas and fundamentals. As in Beltrati and Paladino (2013) we find a positive relation between betas and RWATA, although our test goes in a different direction in that we try to explain betas against a set of variables comprising RWATA, while the authors we cite take the latter as the dependent variable and explain it against the beta.

Such a relation has significant implications. It obviously implies the incentive to optimize risk exposure (risk-weighted assets on total assets) in order to economize in the cost of capital. In this regard, banks adopting an IRB approach for determining regulatory capital might benefit from the advantages of a more precise alignment of regulatory capital to economic capital.

There are, however, other interesting implications regarding a potential strategic optimization of risk-weighted assets. The relation we found between betas and RWATA might, in fact, hinder an incentive for bank managers to dampen the magnitude of risk on total assets should the bank have future growth opportunities to exploit. Should this be the case – and given that exploiting growth opportunities requires banks to expand total assets – credit institutions might, whenever allowed by regulations, find it convenient to optimize in RWAs in order to avoid raising too much capital or to enter the capital market under easier conditions. Moreover, we found a possible explanation to our finding that the impact of LLPGL on betas turns out to be positive and significant (at least in the lagged variable) in a crisis environment in an underestimation of losses during benign conditions that would lead to overcharge provisioning in bad times. Should this hold, banks would lack flexibility if growth opportunities would emerge. Again, a more forward-looking provisioning might act as a strategic policy in light of future growth.

We feel, then, that our results have significant implications as regards the impacts of different pieces of regulation and, namely, prudential capital adequacy regulation and accounting standards for managerial behaviours. Banking supervisors favour the use of accounting approaches based on conservative valuations while IFRS counting standards are supportive of an incurred-loss approach. This scant coordination might be particularly concerning for credit institutions.

We found that the impact of loan-loss provisioning proves to be significant in determining betas and, therefore, the cost of capital. Such a relation is, arguably, particularly concerning during periods of distress when provisions sharply rise and banks are forced to raise their capital levels, both as a sound managerial practice but also because of being forced by regulators.

Following the crisis, supervisors have been requesting banks to increase their capital base. The banks are concerned about a potential increase in the weighted average cost of capital following a strengthening of the capital base due to higher levels of Tier 1 capital, supposedly more expensive than other sources of funds. While many theorists stress the fallacy of such an argument – claiming that higher capital bases reinforce banks' financial strength and, therefore, imply a lowering of the cost of capital – we put forth another argument. We feel that our result of a positive and significant impact of loan-loss provisioning in a crisis environment is an indirect argument in support of the income-smoothing incentive. Rather, to track an average benchmark–banks performance, such a behaviour should be targeted at dampening the volatility of betas and alleviating the impact on the cost of capital during distress periods. Our results go in favour of reducing the cyclicality of capital requirements through a system of dynamic provisioning – such as that experienced in Spain. In fact, where capital requirements are designed to cover unexpected losses, provisioning policies would be able to dampen the procyclicality of those requirements. In fact, by increasing loan-loss reserves during benign times and drawing from them (and, therefore, reducing provisions), banks would be able to ease the access to capital markets. By the way, this is also supportive of an alignment of IFRS standards to Basel II capital regulations.

Finally, our results cast significant concerns as regards different forbearance behaviours and heterogeneous definitions of non-performing exposure across countries. This is a serious concern, especially in Europe. The European Banking Authority (EBA) itself is concerned by the general deterioration of asset quality across the European Union, and the decrease of loss coverage across European countries. The major concerns here arise with regard to forbearance practices potentially leading to delay loss recognition and masking asset quality deterioration and the consistency of asset quality assessment across countries. As regards asset quality assessments different countries draw different lines between performing and non-performing loans.

While the EBA has recently issued two draft definitions of forbearance and non-performing loans on the basis of the Capital Requirement Regulation (Regulation EU No 575/2013) with the aim of promoting consistency and comparability of credit-risk figures in light of a more precise assessment of asset quality in Europe, such comparability has considerable far-reaching implications.

Apart from hindering a proper assessment of asset quality by regulators, a lack of consistency in forbearance and non-performing loans definitions

might have serious drawbacks for the market assessing the real soundness of banks across Europe. To the extent that such heterogeneity leads to biased systematic risk assessment, it would imply distortions in accessing equity capital by banks, which is a major concern in the current environment of persisting uncertainty surrounding the banking industry. Harmonization of forbearance and non-performing loans regulation should, therefore, be welcomed as a levelling-of-the-playing-field policy.

1.7 Conclusions

Based on a sample of European banks, we test for the determinants of banks' systematic risk in order to add evidence to extant literature and shed light on whether, and to what extent, betas respond to fundamentals. Our work is also another way to approach the issues relating to incentives-to-earnings management, which has been widely analysed in literature. Our main findings are that banks' betas, apart from being responsive to sectorial betas, are affected by the exposure to credit risk, which could be measured as the ratio of risk-weighted assets on total assets and fundamentals. Current performances are not significant in explaining systematic risk. The magnitude of loan-loss provisions plays the most significant role. By contrast we do not find evidence of a significant relation of banks' soundness measures with betas. Our work has several implications, in particular in light of current debate on banks' recapitalization and supervisors' efforts to strengthen bank resilience. Other relevant implications, in particular across European countries, are related to the efforts of the European Banking Authority to harmonize the regulatory framework of forbearance practices and non-performing loans definitions. There remains room for future research investigating the impact of new pieces of regulation on capital requirements (Basel III) and forbearance practices on systematic risk assessment.

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2

The Estimation of Banks' Cost of Capital through the Capital at Risk Model: An Empirical Investigation across European Banks

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2.1 Introduction

Valuing banks is one of the most difficult issues to deal with in corporate finance, and the enduring turmoil which has characterized the aftermath of the financial crisis of 2007 has made it even more complicated (Damodaran, 2013). All the recent academic contributions on the topic (among others: Koller et al., 2010; Damodaran, 2013; Massari et al., 2014) have highlighted that valuation of financial institutions requires an equity-side approach and, consequently, an estimation of the cost of equity instead of weighted average cost of capital.

The interest among academics on the topic of the cost of capital of banks has been rising in the aftermath of the financial crisis of 2007. Recently, scholars have been studying the applicability of Modigliani Miller's propositions (MM) to banks' capital structure (Admati et al., 2010, 2012; Baker and Wurgler, 2013; Masera and Mazzoni, 2013), and the effect on the cost of capital of risk weights optimization (Beltratti and Paladino, 2013) and disclosure (Chen and Gao, 2010; Palea, 2012). However, to the knowledge of the authors, few scientific contributions have analysed the methodologies adopted in banks' cost of capital estimation, which is the main topic this chapter deals with.

In practice, the most applied methodology for financial institution estimation of cost of capital is the Capital Asset Pricing Model (CAPM) (Sharpe, 1974; Lintner, 1965).[1] The literature has pointed out several limitations of CAPM usage (Fama and French, 2004; Fernandez, 2015).

Among others, the most important assumption is that investors, in equilibrium, hold the market portfolio so that idiosyncratic risk is all diversified away. The basic limitation of such an approach is to set homogenous expectations for all investors and, consequently, suppose that they hold the same market portfolio. In contrast with the CAPM framework, the literature has theoretically (Roussanov, 2010) and empirically provided evidence of investors' underdiversification (Blume and Friend, 1975; Kelly, 1995; Barber and Odean, 2000; Polkovnichenko, 2005; Calvet et al., 2007; Goetzmann and Kumar, 2008; Fu and Schutte, 2010). Such behaviour is documented to owe to the positive skewness of investors' portfolios, which are intentionally aimed to increase the likelihood of abnormal positive returns (Mitton and Vorkink, 2007). Explanations of positive skewness can be related to the lack of wealth, investor overconfidence (Odean, 1999), familiarity and decision bias (Hirshleifer, 2001; Grinblatt and Keloharju, 2001). In fact, in the real world preferences for investments are heterogeneous, investors care about idiosyncratic volatility, require individual betas and have different market-risk premia (Fernandez, 2015). On the whole, some empirical evidence has demonstrated that individual investors hold heterogeneous underdiversified portfolios.

Investor underdiversification is even more clear in the case of the strategic investor, that is when the entrepreneur, or the relevant and influencing stockholder in a private or publicly traded company holds a major share of its net worth invested in the business. For example, in case of mergers and acquisitions, the bidder who takes control (or purchases a relevant portion) of the target, holds the risk in the business – a risk which the bidder, evidently, does not diversify away. Such concentrated investments cause exposure to a high degree of idiosyncratic risk and, consequently, should require higher expected returns (Mueller, 2008). Empirical evidence has shown that the cost of capital for such investments is between two to four times the cost of capital for well-diversified investors (Kerins, et al., 2004; Moez and Sahut, 2013).

As a result, underdiversification should lead investors to care not only about systematic risk, but also idiosyncratic risk, thus requiring higher compensation for holding additional portions of idiosyncratic risk (Malkiel and Xu, 2006; Fu, 2009). On the whole, if investors do not hold a diversified market portfolio, then idiosyncratic risk should be priced in the required rates of return.[2]

Another relevant limitation of the CAPM, but of the three-factor model as well (Fama and French, 1992,1993), is that it is based on realized returns that are noisy and imprecise as a proxy of expected

returns (among others: Sharpe, 1978; Froot and Frankel, 1989; Fama and French, 1997; Elton, 1999). In order to overcome the realized returns approach, the recent accounting literature has proposed the usage of the implied cost of capital approach (hereafter ICC), where the cost of capital is measured by the internal rate of return, which equates the stock market price with the present value of future cash flows (among others: Gordon and Gordon, 1997; Claus and Thomas, 2001; Gebhardt et al., 2001; Gode and Mohanram, 2003; Easton, 2004, 2009; Ohlson and Juettner-Nauroth, 2005). Such estimation metrics are based on analyst forecasts which, however, have been demonstrated to have a poor predictive power and low-quality estimations (Easton and Monahan, 2005), and, moreover, be characterized by optimistic biases (e.g., Lin and McNichols, 1998; Easton and Sommers, 2007) and small stocks coverage (e.g., Diether et al., 2002). To fill this gap, Hou et al. (2012) and Li and Mohanram (2014) recently proposed to estimate the ICC by cross-sectional estimation models that are believed to better explain the variation in expected profitability across firms and to overcome analysts' coverage limitation.

Notwithstanding the importance of the banking sector, however, most of the accounting and corporate finance studies exclude banks from their sample, arguing that the pervasive regulation, the specific role of capital, debt and taxes make them different from other industrial companies (King, 2009). As a result, there are very few contributions narrowly concerning banks' cost of capital estimation.[3] The methodologies proposed by the literature can be split into three categories: the accounting earnings approach (Zimmer and McCauley, 1991; Green et al., 2003), the traditional and adjusted CAPM (Green et al., 2003; Barnes and Lopez, 2006) and the Discounted Cash Flow (DCF) approach (Green et al., 2003; Maccario et al., 2002). In particular, Maccario et al. (2002) have applied an ICC metric by which, assuming that analysts' expectations are the best proxy of future earnings and that dividend payout and growth rate are constant, they extrapolated the cost of capital by using an inflation-adjusted dividend discount model.

On the whole, looking at the industrial and banking literature on cost of capital estimation, it seems that scholars have been moving their attention from a realized return to a market-implied approach. In this chapter, we follow the ICC methodology literature trend, but propose a new estimation metric which is not based on analysts' expectations or cross-sectional estimates. The model that we propose here is the Capital at Risk Model (hereafter CaRM) (Beltrame et al., 2014),

which derives the cost of equity by considering directly the idiosyncratic stock-market volatility. The CaRM allows for pricing both the systematic and idiosyncratic risks, assuming that investors are undiversified. In fact, according to the literature, most of the investors have preference for positive skewness (Mitton and Vorkink, 2007), which entails underdiversified portfolios (Goetzmann and Kumar, 2008). And even in the case of the strategic investor (e.g., mergers and acquisition and venture capital), the idiosyncratic risk represents a relevant component, as they are considerably exposed to the business and default risk (Kerins et al., 2004; Mueller, 2008; Moez and Sahut, 2013). As a result, underdiversification should lead investors to care about not only systematic risk, but of idiosyncratic risk as well, thereby requiring higher compensation for holding additional portions of idiosyncratic risk (Fu, 2009; Malkiel and Xu, 2006).

The objectives of the chapter are twofold. On one hand, to present the structure of the CaRM discussing its underlying hypothesis and methodology with a specific application to the banking industry; on the other hand, to provide an empirical investigation in order to test whether the model is able to price both the systematic and idiosyncratic risks of banks – risks that are usually excluded from the sample of many papers due to their specifics. The comparison between the CaRM and other cost of capital methodologies is beyond the scope of this chapter.

Our contributions to the literature are several. First, we provide a measure of banks' cost of capital which is based on an ICC approach, but which does not use analysts' forecasts or cross-sectional models to predict future earnings. In these terms, the advantage is that the CaRM directly utilizes real market information and not discretional estimation. Second, the CaRM allows for pricing both the systematic and idiosyncratic risks, while the traditional CAPM model (the most-applied method in banking) prices the systematic risk only. Third, our model shifts the focus of valuation to the asset side of a bank, which is also where authorities focus their attention and regulation.

An alternative method for banks' cost of capital can have very wide applications for managers and investors, even only for the basis for comparison with other measures of cost of capital. In fact, even a very small basis-points variation of the cost of capital may lead to a large difference in terms of investment decisions. An alternative measure of cost of capital would be helpful for managers and investors in capital-budgeting decisions, portfolio selection and valuation; likewise for regulatory authorities who may be better informed on the incentives in undertaking risky investments.

The next section discusses the CaRM method. Section 2.3 describes the data and empirical approach. Section 2.4 provides results in addition to robustness checks. Section 2.5 concludes.

2.2 The application of the CaRM to the banking industry

2.2.1 Model's theoretical framework

The deterioration of the creditworthiness of many companies involves the perception of an increased default risk for shareholders. In fact, assuming the relevance of idiosyncratic risk, the quantification of shareholders' default-risk premium can be useful in the determination of the cost of equity, both for non-financial and financial firms.

In these terms, several studies have shown a lack of positive correlation between default risk and equity return (Dichev, 1998; Garlappi et al., 2008; Avramov et al., 2009; George and Hwang, 2010; Garlappi et al., 2011), although, for financially distressed firms, variables like volatility and market beta have proved to be highly correlated with default risk (Campbell et al., 2007). In other studies, using different dependent variables instead of stock market prices, results seem to be contrasting. As a matter of fact, Chava and Purnanandam (2010), using an implied cost of capital derived by analysts' assessments, found that it was positively related to default risk; and Vassolou and Xing (2004), employing a structural model to quantify default risk, highlighted that firms with higher default risks reported higher returns. In addition, using bond ratings as a measure of the deterioration of economic and financial conditions of companies, several studies found that a bond downgrade is usually followed by a negative stock return (Holthausen and Leftwich, 1986; Hand et al., 1992; Dichev and Piotroski, 2001) highlighting a strong relation between default risk perception and expected equity returns.

This evidence shows that the cost of debt and the cost of equity, whether obtained with alternative measures than equity returns, exhibit some similarities because both configurations of cost include a firm's default-risk estimation. In other words, default risk affects not only third-party lenders in the normal lending activity, but even shareholders in a similar way, such as subordinated debtors (Oricchio, 2012).

According to such a perspective, in this chapter we propose the application of the Capital at Risk Model (Beltrame et al., 2014) to the banking industry relying on a value at risk approach. This is because we believe that a cost of equity estimation that exploits the concept of value at risk

as a measure of unexpected loss can adapt more effectively to companies that already employ value at risk methodology for minimum capital requirements quantification.

The model works in an asset-side approach so that, in order to link the cost of equity to the cost of capital, it is essential to determine whether the Modigliani and Miller (1958) irrelevance proposition[4] is also applicable to banks. In these terms, one of the main reasons the literature has considered for the hypothetical inapplicability of MM's proposition is the presence of Basel's capital constraints. As a matter of fact, high and specific regulatory requirements can be a consequence of higher assets' riskness and, consequently, may indirectly alter the risk-return profile of banks' assets affecting their cost and the overall firm value (Masera and Mazzoni 2013).

The second issue would be related to the role of banks as liquidity providers, a role they play by holding deposits and conducting lending activity. Focusing on the deposit side, through this specific form of financing, the benefits for banks are twofold: firstly, an increase of the volume of credit intermediation owing to the deposit multiplier; and, secondly, the lower cost of deposits, compared to that of other forms of funding, reduces the overall cost of capital. These effects have a relevant impact on the value of a bank, since a substitution of deposits with equity capital implies both a lower capacity to generate additional volumes of intermediation and a lower level of returns. The impact of an increased use of deposits in place of equity can be explained also in terms of the related guarantees of deposits. With regard to the guarantee, Masera and Mazzoni (2013) claim that the presence of government guarantees (or equivalent technical forms) would directly affect value creation, thus violating the irrelevance of MM's proposition supporting the literature that shows that a replacement of equity with deposits reduces the cost of capital.

The empirical evidence on the relationship between banks' capital structure and value are heterogeneous. While Mehran and Thakor (2011) establish the significance of the capital structure on bank's firm value, conversely, Kashyap et al. (2010) explain that, for higher levels of leverage, the cost of equity compensates the more favourable effect of the cost of debt on the weighted average cost of capital. In addition, there is evidence that banks, whose capital is well above the regulatory minimum requirement, manage the leverage in a similar manner of non-financial companies (Reint and Florian, 2010). Besides, the increase in value due to the liquidity generated by a greater use of deposits (in place of equity) is not a mere substitution among sources of funding,

but an increase of capital raised, in contrast with MM's proposition. In support of this thesis, Adamati et al. (2010) state:

> The assumptions underlying the Modigliani-Miller analysis are in fact the very same assumptions underlying the quantitative models that banks use to manage their risks, in particular, the risks in their trading books. Anyone who questions the empirical validity and relevance of an analysis that is based on these assumptions is implicitly questioning the reliability of these quantitative models and their adequacy for the uses to which they are put – including that of determining required capital under the model-based approach for market risks.

On the whole, we point out – notwithstanding that the arguments of MM inapplicability over banks are examples of typical constraints, frictions and opportunities – that if we strictly interpret the MM's first proposition in absence of taxes, where there are no frictions and constraints, MM's proposition would not be applicable, neither for industrial companies nor for banks (Miller, 1995). In other words, there are not strong reasons to rule out the MM's proposition just for banking firms. In particular, if we do not consider market frictions, take separately the value generated on underpriced deposits, and if we assume the same amount of expected cash flows, then the MM's first proposition holds true.

Thus, in this chapter, the cost of capital is described by (2.1), where WACC is the weighted average cost of capital in absence of taxes, r_E is the cost of equity, r_D is the cost of debt, E is the market value of equity, D is the market value of debt and V is the firm's total value.

$$WACC = r_E \frac{E}{V} + r_D \frac{D}{V} \tag{2.1}$$

On the basis of (2.1), we can claim that for higher levels of leverage, the cost of debt grows at a fixed weighted average cost of capital. Considering the case of a totally levered bank (Merton, 1974) in which creditors hold the risk of the business, it is possible to state in (2.2), that the required return on unlevered firm is equal to required return on a totally levered firm.

$$V = D \rightarrow WACC = r_{D,TL} \tag{2.2}$$

So, to determine WACC the CaRM, assume a totally levered framework. This relation can work also in the presence of taxes because consider the net cost of debt and the net WACC.

2.2.2 The CaRM's cost of capital

The evaluation scheme of the CaRM model states that the value of the company can be split into two components: the 'certain' value (V^{low}), which is a function of a determinate confidence interval, and the 'uncertain' value as a function of the unexpected losses (CaR_V), which can be calculated by the value at risk of the asset value's distribution.

$$V = V^{low} + CaR_v \tag{2.3}$$

Such an approach to valuation stems from the expected and unexpected losses remuneration mechanism, which is theoretically (and practically) consistent with regulation and pricing policies adopted by banks.

According to the CaRM, only unexpected losses have to be priced in risk premiums, while expected losses should not be taken into account in the pricing process. This is because, in the risk-neutral theoretical framework, for a borrower requiring a risk-neutral rate, it would be indifferent to obtain the risk-free rate or the corresponding rate applied assuming no default or total capital recovery (assuming the hypothesis of default). Such a relation can be written by the equation (2.4) where: r_f is the risk-free rate; PD is the probability default of the borrower; r_{RN} is the risk-neutral rate and RR is the recovery rate.

$$1 + r_f = (1 - PD)(1 + r_{RN}) + PD \bullet RR\ (1 + r_{RN}) \tag{2.4}$$

It has to be underlined that the risk-neutral rate is a purely nominal remuneration while, on the contrary, the risk-free rate represents the true required return by debtholders or shareholders in the absence of unexpected losses. Whilst, in case of unexpected losses, the cost of capital includes a risk premium to compensate the losses arising from a lower cash flow of reimbursement.

In this perspective, the value at risk approach can be considered a useful and consistent measure of unexpected losses allowing the determining of the related risk premium over the idiosyncratic risk of a bank.[5] According to a parametric approach and considering a normal distribution of assets, the value at risk can be obtained as a multiple of assets' standard deviation. In particular, using a structural model and market data (market capitalization, equity standard deviation and face value of debt), we can obtain the value at risk through the value of the total asset and its standard deviation. Therefore, the sum of the risk-free and risk premiums will represent, respectively, the remuneration of expected

and unexpected losses for both shareholders of an unlevered firm and debtholders of a totally levered firm.

Having assumed that the bank is totally levered, its third-party lenders will require a risk-free rate on the portion of the certain capital, whilst they will expect a higher rate on the capital at risk (CaR) that will be equal to the risk-neutral rate (r_{RN}). It is now possible to determine the shareholders' required rate of return of the unlevered (and totally levered) firm by a weighted average of the risk-free rate and risk-neutral rate as:

$$WACC = r_{D,TL} = r_f \frac{V^{low}}{V} + r_{RN} \frac{CaR_V}{V} = r_f V_{\%}^{low} + r_{RN} CaR_{V,\%} \tag{2.5}$$

so that:

$$WACC = r_f + CaR_{V,\%} \left(r_{RN} - r_f \right) \tag{2.6}$$

where the difference between the risk-neutral rate and risk-free rate is defined as the default premium, while the $CaR_{V,\%}$ is the fraction of the capital at risk depending on the specific and systematic risk.

2.2.3 A structural model for the Capital at Risk

A practical solution to obtaining the value at risk coefficient is to use Merton's (1974) structural model, as it is possible to extend the model to a typical bank's liabilities, such as deposits (Merton, 1977).

The model assumes that the value of a firm's assets (V) follows a stochastic process of the geometric Brownian motion type with parameters μ_V (average) and σ_V (volatility of the process) as in (2.11).

$$dV = \mu_V V dt + \sigma_V V dn \tag{2.7}$$

Taking advantage of Ito's Lemma, we can get the differential of each function. In particular, in the case of the Merton model, equity can be interpreted as a European call option on the value of the firm, with a strike price equal to the face value of the debt and equivalent maturity.

Given the equity (E), its volatility (σ_E), the nominal value of the debt (D), the risk-free rate (r) and time (T), we can, in the case of Merton, express the Black and Scholes (1973) formula as:

$$E = VN(d_1) - De^{-rT} N(d_2) \tag{2.8}$$

where:

$$d_1 = \frac{ln\left(\frac{V}{D}\right) + \left(r + \frac{\sigma_V^2}{2}\right)T}{\sigma_V \sqrt{T}} \tag{2.9}$$

$$d_2 = d_1 - \sigma_V \sqrt{T} \tag{2.10}$$

$$\sigma_E = \sigma_V \frac{V}{E} N(d_1) \tag{2.11}$$

N is the normal distribution, and d_1 and d_2 are the same parameters of the Black and Scholes formula. Reversing the (2.8) and (2.11), we can get a measure of the firm value (V) and its implicit asset volatility.

The structural model assumes that, in the absence of arbitrage between assets' value and free-risk investments, the asset value (V), at the time T, follows a lognormal distribution and the logarithm of V_t is normally distributed as in (2.12).

$$V_T \to LN\left[\left(r_f - \frac{\sigma_V^2}{2}\right)T + ln(V_0), \sigma_V \sqrt{T}\right] \tag{2.12}$$

The certain value with an *alfa* interval confidence will be:

$$V_{\alpha,1}^{low} = \phi^{-1}(\alpha) = exp\left[\mu + \sigma N^{-1}(\alpha)\right] \tag{2.13}$$

and discounting $V_{\alpha,1}^{low}$al 0 we have the Capital at Risk (%):

$$CaR_{V,\%} = \frac{V - V_{\alpha,0}^{low}}{V} = \frac{CaR_V}{V} \tag{2.14}$$

Taking advantage of the Merton model and the properties of logarithms, we can reach the probability of default and, consequently, the risk-neutral rate that can be represented as:

$$r_{RN} = r_f - \frac{1}{T} ln\left[N(h_1)\frac{1}{d} + N(h_2)\right] \tag{2.15}$$

where $N(h_2)$ is *1-PD*, while $N(h_1)\frac{1}{d}$ is the recovery rate (*RR*) multiplied by the probability of default (*PD*). With a normal distribution of returns and lognormal distribution of assets, a totally levered firm has a

50 per cent probability of becoming insolvent and a recovery rate near 50 per cent. Using a one-year time horizon, we can estimate r_{RN} as:

$$r_{RN} \cong r_f - ln(1 - 25\%) \tag{2.16}$$

Finally, through the risk-neutral rate, it is possible to calculate the expected loss rate and formalize the model using the exponential capitalization:

$$WACC = r_f + ln\left(1 + \frac{ELR_{TL} \bullet CaR_{V,\%,}}{1 - ELR_{TL}}\right) \tag{2.17}$$

where ELR_{TL} is the Expected Loss Rate using a totally levered approach.

2.2.4 The bank's cost of debt in the CaRM

Consistently, the model is applied to the pricing of debt capital, first quantifying Capital at Risk (%) for debtors:

$$CaR_{D,\%} = max\left[0; \frac{D_0 - V_\alpha^{low}}{D_0}\right] \tag{2.18}$$

and then the cost of debt:

$$r_D = r_f + CaR_{D,\%}\left(r_{RN} - r_f\right) \tag{2.19}$$

Using exponential capitalization we have:

$$r_D = r_f + ln\left(1 + \frac{ELR \cdot CaR_{D,\%,}}{1 - ELR}\right) \tag{2.20}$$

where the expected loss rate is a function of the probability of default and loss given default rate. In this way, it is easy to understand how the model can be a viable solution not only to quantify the cost of equity, but also for loan pricing since the approach we are assuming is the required return for debtholders.

2.3 Methodology and sample

2.3.1 Descriptive analysis

After having presented the CaRM methodology, our second aim is to provide an empirical investigation in order to test whether our model is able to price both the systematic and idiosyncratic risks. In order to address such an objective, we analyse whether our basic variable of risk, the CaRs, are statistically significant correlated to systematic and

idiosyncratic data of a bank. We run a three-step methodology. First, we separate the total CaR between idiosyncratic CaR and systematic CaR through a market model. Second, we run a first panel regression where the idiosyncratic CaR is the dependent variable and independent variables are represented by banks' financial statements data. Third, we run a second panel regression where the dependent variable is the total CaR, and the independents are the statistically significant idiosyncratic variables of the first panel regression, in addition to the systematic variable.

We tested the CaRM on a sample of 141 European listed banks with data spanning over 2009 to 2013. We gathered market data from Datastream and consolidated balance-sheet data from Bankscope BvD. The observed panel is incomplete. In particular, looking at the response variable (CaR), 102 observations are missing across the five years considered. The conditional time distribution of the observed CaR measures is as in Table 2.1. As one can see, the missing observations are mainly concentrated in years 2009 and 2013.

The types of bank considered are: 'bank holding and holding companies', 'commercial banks', 'cooperative banks', 'savings banks' as reported in Table 2.2. The sample is composed, for the most part, of commercial banks (68 per cent of observations).

Table 2.1 The empirical distribution of observations in years

Year	Absolute frequency	Missing values percentage (%)
2009	117	17.021
2010	122	13.475
2011	123	12.766
2012	127	9.929
2013	114	19.149

Source: Authors' analysis.

Table 2.2 Bank type distribution

Bank type	Absolute frequency	Relative frequency (%)
Bank Holding & Holding Companies	15	10.638
Commercial Banks	96	68.085
Cooperative Banks	24	17.021
Savings Banks	6	4.255
Total	141	100.000

Source: Authors' analysis.

Looking at the empirical distribution of the CaR measures (Figure 2.1), the empirical density distribution of VaR (considering the limitation to the closed interval [0 ; 0.05] – some observations are omitted) shows a clear skewness. A possible solution to this issue is to consider the Box-Cox transformation of the original data, the distribution of which is presented in Figure 2.1.

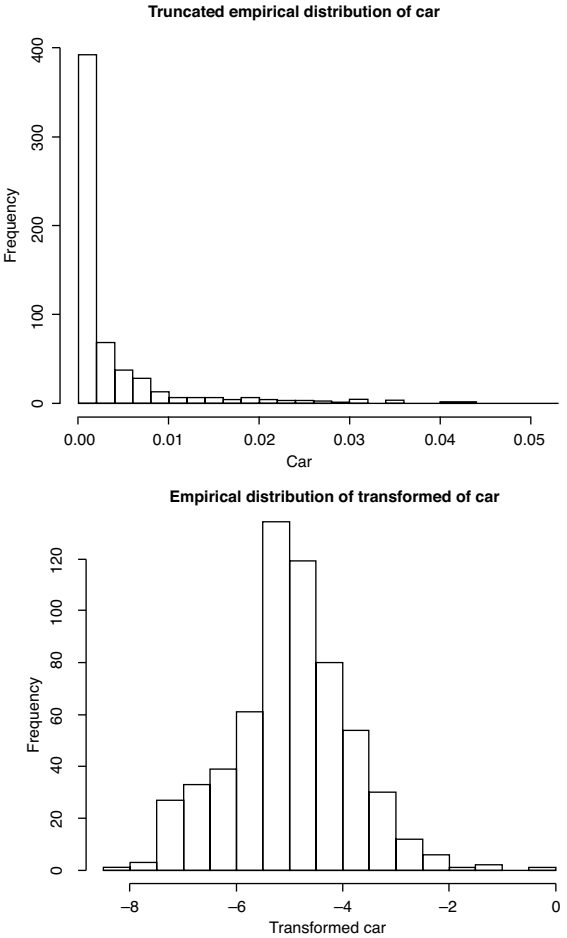

Figure 2.1 Distribution of original CaR measures and their Box-Cox transformation

Source: Authors' analysis.

The empirical analysis shows that the optimal data transformation coefficient is equal to 0.101. All the following analyses are developed considering the Box-Cox transformation.

CaR is obtained through the Merton Model using the following input variables for each year:

- Bund10 year (average) like risk-free rate;
- Market capitalization;
- Yearly standard deviation of equity measured by a transformation of daily standard deviation (time period: one year);
- Total debt of the bank (funding).

CaR values extracted by the sample and market data are studied as a function of some systematic and idiosyncratic banks' variables, which represent the most part of banks' value drivers. To do this, we use a market model to split the variance between systematic and specific risk:

$$r_t = \beta r_m + \epsilon \tag{2.21}$$

From (2.21), we can write:

$$\sigma^2_{r_t} = \beta^2 \sigma^2_{r_m} + \sigma^2_{\epsilon} \tag{2.22}$$

Replacing (2.15) in (2.28), we have:

$$\sigma^2_V \left(\frac{V}{E}\right)^2 N^2(d_1) = \beta^2 \sigma^2_{r_m} + \sigma^2_{\epsilon} \tag{2.23}$$

Therefore, we can exploit asset variance by (Choi and Richardson, 2008):

$$\sigma^2_V = \frac{E^2}{V^2 N^2(d_1)} \beta^2 \sigma^2_{r_m} + \frac{E^2}{V^2 N^2(d_1)} \sigma^2_{\epsilon} \tag{2.24}$$

The term $E/[VN(d_1)]$ is the mutual market leverage that depends on the probability of default. Hence, $\frac{E^2}{V^2 N^2(d_1)} \beta^2 \sigma^2_{r_m}$ is the systemic variance, while $\frac{E^2}{V^2 N^2(d_1)} \sigma^2_{\epsilon}$ is the specific one. The CaR is a multiple k of standard deviation:

$$CaR_{V,\%} = \frac{k \sigma_V}{V} \tag{2.25}$$

Multiplying the terms for k^2/V^2 we can separate the two components of CaR:

$$CaR^2_{V,\%} = \frac{k^2}{V^2}\frac{E^2}{V^2N^2(d_1)}\beta^2\sigma^2_{r_m} + \frac{k^2}{V^2}\frac{E^2}{V^2N^2(d_1)}\sigma^2_{\epsilon} \tag{2.26}$$

In (2.27) we reported the squared idiosyncratic component of CaR:

$$CaR^2_{V,\%,Id.} = \frac{k^2}{V^2}\frac{E^2}{V^2N^2(d_1)}\sigma^2_{\epsilon} \tag{2.27}$$

while in (2.28) the systematic one:

$$CaR^2_{V,\%,Sy.} = \frac{k^2}{V^2}\frac{E^2}{V^2N^2(d_1)}\beta^2\sigma^2_{r_m} \tag{2.28}$$

The used explanatory variables are reported in Table 2.3.

To represent systematic risk we take the beta coefficient because we can split exactly the Capital at Risk coefficient (like a multiplier of asset standard deviation) between the systematic and specific component [see equation (2.26)]. In this way, we can assume that systematic and specific risk can be represented by a single risk factor model, which is the CAPM.

Table 2.3 Explanatory variables used in the CaR analyses

Independent variables	**Type of risk**	**Variable**	**Name of the variable***
CAPM beta	Systematic	5 Years beta over S&P 500	CaRsy
Year	Systematic	Year	D
Size	Idiosyncratic	Ln Total Asset	ln totass
Asset growth	Idiosyncratic	Total Asset$_t$ – Total Asset$_{t-1}$	dtotass
Asset density	Idiosyncratic	RWA / Total Asset	drwa
Nonperforming Loans	Idiosyncratic	NPLs / Loans	dnpl
Capital adequacy	Idiosyncratic	Tier 1 Ratio	dtier
Profitability	Idiosyncratic	Average RoA of the Year	roaa
Operating leverage	Idiosyncratic	Overheads/Total Asset	overta
Credit risk	Idiosyncratic	Loan Loss Provisions/ Gross Loans	llpgl

*The variables preceded by 'd' represent first differences values $x(t) - x(t-1)$.

Source: Authors' analysis.

Table 2.4 VIF test results

Variable	VIF	Standardized VIF
Lntotass	1.986	1.409
Dtotass	3.059	1.749
Drwa	3.104	1.039
Dnpl	1.080	1.098
Dtier	1.205	1.098
Roaa	2.764	1.662
Overtotass	1.980	1.407
Llpgl	16.567	4.070
Llpta	19.422	4.407

Source: Authors' analysis.

Idiosyncratic variables are considered in the first difference form in order to transform a stock measure into a flow. On the contrary, the variables obtained from the profit-and-loss account are considered in the year the CaR is calculated. Given their characterization, these measures could have been naturally correlated. Thus, we run the VIF test, the results of which are reported in Table 2.4.

As we can see, the only two variables showing problematic VIF values are *llpgl* and *llpta*. The following analyses will be developed considering the credit risk (*llpg*) variable only. As a matter of fact, the absolute values of all the correlations are lower than 0.7 and most of them are close to 0.

A preliminary analysis of relationship between value at risk and time and specialization is developed in Table 2.5. It summarizes the conditional means and standard deviations of CaRs. Results suggest a possible relationship between bank specialization and value at risk measure. In particular the cooperative banks present the lowest VaR measures.

The two panel dimensions are also studied by a graphical representation of their time and individual heteroskedasticity.

The specific linear time trend and time heteroskedasticity are not significant. Individual bank effects are quite different and their variability is also heterogeneous.

2.3.2 The model specification and estimation results

We decided to test the relation between CaRs and banks' explanatory variables running two regressions: the first (Model 1), testing the relation between Idiosyncratic CaR ($TCaRid_{i,t}$) and banks' financial statement

Table 2.5 The conditional summary statistics for CaR transformed measures

Variable	Mean	Standard deviation
Global	–4.977	1.119
Bank Holding & Holding Companies	–4.849	0.947
Commercial Banks	–4.755	1.030
Cooperative Banks	–6.076	0.870
Savings Banks	–5.287	1.499
Year 2009	–4.567	1.176
Year 2010	–5.059	1.005
Year 2011	–5.199	1.046
Year 2012	–5.188	1.001
Year 2013	–4.834	1.252

Source: Authors' analysis.

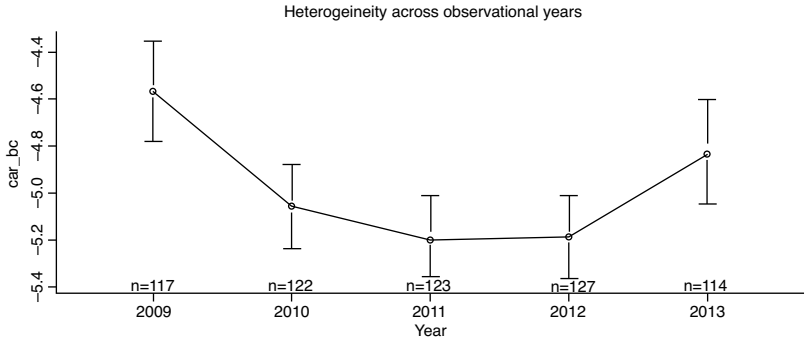

Figure 2.2 Time trend and heteroskedasticity

Source: Authors' analysis.

variables; the second (Model 2), testing the relation between the Total CaR (the sum of Systematic and Idiosyncratic CaR, $TCaR_{i,t}$) and banks' significant variables of Model 1, with the addition of the five-year regression beta ($CaRsy_{i,t}$) as a measure of systematic risk.

In order to derive the best specification of the model, we tested for some important assumptions. First of all, we analysed the individual heteroskedasticity by considering a dummy variable regression (DV regression) in which the individual effects enter the classical linear model. The comparison of the models highlights two peculiar results. The goodness of fit of the DV regression is quite larger than the linear model. The independent variables in the two model specifications present different

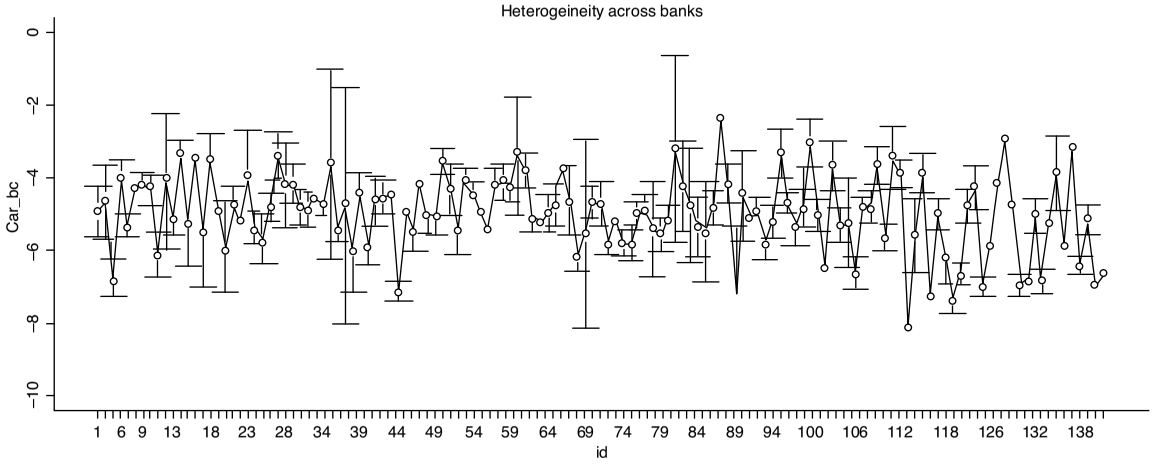

Figure 2.3 Individual effect evaluation

Source: Authors' analysis.

significance. The same result can be obtained by comparing the ordinary linear model with the fixed-effect model that is within estimation of panel data. The result of this comparison suggests that the fixed-effect model is a better choice. In order to test the so-called poolability, we considered the testing procedure based on the evaluation of the pooled model. The LM test (Breusch-Pagan) result shows that individual effects are needed (p-value < 0.0001). Moreover, we tested for time effect. The comparison of fixed- or random-effect models, estimated with or without the time dummies, can guide our final choice. Under both the individual effects specification, the model comparison is favourable to the introduction of time effects. Also in this case the LM multiplier can be adopted to test for time-effects significance. Under both the fixed and random effects hypotheses, the testing procedure identifies significant time effects. In order to choose between the random and fixed effect models specifications, we run a Hausman test. The results of the testing procedure (p-value = >0.001) are in favour of the random-effects model specification.

Finally, Model 1 can be defined as:

$$TCaRid_{it} = \alpha_1 + \sum \beta_t D_t + \gamma_1 lntotass_{it} + \gamma_2 dtotass_{it} + \gamma_3 drwa_{it} + \gamma_4 dnpl_{it} + \gamma_5 dtier_{it} + \gamma_6 roaa_{it} + \gamma_7 overta_{it} + \gamma_8 llpgl_{it} + \varepsilon_{it} \quad (2.29)$$

where: $\alpha_i = \alpha + u_i$ is the sum of intercept and a random individual (bank) effect, *roaa* is measured by net income divided by total average assets, *overta* is measured by operating costs divided by total assets, *llpgl* is measured by loan loss provisions divided by gross loans.

Thus, Model 2 can be written as:

$$TCaR_{it} = \alpha_1 + \gamma_0 CaRsy_{it} + \sum \beta_t D_t + f\,(sel\,var) + \varepsilon_{it} \quad (2.30)$$

where *f(sel var)* is the linear deterministic model selected in Model 1.

In order to test the model specification we also proceed with the Breusch-Godfrey/Wooldridge test for serial correlation in panel models. The testing procedure suggests that residual serial correlation is present in the idiosyncratic errors (p-value 0.0333). The model estimation can be affected by stationarity issues. The results of a Covariate Augmented Dickey-Fuller test (CADF–Hansen, 1995) suggest that the transformed data CaR presents a unit root while once the model is considered the residuals do not present any stationarity issue (p-value near to 1). Another possible issue is represented by the presence of residual

heteroskedasticity. In this case the studentized Breusch-Pagan test presents a p-value lower than 0.001 in favour of the alternative of the presence of heteroskedasticity. The efficiency of model estimators is cursed by heteroskedasticity, and for this reason we considered a White correction of coefficient covariance matrix (White, 1980). In particular, we considered the HC covariance matrix estimator defined in Zeileis (2004). Moreover, the power transformation we adopted significantly reduces the effect of heteroskedasticity. The sandwich error estimator can be applied to the obtained estimated models.

2.4 Results

In Table 2.6 and Table 2.7, we reported, respectively, the results of Model 1 and Model 2 regressions considering the lagged $t - 1$ version of the model. Thus, the estimation is made on the observed CaRs in year t in relation to the explanatory variable measured in $t - 1$.

With regard to the specific risk (Table 2.6) risk-weighted asset density, capitalization, efficiency ratio and credit risk show a positive significant relation with Idiosyncratic CaRs.

As expected, the RWA density variable has a strong significant relation with Idiosyncratic CaRs. In facts it represents forward-looking information of future outstanding risk in banks' portfolios and, consequently, it leads directly to an increase of the amount of CaR. Thus, the higher the level of risk in banks' assets influences the expected idiosyncratic volatility since RWA density can be interpreted as a forward-looking measure of banks' riskiness.

The increase of overheads to total assets may contribute to a specific CaR increase due to the effect of the operating leverage over risk. As a matter of facts, *ceteris paribus*, a reduction of operating income, which is more likely to occur during periods of financial turmoil, has a direct effect on expected earnings and on the obtainable potential dividends. As a result, stock market price volatility can be strongly affected by the operating leverage and by the degree of efficiency banks are determined to reach.

Among the significant variables, the positive relation between Idiosyncratic CaRs (as a measure of specific risk) and capitalization is explained by the specific role of capital in banks' balance sheet.

Moreover, the regulatory capital has a role of debtholders losses protection and, on average, it is kept close to the minimum requirements or aligned with those of the competitors. As a consequence, the higher level of capital is costly for shareholders and can be interpreted as an

Table 2.6 Model 1 – Idiosyncratic CaR

	Model 1			Model 1 Selected Variables		
Variable	**Estimated value**	**Std. Error**	**Corrected p-value**	**Estimated value**	**Std. Error**	**Corrected p-value**
(Intercept)	−6.777	1.178	0.000	−6.149	0.219	0.000
Lntotass	0.027	0.056	0.680			
Dtotass	−0.007	0.005	0.326			
Dr	0.012	0.004	0.022	0.008	0.002	0.000
Dnpl	0.000	0.000	0.572			
Dtier	0.008	0.001	0.000	0.007	0.001	0.000
lag(roaa)	−0.030	0.048	0.515			
lag(overtotass)	0.478	0.125	0.005	0.369	0.086	0.000
lag(llpgl)	0.138	0.053	0.073	0.085	0.031	0.194
factor(year)2010	−0.716	0.120	0.000	−0.667	0.105	0.000
factor(year)2011	−0.783	0.119	0.000	−0.802	0.105	0.000
factor(year)2012	−0.744	0.121	0.000	−0.723	0.106	0.000
factor(year)2013	−0.254	0.125	0.070	−0.213	0.111	0.097
Idiosyncratic error	0.422			0.426		
Individual error	0.699			0.910		
R^2	0.455			0.392		
AdjR^2	0.440			0.384		

Source: Authors' analysis.

Table 2.7 Model 2 – Total CaR

	Model 2			Model 2 Selected Variables		
Variable	**Estimated value**	**Std. Error**	**Corrected p-value**	**Estimated value**	**Std. Error**	**Corrected p-value**
(Intercept)	–1.768	0.709	0.077	–4.737	0.132	0.000
carsy_bc	0.028	0.002	0.000	0.019	0.001	0.000
Lntotass	–0.140	0.033	0.001			
Dtotass	–0.003	0.003	0.340			
Drwa	0.006	0.003	0.030	0.004	0.002	0.001
Dnpl	0.000	0.000	0.504			
Dtier	0.005	0.001	0.000	0.005	0.001	0.000
lag(roaa)	–0.095	0.029	0.001			
lag(overtotass)	0.219	0.072	0.028	0.305	0.050	0.000
lag(llpgl)	0.073	0.032	0.186	0.010	0.021	0.025
factor(year)2010	–0.437	0.074	0.000	–0.441	0.073	0.000
factor(year)2011	–0.346	0.075	0.000	–0.461	0.073	0.000
factor(year)2012	–0.328	0.077	0.000	–0.382	0.075	0.000
factor(year)2013	–0.051	0.078	0.599	–0.094	0.077	0.370
Idiosyncratic error	0.157			0.209		
Individual error	0.188			0.245		
R^2	0.702			0.578		
AdjR^2	0.676			0.565		

Source: Authors' analysis.

increasing of strategy of future risk-taking and, therefore, of its earnings volatility (Calem and Rob, 1999).

With regard to credit risk, the variation of non performing loan (NPLs) seems to have a positive relation with Idiosyncratic CaRs but it is statistically not significant. On the other hand, the amount of loan loss provisions in relation to gross loans shows a strong positive explanatory power over Idiosyncratic CaRs. As expected, the higher the provisions, the higher the expected earnings and dividends contraction and, in general, a negative information of banks' assets riskiness, which increases stock market volatility.

Finally, it has to be underlined that the lagged RoA is not significant since, as expected, past operative performance has a very poor predictive power over future profitability, especially during periods of financial turbulence. However, the negative sign can be interpreted as a lowering of risk in terms of idiosyncratic volatility.

Looking at Table 2.7, the Total CaR panel regression, results show that the additional systematic risk variable (*carsy_bc*) is strongly significant at a 99 per cent level of confidence.

The beta, as a measure of systematic volatility, has been found positively related to Total CaRs as a multiplier of asset volatility. This evidence demonstrates that the systematic risk (that we proxied with correlation of banks' stock market returns with the S&P 500 that we assumed as the market portfolio) is a considerable factor in pricing risk premium and positively affects the Capital at Risk. However, not only the systematic factor is found to be significant in explaining CaR's variance. As a matter of fact, all the other variables included in the Idiosyncratic CaR regression remained statistically significant and with the same sign. In these terms, we also obtained the significance of size and asset profitability that, however, we dropped in the 'selected variables' model as they could be correlated with beta since we did not find them statistically significant in the idiosyncratic regression. The explanatory power of the Total CaR regression rises from .44 to .68, drawing a remarkable reduction of error components as well.

As we can note the corrected testing procedures lower the coefficient's significance level. Our results support CaRM since the Total CaR is found significantly related to both idiosyncratic and systematic components.

For both models we checked for robustness by considering both the full and the selected variables models. The substantial stability of the estimated coefficients supports the model robustness hypothesis (see Table 2.9).

Table 2.8 Model 1 – corrected p-values

Model 1 Variables	Estimated value	p-value	Corrected p-value
(Intercept)	–6.777	0.000	0.000
Lntotass	0.027	0.636	0.680
Dtotass	–0.007	0.155	0.326
Draw	0.012	0.005	0.022
Dnpl	0.000	0.849	0.572
Dtier	0.008	0.000	0.000
lag(roaa)	–0.030	0.529	0.515
lag(overtotass)	0.478	0.000	0.005
lag(llpgl)	0.138	0.010	0.073
factor(year)2010	–0.716	0.000	0.000
factor(year)2011	–0.783	0.000	0.000
factor(year)2012	–0.744	0.000	0.000
factor(year)2013	–0.254	0.044	0.070

Source: Authors' analysis.

Table 2.9 Model 2 – corrected p-values

Model 2 Variables	Estimated value	p-value	Corrected p-value
(Intercept)	–1.768	0.013	0.077
carsy_bc	0.028	0.000	0.000
Lntotass	–0.140	0.000	0.001
Dtotass	–0.003	0.234	0.340
Draw	0.006	0.022	0.030
Dnpl	0.000	0.525	0.504
Dtier	0.005	0.000	0.000
lag(roaa)	–0.095	0.001	0.001
lag(overtotass)	0.219	0.002	0.028
lag(llpgl)	0.073	0.025	0.186
factor(year)2010	–0.437	0.000	0.000
factor(year)2011	–0.346	0.000	0.000
factor(year)2012	–0.328	0.000	0.000
factor(year)2013	–0.051	0.514	0.599

Source: Authors' analysis.

2.5 Conclusions

The empirical evidence shows that, in practice, investors are not completely diversified (Barber and Odean 2000, Barnartzi and Thaler 2001). As a result, investors' risk premium must reflect not only

systematic risk but idiosyncratic risk as well. Moreover, default risk may increase the probability of bankruptcy so that specific risk can become even more costly. Through the Capital at Risk Model, we propose a method that enables quantifying in one risk premium both the specific and systematic risk.

First of all, if we theorize an evaluation scheme that considers an average production of profits and cash flows, then the risk premium should include just the unexpected losses that might arise from the deviation of profits and cash flows from their means. Effectively, investors' expected losses are taken into account by the average profits or cash flows, so that the relevant portion of risk is the downside portion of losses beyond their means: the value at risk.

Second, if we have a totally levered firm, then the downside risk of debtors is the same for the equity holders, which reflects the overall assets' riskiness.

In order to apply the Capital at Risk Model, we took the Merton Model to calculate the value of assets, their implicit volatility (to obtain the portion of capital at risk) and the yearly assets' loss (to obtain a risk-neutral rate of a totally levered firm).

The aim of this chapter is to check whether the CaRM model works in the banking industry given the presence of regulatory measures based on VaR methodology. Using the Merton Model seems to be clear the rational relationship between Capital at Risk and equity standard deviation as a measure of specific risk. The main objective of this chapter is to test whether the portion of capital at risk is affected not only by systematic risk, here considered by a transformation of CAPM's beta coefficient, but also by other idiosyncratic variables. Results show a positive relation with change in RWA density, change in capitalization, overheads to total assets and loan loss provisions.

The positive relation with CAPM's beta highlights the ability of the model to determine not only the specific risk premium by equity standard deviation, but also the systematic component.

Finally we point out that the CaRM does not represent a cost of capital for an unlevered bank (r_0), but, actually, a weighted average cost of capital. As a matter of fact the Merton model is based on market data that implicitly takes into account banks' leverage. Such an approach allows claiming that the CaRM is, actually, a cost of capital that is corrected for the specific default risk.

On the whole, we claim that the main strength of the CaRM model is that the cost of equity is quantified in the same theoretical framework

as the cost of debt coherently with MM. This setting allows for a more accurate comparison between the required return on equity and debt capital.

Future research should be aimed at testing other typologies of asset distribution and offer an estimation and predictive power comparison among other methodologies such as CAPM and ICC metrics.

Notes

1. Bruner et al., (1998), Graham and Harvey (2001) and Damodaran (2013) support the evidence that CAPM is the most used method for cost of capital estimation, also for financial institutions.
2. In terms of predictive power of idiosyncratic risk, the recent literature has found mixed results: from a not significant and inconsistent relation (Bali and Cakici, 2008; Choi, 2009), to a negative relation (Ang et al., 2006), up to a positive power of prediction (Malkiel and Xu, 2006; Fu, 2009; Brockman et al., 2009). The evidences demonstrate that such mixed results are dependent from time period, sample composition and idiosyncratic measure used in the analysis.
3. An overview of banks' cost of equity has been presented by King (2009) who, using a single factor inflation-adjusted cost of equity, studied its trend in six countries over the period 1990–2009 highlighting that, in the CAPM approach hold many significant shortcomings, such as the limitations of the mean-variance approach and the insufficiency of a single market factor to explain the cross-section realized returns.
4. According to MM proposition, under market efficiency, absence of asymmetric information, absence of taxation and absence of distress costs, the capital structure has no impact on firm value.
5. According to a parametric approach and normal distribution of assets, the Value at Risk can be obtained as a multiple of assets' standard deviation. In particular, using a structural model and market data (market capitalization, equity standard deviation and face value of debt), we can obtain the value at risk by the value of total asset and its standard deviation.

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3

Moving towards a Pan-European Deposit Guarantee Scheme: How Bank Riskiness Is Relevant in the Scheme

Giusy Chesini and Elisa Giaretta

3.1 Introduction

The recent global financial crisis has highlighted clearly the need for better regulation and supervision of the financial sector. As far as deposits are concerned, savers suddenly realized that different levels and forms of depositor protection co-existed in the EU and following the Northern Rock bank run in September 2007, it was clear that deposit-protection systems in the EU did not function as they should.

Because of the possible spreading of bank runs all over the world, deposit insurance schemes became more common, and also in countries where they did not formerly exist, such as Australia and New Zealand, they were quickly set up. On the other hand, in countries where the schemes were already adopted, an overhaul of the main characteristics of these schemes began.

All this considered, the present chapter focuses on the recent evolution of regulation concerning deposit guarantee schemes (DGSs), in particular considering that their main characteristics in Europe are changing due to the approval of a new directive that set up harmonization of the national schemes and, in the future, probably the birth of a supranational one.

Funding arrangements play a critical role in the success of any deposit guarantee scheme, so it is useful first of all to analyze these arrangements in order to determine if the different schemes are equally effective. It is evident, considering the recent evolution in the funding arrangements

worldwide, that a well-designed deposit insurance funding arrangement now include a risk-based pricing system able to minimize the moral hazard issue that often accompanies even the most carefully designed insurance scheme. In fact, it could happen that banks are induced to take on excessive risk in their activity because creditors, that is, depositors, do not suffer the full consequences of a bank's failure – being protected by the scheme and, therefore, less likely to monitor its condition.

Following these concerns, in this research two main questions are addressed. The first – after a comparison of the main characteristics of the new 'European DGS' and the main characteristics of the scheme managed by the US Federal Deposit Insurance Corporation (FDIC) – wants to analyze the similarities and the differences in these schemes in order to find out if there is a convergence of the schemes themselves. So, are the schemes worldwide converging towards a specific deposit insurance scheme?

The second considers the fact that the new European directive requires that DGSs' funding arrangements are risk-based pricing systems able to minimize the moral hazard behaviours of banks. This is something new in Europe, and it tends to make banks evaluated/supervised by the DGSs similarly to the firms evaluated by the banks when the latter lend money to the former. Are European banks more or less risky than US banks and, in Europe, which banks should pay a higher risk premium because they have riskier activity?

3.2 Literature review on deposit insurance and bank risk

The literature concerning deposit insurance schemes can be considered starting with the study of Diamond and Dybvig in 1983. According to the latter banks have issued demand deposits throughout their history, and economists have long had the intuition that demand deposits are a vehicle through which banks fulfil their role of turning illiquid assets into liquid assets. In this role banks can be viewed as providing insurance that allows agents to consume when they need to most. The well-known paper shows that bank deposit contracts can provide allocations superior to those of exchange markets, offering an explanation of how banks subject to runs can attract deposits. Moreover, bank runs in the model can cause real economic damage, rather than simply reflecting other problems (Goedde-Menke et al., 2014).

Despite its stabilizing effect in the short run, deposit insurance has an adverse effect of raising systemic risk in the long run, because of the fact that banks are induced to moral hazard behaviours. The moral hazard

problem associated with deposit insurance is well recognized as one of the major factors having contributed to the US savings and loan debacle in the 1980s. Demigurc-Kunt and Detragiache in 2002 (and many others) evidenced that deposit insurance exacerbated moral hazard problems in bank lending and was associated with the higher likelihood of a banking crisis. Also Bhattacharya et al. (1998) argue that deposit insurance, in distorting the behaviour of insured institutions, increases the risk of moral hazard. Pennacchi (2006) also suggests that the presence of deposit insurance changes investment decisions made by banks. Furthermore, when deposits are insured, bank depositors lack incentives to monitor: that is they do not exercise marker discipline, and the banks are induced to take on excessive risk in their activities (Demigurc-Kunt and Kane, 2002; Barth et al., 2008; Ioannidou and Penas, 2010).

In a nutshell, there is widespread agreement in the academic literature that deposit insurance stabilizes a banking system in the short run but heavily affects bank risk-taking through two channels: increasing moral hazard by banks and reducing market discipline by depositors (Hasan et al., 2013). So, in the long run bank solvency might be reduced and financial fragility might increase.

Of course, one may argue that the past failures of explicit deposit insurance schemes to stabilize their banking systems are due to factors such as non-risk rated deposit insurance premiums and adequate coverage (Demirguc-Kunt, Kane and Laeven, 2008); and, hence, higher coverage could have prevented bank runs in many cases. Furthermore, the absence of bank runs may mean financial stability, but may also mean that depositors have no incentive to monitor banks and so over a long period banks might be induced to take on excessive risk (Bhattacharya et al., 1998). Consequently, higher deposit insurance coverage tends to undermine market discipline and exacerbate the notorious moral hazard problem by inducing banks into overly risky activities. Moreover, the lack of market discipline allows bankers and regulators to disregard the issue of market stability. And, if so, it could be too late for the public to find out where there is a financial meltdown due to mismanagement and regulatory forbearance (Chu, 2011).

By considering this, in recent years it has strongly emerged that banks, members of a DGS, should be charged a fee commensurate with their relative risk of failure – for example higher premiums for higher insurance risk. With correct risk pricing, the benefits of increased risk-taking can be taxed away, which helps to restore an element of market discipline (Cordella and Yeyati, 2002). While appropriately assigning bank risk is not straightforward, efforts should be made to adjust premiums

for risk, for example, by assigning banks to risk buckets and charging different premiums for banks in each bucket. Even if some authors argue that risk-based deposit insurance premiums alone cannot control moral hazard in deposit insurance (Prescott, 2002), in the United States and very recently in Europe the premiums have become risk-based contributions.

In particular, until 2014, most European DGSs did not adjust premiums for risk across banks, and most levied premiums that did not adequately reflect the average risk in the system (that is, they were not fairly priced) and the burden therefore fell disproportionally on smaller and other deposit-rich banks. The recent recast of the 1994 European deposit insurance directive has altered this situation by introducing contributions that consist of both non-risk and risk-based elements (IMF, 2013) for every country's DGS.

Consequently, the topic concerning bank risk and the financing of DGSs has now become relevant in Europe.

In this research, bank riskiness is measured using the Z-Score of each bank. The well-known Z-Score index measures the distance from insolvency, consequently a higher Z-Score index indicates that a bank is more stable.

Before this research two papers were produced and should be mentioned as they measure bank risk using the same indicator: Anginer et al. (2014) and Laeven and Levin (2009).

Anginer et al. (2014) analyzed the impact of deposit insurance on bank risk and systemic stability during a period of global financial instability. They are interested in how regulation and supervision impact the relationship between deposit insurance and systemic stability. It is known that the adverse consequence of deposit insurance can potentially be mitigated through better bank regulation and supervision. To examine this relationship, they use a bank supervisory quality index, which measures whether the supervisory authorities have the power to take specific preventive and corrective actions, such as replacing the management team. This variable comes from the banking surveys conducted by Barth et al. (2008).[1]

Differently, Laeven and Levine (2009) provide the first empirical assessment of theoretical predictions concerning how a bank's ownership structure interacts with national regulations in shaping bank risk-taking. Synthetically, they examine whether ownership structure affects bank risk and whether the impact of national regulations on bank risk depends on the ownership structure of individual banks. Policy considerations motivate their research. The risk-taking behaviour of banks affects

financial and economic fragility, so shaping the risk-taking behaviour of individual banks is very relevant.

Very differently from the latter two papers, the present research examines the relationship between bank risk, bank stability and bank profitability in a comparative analysis that takes into consideration the different riskiness in US and in EU banks. In particular, with this analysis, the differences in the Z-Score of banks highlight the relevance to pay very different contributions to the national DGSs, and this becomes interesting in a comparative perspective because depositors tend to invest in the country that offers the highest and safest expected return on investment in deposits, which depends on the return on banking activities as well as deposit insurance levels (Engineer et al., 2013; Huizinga and Nicodeme, 2006). If banks have to pay higher contributions to their national deposit insurance schemes, they find themselves in a worse competitive position in comparison to their competitors. This is the reason why risk-adjusted premia are definitely preferred by the legislators nowadays; these premia help both to promote market discipline exercised by depositors and to induce lower risk-taking by banks, with beneficial effects on financial stability.

3.3 The evolution of the regulation of deposit guarantee schemes in Europe

European Directive 94/19/EC stated that all member states had to set up deposit protection schemes for small depositors, starting from 1994. In particular, the directive stated that DGSs had two main functions: to protect bank-account holders and to enhance the stability of European financial markets. The problem was that the level of harmonization was too low, and a multiplicity of deposit insurance schemes was maintained with wide variations in coverage level, deposit/depositor eligibility, payout procedures and funding mechanisms (Ayadi and Lastra, 2010).

As everyone knows, the wide variety of deposit guarantee schemes (DGS) has not proven to be crisis-resilient and, starting from 2008, large government interventions were necessary to deal with failing banks in order to restore depositors' trusts and prevent bank runs.

The recent global financial crisis has stimulated much debate on prudential policy and bank safety nets. Deposit insurance is surely a relevant instrument in protecting depositors from losses resulting from bank failures or, more simply, in dealing with concerns about bank runs (Basel Committee on Banking Supervision and IADI, 2009).

In particular, following the crisis, on 15 October 2008 the European Commission proposed a revision to EU rules on DGSs and, later, on 11 March 2009, the European Parliament and the Council publicized the Directive 2009/14/EC, amending the previous Directive 94/19/EC, as regards the coverage level (20,000 euro minimum guarantee threshold) and the payout delay.

The issue was not completely solved with the 2009 directive and, on 12 July 2010, the European Commission adopted a legislative proposal for a comprehensive revision of the Directive 94/19/EC. In particular, the proposal stated that depositors should enjoy the same level of deposit protection in all member states, as the existing variety of DGS was considered unreliable in times of crisis. Consequently, the main aim was to create a level playing field, with a focus on coverage limits and preference for ex-ante funding.

The legislative proposal did not yet represent a radical change, as in some aspects it maintained the diversity in national DGSs. Consequently, it was widely supposed not to represent a sufficient response to the problems raised by the crisis. Moreover, the legislative proposal remained stalled for several months due to lack of agreement between the Council and the European Parliament.

In the meanwhile, the European Commission began to study the possibility that DGSs could require risk-adjusted premiums from banks. In 2008 a Commission report investigated the feasibility of the risk-based models applied across the DGSs in the member states (European Commission, 2008) and, later in 2009, the Commission prepared a report on possible models for risk-based contributions to DGSs (European Commission, 2009). In particular, the possible approaches for calculating contributions on the basis of the risk profile of banks are: the single indicator model (SIM); the multiple indicator model (MIM); and the default risk model (DRM) (European Commission, 2009a). The first two models are based on approaches currently applied by some of the DGSs in the EU and rely on the use of accounting-based indicators to assess the risk profile of banks. More precisely, the European Commission proposes indicators that cover four key areas commonly used to evaluate the financial soundness of a bank: capital adequacy; asset quality; profitability; and liquidity.

Afterwards, these regulatory developments became more relevant because they have been included in the discussions on the realization of the Banking Union, which was the key commitment of the EU Heads of State and Government in June 2012. The Banking Union is based on three pillars: (1) a single supervisory framework that minimizes equally

the risk that a euro area bank takes excessive risk and runs into failure; (2) a single resolution framework; and (3) a system of deposit protection that provides depositors with equal confidence that their deposits are safe, regardless of jurisdiction. Following these agreements, on 12 September 2012 the European Commission publicized the proposals for a Single Supervision Mechanism (SSM) that appears as the first concrete step towards the Banking Union. In this context, although a pan-European DGS was originally proposed as one of the Banking Union elements, the SSM and the establishment of the pan-EU bank resolution fund were given clear priority, with DGS harmonization considered as an objective to be pursued at a later stage.

Very relevantly, on 11 December 2013 the European Parliament and the Member States reached an agreement on bank recovery and resolution (BRRD), and just a few days after, on 17 December, they also reached a provisional agreement on an important text for the protection of deposits. In particular, the new rules provided authorities with the means to intervene decisively, both before problems occur and early on in the process.

In January 2014 it was communicated by the European Commission that, at the moment it was not envisaged to equip the Banking Union with a single supranational deposit guarantee scheme. But, finally, on 3 March 2014, the Council of the European Union adopted the proposed directive on deposit guarantee schemes at first reading, while the Parliament adopted the text of the directive at second reading on 15 April. Besides the latter text, the European Parliament adopted two other texts in order to complete the legislative framework underpinning the Banking Union: the Single Resolution Mechanism (SRM) and the Bank Recovery and Resolution Directive (BRRD). The three texts are strictly interconnected.

In April 2014 it was also restated that a pan European deposit guarantee scheme was not foreseen at that stage. However, the directive opens the way to a voluntary mechanism of mutual borrowing between the DGSs from different EU countries. At the moment the pan-European scheme appears to be a potential option in the future, once the current banking reforms (the three texts mentioned above) have been implemented, and the other elements of the Banking Union are in place.[2]

It appears clear that deposit insurance and the resolution fund are intended as separate functions in the EU Banking Union, but they could be combined in a single fund allowing for swift decision-making. So a prospective European deposit insurance and resolution fund could be the best solution in order to stabilize the retail deposit base and resolve

troubled cross-border banks.[3] On the one hand, the resolution maintains the systemic functions of banks, avoids contagion and therefore additional payouts (Gross and Schoenmaker, 2014). On the other hand, a DGS dissuades bank runs and therefore avoids vicious circles that lead to bank crises. As a result, the combined introduction of deposit guarantee schemes and resolution frameworks produces synergies (Gerhardt and Lannoo, 2011).

As also suggested by Allen et al.[4] that the latter two functions could be combined within some kind of European equivalent of the Federal Deposit Insurance Corporation (FDIC). The EU would then get a European Deposit Insurance Fund with resolution powers. The fund would be fed through regular risk-based deposit insurance premiums with a fiscal backstop of national governments based on a pre-committed burden-sharing key.

3.3.1 The main characteristics of Directive 2014/49/EU

The original directive on DGSs – adopted in 1994 – has not been changed substantially for about 15 years although financial markets significantly changed during that period of time. As already stated, the minimum harmonization approach introduced in the mid-1990s has resulted in significant differences between DGSs as to the level of coverage, the scope of covered depositors and products and the payout delay. Also the financing of schemes was left entirely to the discretion of member states. This turned out to be not so positive for financial stability and the proper functioning of the internal market, in particular when the international financial crisis hit in autumn 2008.

Moreover, the need for a further Europeanisation of the bank safety nets, as a result of the current and ongoing euro area fiscal and debt crisis, with a view to establishing a European Banking Union, led to the introduction of Directive 2014/49/EU.

In order to analyse the new provisions of this directive, it is useful to focus specifically on three main aspects:

- the degree of protection of deposits in the perspective of depositors;
- the financing requirements of the individual DGS in order to get the optimal fund size;
- the deposit insurance pricing for the banks.

As far as the protection of deposits is concerned, Directive 2014/49/EU ensures that depositors benefit from a guaranteed coverage of 100,000 euros in case of bankruptcy, backed by funds to be collected in advance

Table 3.1 The evolution of European regulation

Year	Reference	Minimum coverage (euro)	Co-insurance	Funding	Payout delay
1994	Directive 94/19/EC	20,000	10% maximum	Chosen at national level	Three to nine months
2006	Communication concerning the review of Directive 94/19/EC on DGSs	20,000	Self-regulatory approach	Harmonization costs too high, further assessment needed	Self-regulatory approach to shorten the delay
2008	Report on risk-based contributions in EU DGSs			Description of systems with risk-based funding	
2009	Directive 2009/14/EC	50,000 by 2009; 100,000 by 2010	Abolished		Four to six weeks
2009	Report on possible models for risk-based contributions to EU DGSs			Scenario analysis on risk-based funding	
2010	COM (2010) 368 final, 2010/0207 (COD)	100,000		Over 10-year period; ex-ante financing (1.5% of eligible deposits); extraordinary (ex-post) contributions of up to 0.5% of eligible deposits if necessary; mutual borrowing facility among DGSs in the EU; alternative funding arrangements; risk-based contributions	Seven days
2014	Directive 2014/49/EU	100,000		Ex-ante financing (0.8% eligible deposits over 10-year period); risk based contributions	Seven days payout by 2024

Source: Authors' elaboration.

from the banking sector. In addition, access to the guaranteed amount must be easier and faster. Repayment deadlines should be gradually reduced from the current 20 working days to 7 working days by 2024.[5]

While every national DGS remains responsible for all banks authorized in its jurisdiction, it also act as a single point of contact and to manage, on behalf of the home DGS, the claims of depositors of local branches of banks opened in other EU member states.

Moreover, the DGS is in close contact with the supervisory authorities and is informed at an early stage by supervisory authorities if a bank failure becomes likely. The DGS will have prompt access to information on deposits at any time. The verification of claims is to be simplified by abandoning time-consuming set-off procedures; so, if a bank fails, no applications from depositors are needed because the scheme pays on its own initiative.

As far as the financing requirements go, first of all, the DGS should have enough funds in place to ensure the safety of depositors' savings. In order to do so, banks have to pay into the schemes on a regular basis (ex-ante) and not only during a bank failure (ex-post).

More importantly, for the first time since the introduction of DGSs in 1994, new financing requirements for national DGSs are provided in Directive 2014/49/EU, which can be summarized in three main points:

1. The target funding level for ex-ante funds of every DGS is 0.8 per cent of covered deposits to be collected from banks over a 10-year period. This is a minimum level required by EU law and member states can set a higher target level for their DGSs. Currently, schemes in about half of the member states have already reached the above target level or are relatively close to it. In one third of member states, DGS funds are above 1 per cent of covered deposits and in a few of them, they are even beyond 2 per cent or 3 per cent. On the other hand, the directive stipulates that member states, upon approval of the Commission, may set a target level lower than the above one, but not lower than 0.5 per cent of covered deposits. This is possible, for instance, where, given the characteristics of the banking sector (for example concentration of most assets in a few banks) it is unlikely that banks will be liquidated (they would be rather resolved), which makes triggering the DGS less likely.
2. In addition to ex-ante contributions, if necessary, banks will have to pay additional (ex-post) contributions to a certain extent, which will be limited in order to avoid pro-cyclicality and a worsening financial situation for healthy banks. If this is still insufficient, DGS will borrow

from each other up to a certain limit (on a voluntary basis) or – as a last resort – use additional funding sources, such as loans from public or private third parties (alternative funding arrangements).

3. The new financing requirements ensure the schemes have enough funds in place to deal with small- and medium-sized bank failures. Large banks will be subject to resolution according to the Bank Recovery and Resolution Directive (BRRD). The available financial means of DGS must be invested in low risky assets and in a sufficiently diversified manner. They should include, cash, deposits and low-risk assets that can be liquidated within a short period of time. However, DGS funds may also consist of so called 'payment commitments' of a bank towards a DGS, which must be fully collateralized. In any case, the total share of payment commitments shall not exceed 30 per cent of the total amount of available financial means of the DGS.

Finally, as far as the pricing for the banks goes, it is relevant to consider the degree of risk incurred by the banks, members of a DGS.

In fact, very relevantly, the directive stipulates that the contribution to a national DGS is based, besides on the amount of covered deposits, also on the degree of risk incurred by the respective member. Without such risk-adjusting, banks with the same amount of covered deposits would pay the same amount of contribution to DGS. On the contrary, if risk-adjusting is applied, those banks may pay different contributions, depending on whether their activity – measured by a set of specific indicators – is deemed more prudent or riskier (Gomez_Fernandez-Aguado et al. 2014).

By considering that riskier banks imply a higher likelihood of failure and, in turn, the need to trigger the DGS, it sounds fair that such banks pay larger contributions to their national DGSs.

In order to ensure consistent application of the directive in member states, the European Banking Authority (EBA) is expected to issue guidelines to specify methods for calculating the contribution to DGSs. In particular, these guidelines should include a calculation formula, specific indicators, and risk classes for members, thresholds for risk weights assigned to specific risk classes, and other necessary elements.

At the same time, DGSs may use their own risk-based methods for determining and calculating the risk-based contributions by their members. However, each method shall be approved by the competent authority in a given member state, and the EBA must be informed about the methods approved. This sounds like a sort of Basel requirements properly adapted to DGSs.

As stipulated by the directive, three years after its entry to force, and at least every five years afterwards, the EBA shall conduct a review of the guidelines on risk-based or alternative own-risk methods applied by DGS.

It is possible to easily notice that the directive still leaves some room to the discretion of individual DGSs and, in particular, the theme of the bank risk measure becomes relevant considering that most EU DGSs currently did not adjust premiums for risk across banks. Exceptions include Finland, France, Greece, Hungary, Italy, Portugal, Romania and Sweden.[6]

3.4 The Federal Deposit Insurance Corporation (FDIC) in the United States

In the United States the deposit insurance scheme, set up by the Federal Deposit Insurance Corporation (FDIC), has performed a pivotal role in the financial system for many years also because it has carried out tasks well beyond the mere insurance function.

In the United States, banks can be chartered by the states or by the federal government; banks chartered by states also have the choice of whether to join the Federal Reserve System. The FDIC is the primary federal regulator of banks that are chartered by the states that do not join the Federal Reserve System. In addition, the FDIC is the back-up supervisor for the remaining insured banks and thrift institutions.

The FDIC directly examines and supervises more than 4,500 banks and savings banks for operational safety and soundness, more than half of the institutions in the US banking system. Practically, it is in charge of insuring deposits, regulating the US branches and agencies of foreign member banks, supervising member banks according to agreements with their primary regulators and acting as receiver and liquidator of failed banks.

The FDIC therefore has been performing for several years an active role in financial supervision and even bank resolution (Beck and Laeven, 2006), besides deposit protection.

It started its insurance activity in 1934 as an independent agency in response to the thousands of bank failures that occurred in the 1920s and early 1930s. It is funded by premiums that banks and thrift institutions pay for deposit insurance coverage and from earnings on investments in US Treasury securities (Acharya et al. 2010).

After the global financial crisis, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 has indeed given the FDIC

more responsibility in bank examination and resolution processes, for instance by transferring receivership authority over failing institutions to the FDIC.

Banks apply for insurance and FDIC agrees to insure those that present an acceptable level of risk. Insurance is provided according to well-defined rules. The FDIC charges premiums based upon the risk that the insured bank poses, and it inspects, or examine, banks to further manage that risk.

As regards deposit insurance, in its 80-year history FDIC has evolved from a relatively simple set of rules to a more sophisticated system wherein risk is explicitly taken into account in determining the appropriate size of the insurance fund and what premiums the banks have to pay.

In order to make a comparison between the main characteristics of the European DGS introduced in 2014 and the operation of FDIC, the analysis focuses on the degree of protection of deposits in the perspective of depositors, on the financing requirements of the insurance scheme and on the pricing for the banks.

As far as the degree of protection goes, the standard insurance amount is currently $250,000 per depositor, per insured bank, for each account ownership category.

Regarding financing requirements, the fund is financed ex-ante by the banks themselves. It must be said that the FDIC has always had an explicit ex-ante fund paid for by the banking industry to satisfy claims as they arise. It is given in the United States that alternative arrangements, such as pay-as-you-go or ex-post assessments, increase the risk of costly delays and can undermine confidence in the banking system more generally.

In the United States there has been a huge debate about the optimal fund size, and the current fund-management strategy remains fixed to the setting of a long-term reserve ratio goal (DRR = designated reserve ratio) of 2 per cent, which was set in 2011. In moving toward this goal, the law requires the reserve ratio to reach the minimum requirement of 1.35 per cent by 2020. Thereafter, the FDCI's plan is to systematically increase the fund toward the 2 per cent target. At the end of 2013 the reserve ratio was only 0.63 per cent.[7]

An important point to note about the 2 per cent target is that it is viewed as a soft rather than a hard target. There is an explicit plan to reduce rates to produce the long-term average rate when the reserve ratio reaches 1.15 per cent. Once the reserve ratio reaches 2 per cent, the plan provides for rates to be reduced gradually, but not to zero, as the reserve ratio grows.

Finally, a related topic of that of optimal fund size is the deposit insurance pricing – that is, who should pay what to achieve the target fund size.

On this issue, it is remarkable that, from the foundation of FDIC to 1991, Congress set premium rates and all banks paid the same rate. The result was that better-run banks subsidized those banks with a much higher risk profile. However, as with the law governing insurance fund adequacy, the rules governing pricing also were modified in response to the banking crisis of the late 1980s to resemble those of private insurers more closely and to reduce this subsidy. In 1991, Congress required the FDIC to adopt a risk-based premium system, which the FDIC did beginning in 1993 (Yiqiang et al. 2013).

The FDIC initial risk-based pricing system was simple and relied on two factors: supervisory ratings and capital ratios. In 2006 restrictions on the FDIC's ability to assess premiums when the fund exceeded a certain level were eliminated. With greater flexibility to price, separate methodologies were adopted for large and small banks and further metrics were incorporated into the system to provide for more granular directions in risk.

The procedure is different for small and large banks.

For smaller banks, the FDCI relied upon a rich data set of supervisory rating changes and statistical methods to identify five financial ratios that are good predictors of supervisory rating downgrades. Shortly thereafter, a sixth financial ratio was added and, with other minor modifications, this remains the basis of the small bank-risk-based pricing system today.[8]

The FDIC did not have the same rich data on supervisory rating changes for large banks. As a result, it initially adopted a system based upon capital levels, supervisory ratings and debt-issuer ratings to reflect these views of relative risk. At the onset of the most recent crisis, this approach proved unsatisfactory as neither supervisory ratings nor debt-issuer ratings adequately reflected the increasing differences in risk profiles among these banks.

Eventually, an entirely new scorecard approach was introduced to assess premiums for the largest banks. This approach more closely resembles those that large financial institutions use to evaluate the risk of their counterparties and is conceptually designed around the concepts of probability of failure and loss given failure. It contains about a dozen financial ratios that, pre-crisis, proved to be useful predictors of a relative risk ranking post-crisis. The scorecard uses supervisory ratings and these financial ratios to determine a bank's ability to withstand

Table 3.2 The evolution of the US regulation

Year	Reference	Minimum coverage (euro)	Co-insurance	Funding	Payout delay	Other functions
1933	Banking Act		Federal government guarantee			FDIC is authorized to establish a deposit insurance national bank (DINB) to assume the insured deposits of a failed bank.
1991	Federal Deposit Insurance Corporation Improvement Act (FDICIA)			Risk-based assessment systems. Institutions were assigned to risk categories based on two criteria: capital levels and supervisory ratings		Receivership management program
2005	Federal Deposit Insurance Reform Act	$100,000		Better defined risk categories to assess bank contributions. Reserve ratio = Deposit Insurance Fund (DIF)/estimated insured deposits = between 1.15% and 1.50%. Indexing mechanisms to ensure that coverage levels keep pace with inflation (from January 2011)		
2008	The Emergency Economic Stabilization Act	Temporarily $250,000				
2010	Dodd-Frank Wall Street Reform and Consumer Protection Act	250,000	It is backed up by federal government	Quarterly risk-based contributions collected and managed in advance.		More responsibility in bank examination and resolution processes by transferring receivership authority over failing institutions to FDIC

Source: Authors' elaboration.

asset- and funding-related stress, and it combines these with a measure of the bank's loss severity in the event it does fail. The goal is to identify forward-looking indicators that differentiate risk and suggest how large institutions will fare during periods of economic stress.

3.5 Data and statistics

After the review of the main pieces of regulation concerning deposit protection, in this section an analysis of the riskiness of banks is worked out together with an analysis of the characteristics of bank stability that can be relevant in determining also the probability of default of banks in the period 2007–13.

In order to study this, from the database Bankscope (Bureau Van Dijk), a sample of active commercial banks, savings banks and cooperative banks in the EU and in the United States is extracted. Excluded from the sample are bank holdings and holding companies, central banks, clearing and custody institutions, finance companies, group finance companies, investment banks, investment and trust corporations, Islamic banks, micro-financing institutions, multi-lateral governmental banks, private banking and asset management companies, real estate and mortgage banks, securities firms, specialized governmental credit institutions and other non-banking credit institutions. In this way a new dataset is created, composed of banks located in the EU and in the United States and specialized in deposit activity.

In particular, in order to study banks with relevant deposit activity, banks with deposits and short-term funding higher than 1 billion USD in at least one of the seven years analysed, from 2007 to 2013 are extracted from the dataset.

Furthermore, for the same reason, banks with the ratio deposits and short-term funding on total assets higher than 40 per cent are selected.

Finally, banks that can be considered too big to fail, with total assets greater than 10 billion USD in at least one year in the period 2007–13 are excluded from the sample.

The final sample includes 2,986 EU and 326 US banks.

In order to better understand the main features of the data set, Table 3.3 resumes the parameters and the selection criteria while Table 3.4 explains the composition of banks in the sample.

By considering the main ratios used by the FDIC and those analysed by the European Commission, and with the constraint of data availability, nine ratios are chosen in order to investigate the liquidity, the quality of assets and the capitalization of banks in the mentioned period[9]; in particular, the higher the ratios, the more stable the bank tends to be:

Table 3.3 Characteristics of the sample banks

Parameter	**Selection criteria**
Period	2007/2013
Location	European Union and United States
Specialization	Commercial banks, savings banks, cooperative banks
Deposits and short term funding	> 1 billion USD
Deposits and short term funding/ Total assets	> 40 per cent
Total assets	< 10 billion USD
Status	Active banks

Table 3.4 Composition of the sample

	EU	**US**	**EU & US**
Commercial banks	743	214	957
Savings banks	712	105	817
Cooperative banks	1,531	7	1,538
Total	*2,986*	*326*	*3,312*

Source: Authors' elaboration from Bankscope database.

- liquid assets/deposits and borrowings;
- loan loss reserves/gross loans;
- loan loss reserves/impaired loans;
- equity/net loans;
- equity/customer and short-term funding;
- equity/liabilities;
- equity/total assets;
- tier 1 ratio; and
- total capital ratio.

Moreover, a Z-Score index for each bank is calculated to analyse the riskiness of banks in the sample. Specifically, the Z-Score index is given by the sum of the assets return measured by the return on average assets (ROAA) and the ratio defined by equity/total assets (leverage) scaled by the standard deviation of ROAA index (Laeven and Levine, 2009; Anginer et al., 2014).

The first ratio is a liquidity index for banks. It measures the ability of a bank to meet its short-term debt obligations. The subsequent three

ratios measure the bank–asset quality, that is, they determine the quality of the loans of a bank. Finally, the last five ratios aim to indicate the stability and the capitalization of the banks. These ratios are relevant because they give information concerning the protection of depositors and the conditions of stability of each bank.

The Z-Score index is also very relevant in the analysis because it is able to assess the riskiness of the bank; in fact, the higher the leverage, the greater (for the same ROAA) the bank's ability to increase the volume of assets, and the latter could be riskier. By considering the construction of the index, the higher the Z-Score, the lower the bank risk.

For each ratio analysed, the average and the median values for EU banks and US banks are calculated; moreover, the differences between the average and the median values of EU banks and US banks are calculated: positive differences mean higher values for EU banks – higher stability or lower bank risk – while negative differences mean lower values for EU banks – lower stability or higher bank risk.

Finally, a Student's T test is adapted to test the statistical significance between all the ratios for EU and US banks.

Tables 3.5–3.11 reports data for each year analyzed whilst Table 12 reports the values for the entire period 2007–13.

As we can see from the first six tables, in each year analyzed the values of loan loss reserves/impaired loans, equity/net loans (median values for 2008, 2009, 2010, 2012 and 2013), equity/customer and short term funding, equity/liabilities and equity/total assets are higher for US banks, meaning that US banks present more stability than EU banks. From 2010 to 2013 also Tier 1 ratio and total capital ratio (only average values) are higher for US banks. However, for each analysed year, the Z-Score index for EU banks is two or three times the value of the index for US banks, which means that US banks are riskier than EU banks. In most cases the differences between EU and US banks are statistically significant (with p-value less than 0.01).

Considering the whole period, US banks show higher values and consequently higher stability for the following indexes: equity/customer and short-term funding, equity/liabilities, equity/net loans (only median values), equity/total assets, loan loss reserves/impaired loans, Tier 1 ratio and total capital ratio (average values only). The Z-Score index is higher for EU banks, meaning that the bank risk is lower.

In the analysis, most variables are statistically significant (with p-value less than 0.01), namely equity/liabilities, equity/net loans, equity/total assets, loan loss reserves/gross loans, loan loss reserves/impaired loans, Tier 1 ratio, Total capital ratio and Z-Score.

Table 3.5 Statistics for 2,986 EU and 326 US banks in 2007

	EU	US	Difference (EU – US)	T test
Liquid assets/Deposits and borrowings %	20.90	8.46	12.44	0.00000***
	(16.69)	(3.99)	(12.70)	
Loan loss reserves/Gross loans %	2.62	1.11	1.51	0.00000***
	(1.74)	(1.09)	(0.65)	
Loan loss reserves/Impaired loans %	67.44	217.37	–149.93	0.00000***
	(47.62)	(144.87)	(–97.25)	
Equity/Net loans %	19.00	20.73	–1.73	0.35371
	(12.41)	(14.37)	(–1.96)	
Equity/Customer and short-term funding %	13.47	17.73	–4.26	0.15210
	(8.49)	(12.35)	(–3.85)	
Equity/Liabilities %	11.25	13.34	–2.09	0.00323***
	(7.91)	(10.97)	(–3.06)	
Equity/Total assets %	9.29	11.27	–1.98	0.00000***
	(7.29)	(9.85)	(–2.56)	
Tier 1 ratio %	17.74	14.85	2.90	0.00936***
	(14.00)	(11.40)	(2.60)	
Total capital ratio %	17.25	15.94	1.31	0.07764*
	(14.44)	(12.45)	(1.99)	
Z-Score	106.25	35.19	71.06	0.00000***
	(41.31)	(20.93)	(20.38)	

Notes: Average and median values (median values in brackets). Student's T test. **P-value <10%. **P-value <5%. ***P-value <1%.*

Source: Authors' elaboration from Bankscope database.

Table 3.6 Statistics for 2,986 EU and 326 US banks in 2008

	EU	US	Difference (EU – US)	T test
Liquid Assets/Deposits and borrowings %	21.06	8.32	12.74	0.00000***
	(17.15)	(4.14)	(13.01)	
Loan loss reserves/Gross loans %	2.81	1.40	1.41	0.00000***
	(2.00)	(1.26)	(0.74)	
Loan loss reserves/Impaired loans %	57.66	143.40	–85.74	0.00000***
	(45.76)	(94.28)	(-48.52)	
Equity/Net loans %	19.21	18.10	1.11	0.46261
	(12.40)	(14.46)	(–2.06)	
Equity/Customer and short-term funding %	13.29	14.49	–1.20	0.13365
	(8.34)	(12.03)	(–3.69)	
Equity/Liabilities %	11.26	12.82	–1.55	0.02625**
	(7.81)	(10.84)	(–3.03)	
Equity/Total assets %	9.13	10.91	–1.77	0.00000***
	(7.21)	(9.77)	(–2.56)	
Tier 1 ratio %	15.63	14.91	0.72	0.30206
	(13.00)	(11.89)	(1.11)	
Total capital ratio %	16.62	16.07	0.55	0.33890
	(15.00)	(13.18)	(1.82)	
Z-Score	105.01	35.56	69.45	0.00000***
	(39.89)	(20.87)	(19.01)	

Notes: Average and median values (median values in brackets). Student's T test. **P-value <10%. ***P-value <5%. ****P-value <1%.*

Source: Authors' elaboration from Bankscope database.

Table 3.7 Statistics for 2,986 EU and 326 US banks in 2009

	EU	US	Difference (EU – US)	T test
Liquid Assets/Deposits and borrowings %	19.77	10.81	8.96	0.00000***
	(14.61)	(7.02)	(7.59)	
Loan loss reserves/Gross loans %	3.38	1.99	1.40	0.00000***
	(2.36)	(1.63)	(0.74)	
Loan loss reserves/Impaired loans %	52.78	80.40	–27.62	0.00000***
	(43.60)	(52.26)	(–8.67)	
Equity/Net loans %	21.41	18.95	2.46	0.11515
	(12.79)	(15.30)	(–2.52)	
Equity/Customer and short-term funding %	13.84	14.31	–0.47	0.63628
	(8.48)	(12.10)	(–3.62)	
Equity/Liabilities %	12.16	13.21	–1.06	0.28051
	(8.04)	(11.00)	(–2.96)	
Equity/Total assets %	9.25	11.33	–2.08	0.00001***
	(7.42)	(9.89)	(–2.48)	
Tier 1 ratio %	15.23	15.46	–0.23	0.70274
	(13.00)	12.74)	(0.26)	
Total capital ratio %	16.64	16.66	–0.02	0.96845
	(15.18)	(14.07)	(1.11)	
Z-Score	112.097	39.42	73.55	0.00000***
	(43.74)	(23.08)	(20.67)	

Notes: Average and median values (median values in brackets). Student's T test. *P-value <10%. **P-value <5%. ***P-value <1%.

Source: Authors' elaboration from Bankscope database.

Table 3.8 Statistics for 2,986 EU and 326 US banks in 2010

	EU	US	Difference (EU – US)	T test
Liquid Assets/Deposits and borrowings %	18.62	11.56	7.06	0.00000***
	(13.52)	(7.83)	(5.70)	
Loan loss reserves/Gross loans %	3.91	2.10	1.81	0.00000***
	(2.62)	(1.75)	(0.88)	
Loan loss reserves/Impaired loans %	52.88	78.83	–25.95	0.00014***
	(43.40)	(49.53)	(–6.13)	
Equity/Net loans %	21.67	20.34	1.33	0.33683
	(12.93)	(16.13)	(–3.21)	
Equity/Customer and short-term funding %	13.99	14.36	–0.36	0.69999
	(8.75)	(12.62)	(–3.87)	
Equity/Liabilities %	12.21	13.44	–1.23	0.17620
	(8.31)	(11.59)	(–3.28)	
Equity/Total assets %	9.38	11.67	–2.29	0.00000***
	(7.63)	(10.40)	(–2.77)	
Tier 1 ratio %	15.05	16.59	–1.54	0.01217**
	(12.90)	(14.00)	(–1.10)	
Total capital ratio %	17.31	17.80	–0.50	0.36451
	(15.64)	(15.27)	(0.38)	
Z-Score	122.89	40.68	82.22	0.00000***
	(47.16)	(25.03)	(22.14)	

Notes: Average and median values (median values in brackets). Student's T test. **P-value <10%. **P-value <5%. ***P-value <1%.*

Source: Authors' elaboration from Bankscope database.

Table 3.9 Statistics for 2,986 EU and 326 US banks in 2011

	EU	US	Difference (EU – US)	T test
Liquid Assets/Deposits and borrowings %	19.17	12.28	6.88	0.00000***
	(14.06)	(8.27)	(5.79)	
Loan loss reserves/Gross loans %	3.81	2.05	1.76	0.00000***
	(2.42)	(1.70)	(0.72)	
Loan loss reserves/Impaired loans %	49.87	84.53	–34.66	0.00000***
	(41.69)	(53.28)	(–11.59)	
Equity/Net loans %	23.25	24.99	–1.73	0.58781
	(13.63)	(17.03)	(–3.40)	
Equity/Customer and short-term funding %	13.73	14.98	–1.25	0.17994
	(9.40)	(13.03)	(–3.63)	
Equity/Liabilities %	12.11	15.48	–3.37	0.03935**
	(8.79)	(12.17)	(–3.38)	
Equity/Total assets %	9.67	12.35	–2.68	0.00000***
	(8.06)	(10.84)	(–2.78)	
Tier 1 ratio %	14.44	18.44	–3.99	0.00001***
	(12.65)	(14.60)	(–1.95)	
Total capital ratio %	17.83	19.56	–1.73	0.04582**
	(16.00)	(15.83)	(0.17)	
Z-Score	146.93	42.39	104.54	0.00000***
	(49.90)	(25.89)	(24.01)	

Notes: Average and median values (median values in brackets). Student's T test. **P-value <10%. **P-value <5%. ***P-value <1%.*

Source: Authors' elaboration from Bankscope database.

Table 3.10 Statistics for 2,986 EU and 326 US banks in 2012

	EU	US	Difference (EU – US)	T test
Liquid Assets/Deposits and borrowings %	18.23	12.73	5.50	0.00000***
	(12.52)	(8.18)	(4.34)	
Loan loss reserves/Gross loans %	3.41	1.84	1.57	0.00000***
	(2.08)	(1.61)	(0.48)	
Loan loss reserves/Impaired loans %	47.53	83.05	–35.52	0.00000***
	(42.57)	(58.44)	(–15.87)	
Equity/Net loans %	24.23	21.48	2.75	0.04263**
	(14.45)	(17.79)	(–3.34)	
Equity/Customer and short-term funding %	13.63	15.30	–1.67	0.13273
	(9.90)	(13.08)	(–3.18)	
Equity/Liabilities %	12.90	14.41	–1.51	0.09038*
	(9.31)	(12.58)	(–3.27)	
Equity/Total assets %	10.04	12.25	–2.21	0.00000***
	(8.47)	(11.19)	(–2.71)	
Tier 1 ratio %	14.34	18.18	–3.84	0.00000***
	(12.89)	(14.86)	(–1.97)	
Total capital ratio %	17.98	19.26	–1.28	0.05629*
	(16.32)	(16.10)	(0.23)	
Z-Score	157.60	67.56	90.04	0.00000***
	(54.20)	(31.39)	(22.81)	

Notes*:* Average and median values (median values in brackets). Student's T test. **P-value <10%. **P-value <5%. ***P-value <1%.*

Source: Authors' elaboration from Bankscope database.

Table 3.11 Statistics for 2,986 EU and 326 US banks in 2013

	EU	US	Difference (EU – US)	T test
Liquid Assets/Deposits and borrowings %	16.69	11.39	5.30	0.00000***
	(11.27)	(6.82)	(4.45)	
Loan loss reserves/Gross loans %	3.78	1.67	2.11	0.00000***
	(2.12)	(1.40)	(0.72)	
Loan loss reserves/Impaired loans %	48.71	104.39	–55.69	0.00000***
	(44.54)	(74.76)	(–30.22)	
Equity/Net loans %	23.13	20.88	2.24	0.07962*
	(15.13)	(17.36)	(–2.23)	
Equity/Customer and short–term funding %	13.96	15.80	–1.84	0.14057
	(10.29)	(13.23)	(–2.94)	
Equity/Liabilities %	12.65	14.92	–2.27	0.02135**
	(9.70)	(12.54)	(–2.84)	
Equity/Total assets %	10.15	12.26	–2.11	0.00000***
	(8.79)	(11.14)	(–2.35)	
Tier 1 ratio %	15.06	18.55	–3.48	0.00002***
	(13.37)	(15.01)	(–1.65)	
Total capital ratio %	18.33	19.57	–1.24	0.11251
	(16.74)	(16.14)	(0.59)	
Z-Score	150.38	63.22	87.17	0.00000***
	(44.25)	(31.12)	(13.12)	

Notes: Average and median values (median values in brackets). Student's T test. **P-value <10%. **P-value <5%. ***P-value <1%.*

Source: Authors' elaboration from Bankscope database.

Table 3.12 Statistics for 2,986 EU and 326 US banks in 2007/2013

	EU	US	Difference (EU – US)	T test
Liquid Assets/Deposits and borrowings %	19.20	10.84	8.36	0.97250
	(14.21)	(6.41)	(7.79)	
Loan loss reserves/Gross loans %	3.48	1.74	1.74	0.00000***
	(2.20)	(1.43)	(0.77)	
Loan loss reserves/Impaired loans %	51.72	109.83	–58.11	0.00000***
	(43.46)	(66.53)	(–23.08)	
Equity/Net loans %	21.77	20.81	0.97	0.00000***
	(13.41)	(16.10)	(–2.70)	
Equity/Customer and short-term funding %	13.71	15.28	–1.57	0.50307
	(9.26)	(12.60)	(–3.35)	
Equity/Liabilities %	12.10	13.97	–1.87	0.00000***
	(8.68)	(11.68)	(–3.00)	
Equity/Total assets %	9.56	11.74	–2.17	0.00000***
	(7.95)	(10.45)	(–2.51)	
Tier 1 ratio %	15.07	16.73	–1.65	0.00000***
	(13.02)	(13.72)	(–0.70)	
Total capital ratio %	17.47	17.86	–0.38	0.00000***
	(15.73)	(14.94)	(0.79)	
Z-Score	128.86	46.29	82.57	0.00000***
	(45.41)	(25.58)	(19.83)	

Notes: Average and median values (median values in brackets). Student's T test. **P-value <10%. **P-value <5%. ***P-value <1%.*

Source: Authors' elaboration from Bankscope database.

In order to better understand the main trends in the ratios analysed, Figures 3.1–3.10 show the trend of each variable analysed in the period 2007–13 for EU banks, US banks and their difference.

The value of liquid assets/deposits and borrowings (Figure 3.1) is higher for EU banks. However the ratio increases for US banks and decreases for EU banks. Consequently, the difference is decreasing. Overall, it means

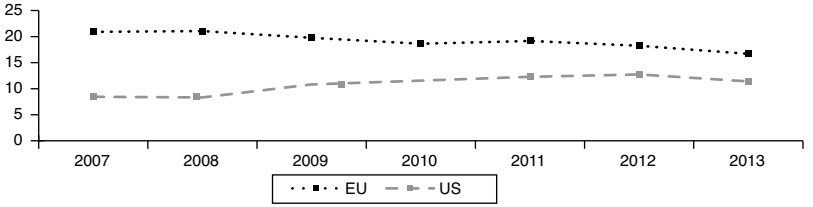

Figure 3.1 Liquid assets/Deposits and borrowings % for 2,986 EU and 326 US banks in 2007/2013

Source: Authors' elaboration from Bankscope database.

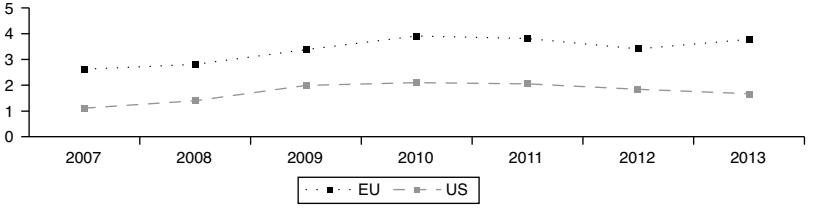

Figure 3.2 Loan-loss reserves/Gross loans % for 2,986 EU and 326 US banks in 2007/2013

Source: Authors' elaboration from Bankscope database.

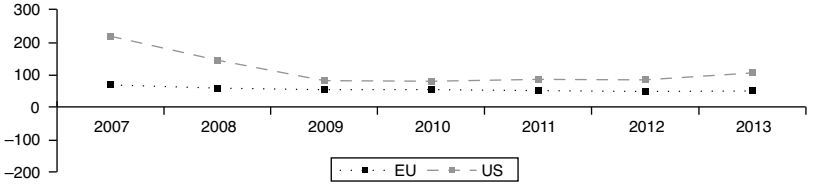

Figure 3.3 Loan-loss reserves/Impaired loans % for 2,986 EU and 326 US banks in 2007/2013

Source: Authors' elaboration from Bankscope database.

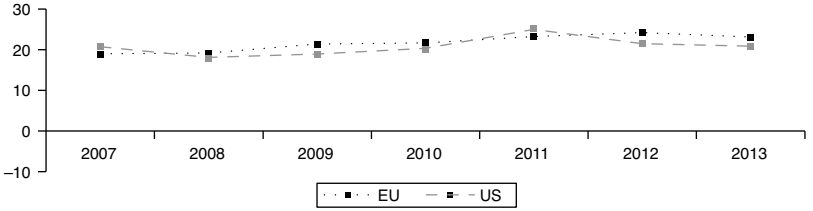

Figure 3.4 Equity/Net loans % for 2,986 EU and 326 US banks in 2007/2013
Source: Authors' elaboration from Bankscope database.

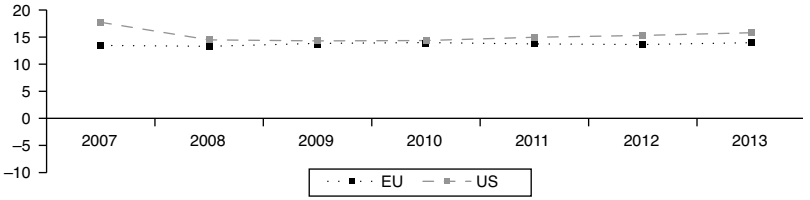

Figure 3.5 Equity/Customer and short-term funding % for 2,986 EU and 326 US banks in 2007/2013
Source: Authors' elaboration from Bankscope database.

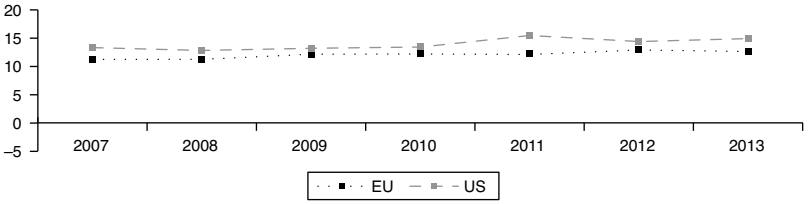

Figure 3.6 Equity/Liabilities % for 2,986 EU and 326 US banks in 2007/2013
Source: Authors' elaboration from Bankscope database.

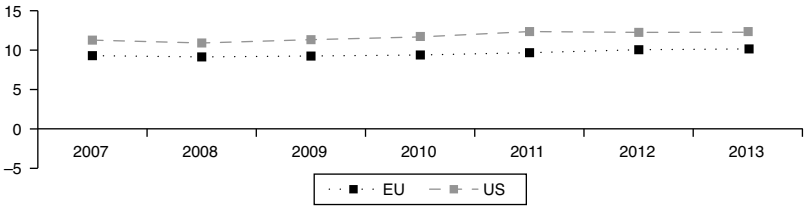

Figure 3.7 Equity/Total assets % for 2,986 EU and 326 US banks in 2007/2013
Source: Authors' elaboration from Bankscope database.

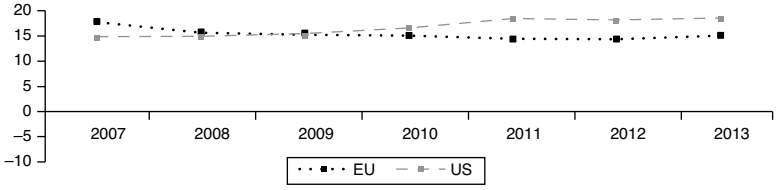

Figure 3.8 Tier 1 ratio % for 2,986 EU and 326 US banks in 2007/2013
Source: Authors' elaboration from Bankscope database.

Figure 3.9 Total capital ratio % for 2,986 EU and 326 US banks in 2007/2013
Source: Authors' elaboration from Bankscope database.

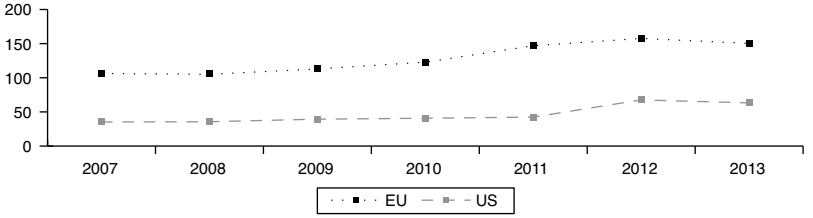

Figure 3.10 Z–Score for 2,986 EU and 326 US banks in 2007/2013
Source: Authors' elaboration from Bankscope database.

that EU banks present more capacity to meet their short-term obligations, but the current US environment allows US banks to improve on this capacity and easily meet their short-term commitments.

Considering the asset-quality ratios, the first ratio (loan loss reserves/gross loans, Figure 3.2) is higher for EU banks. Moreover, it has faced an overall increase and, also, the difference between EU and US banks is increasing. This should suggest that the EU asset quality is better than

US asset quality and that EU banks are more cautious and set aside more reserves for loans. However, the analyses of loan loss reserves/impaired loans (Figure 3.3), which is higher for US banks in the entire period, demonstrate that EU banks are obliged to set aside more loan loss reserves because the relative amount of impaired loans is higher. As a consequence, US banks present better quality in the loans. By considering the overall trend of this ratio, the value decreases for US banks and remains stable for EU banks, confirming the growing stability for US banks already demonstrated with the liquidity index. The equity/net loans (Figure 3.4), which complete the analysis of the asset quality, overall increases in the period 2007 to 2013 for both EU and US banks. However the trend is not constant in the period: the value for EU banks increases from 2007 to 2012 and faces a small decrease in 2013; while the value for US banks decreases in 2008, increases in 2009 and 2010, then decreases again in 2012 and 2013. As result, the value is higher for US banks in 2007 and 2011.

Moving to the capitalization ratios, the value of equity/customer and short-term funding (Figure 3.5) is higher for US banks than for EU banks in the period 2007 to 2013, which indicates the higher bank capitalization in the US sample. In the period analysed, the ratio decreases for US banks and increases for EU banks and, consequently, the difference decreases. It means that EU banks are becoming more capitalized in order to meet regulatory requirements. The ratio between equity and liabilities (Figure 3.6) increases for both US banks and EU banks in the period 2007 to 2013, achieving a peak in 2011 for US banks and in 2012 for EU banks. As for equity/customer and short-term funding, the ratio is higher for US banks for each year, meaning a higher capitalization for US banks. Moreover, also the ratio between equity and total assets (Figure 3.7) is higher for US banks in the entire period. For both US and EU banks the value increases between 2007 and 2013. The value of Tier 1 ratio (Figure 3.8) in 2007 and in 2008 is higher for EU banks, while from 2009 to 2013 is higher for US banks. This results from a decrease in the value for EU banks and an increase for US banks. The total capital ratio (Figure 3.9), like tier 1 ratio, until 2008 is higher for EU banks, and after 2009 is higher for US banks. The value for EU banks decreases and for US banks grows.

On the other side, the Z-Score index (Figure 3.10) grows for both EU and US banks, meaning that bank riskiness is decreasing. It is important to note that the Z-Score index is lower for US banks – that is, the bank risk is higher for US banks.

Table 3.13 Statistics for 2,986 EU and 326 US banks in 2007/2013

	EU		US	
	Average	**% variation**	**Average**	**% variation**
2007	0.58		0.94	
		–48%		–67%
2008	0.30		0.31	
		–30%		–142%
2009	0.21		–0.13	
		10%		–269%
2010	0.23		0.22	
		–4%		95%
2011	0.22		0.43	
		9%		81%
2012	0.24		0.78	
		–21%		10%
2013	0.19		0.86	

Note: Average values and annual percentage variation of ROAA.

Source: Authors' elaboration from Bankscope database.

The higher bank risk for US banks derives from a higher variation of the ROAA for US banks in the period analysed. In fact, as we can see in Table 3.13 and in Figure 3.11 for US banks ROAA decreases from 2007 to 2009 and increases from 2010 to 2013 while for EU banks it decreases constantly. Indeed, a greater volatility in the return on assets (or in the ROAA) conduces to a higher risk. Mathematically, the value of the standard deviation of ROAA for the period is the denominator of the Z-Score index and its increase conduces to a decrease in the value of the index.

In order to have a better understanding of bank riskiness of EU banks, the Z-Score index for each EU country is decomposed. Figure 3.12 reports the individual values of the Z-Score for each EU country together with the average values for EU and US banks.

There is only one country that presents a Z-Score higher than the EU average, which amounts to 128.86, and that is Germany, with a Z-Score of 219.00. As, the Z-Score value for German banks is near twice the average EU value, the average EU Z-Score represents an uneven situation; excluding Germany, the EU average Z-Score would be less than a half.

Beyond Germany, there are only other two EU countries that present a Z-Score higher than the US Z-Score (which amounts to 46.29), namely: Finland (53.76) and Austria (48.51). There are three countries with a Z-Score higher than 40: France (43.62), Malta (40.69) and Slovakia (40.44). They

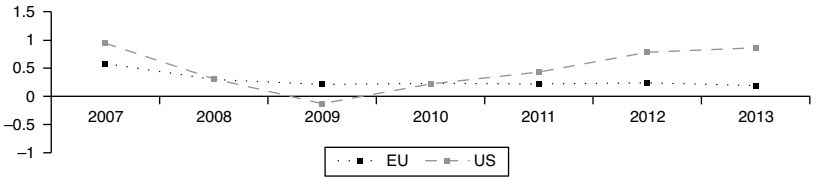

Figure 3.11 ROAA for 2,986 EU and 326 US banks in 2007/2013
Source: Authors' elaboration from Bankscope database.

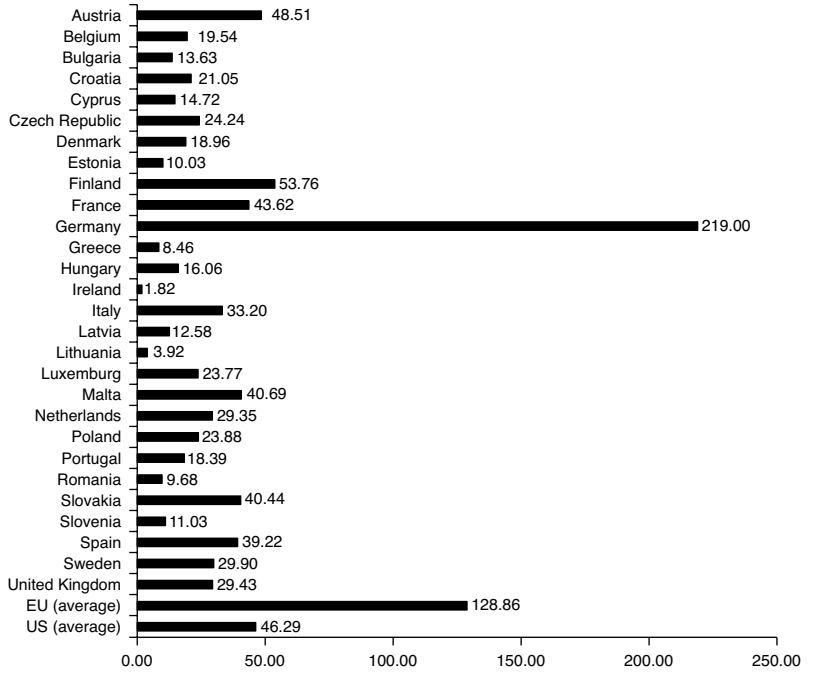

Figure 3.12 Z-Score for 2,986 EU banks for each country in 2007/2013
Source: Authors' elaboration on Bankscope database.

are followed by Spain (39.22), Italy (33.20), Sweden (29.90), the United Kingdom (29.43), the Netherlands (29.35), Czech Republic (24.24), Poland (23.88), Luxembourg (23.77), Croatia (21.05), Belgium (19.54), Denmark (18.96), Portugal (18.39), Hungary (16.06), Cyprus (14.72), Bulgaria (13.63), Latvia (12.58), Slovenia (11.03) and Estonia (10.03).

The last four countries, with Z-Scores lower than 10, are: Romania (9.68), Greece (8.46), Lithuania (3.92) and Ireland (1.82).

It is important to highlight that these differences in bank riskiness, calculated in this research through the Z-Score index, are going to generate very different contributions to the risk-based insurance premiums that banks will have to pay to their DGSs. In particular, even if the contribution to the national DGS were to be based on the evaluation of each individual bank, if a supranational DGS would be set up, then very different premiums would have to be paid by the European banks. The change from flat-rate to risk-adjusted contribution would mitigate its effect for less-risky banks within the same country. In fact, many countries with less-risky banking systems would actually pay lower contributions to a common scheme. From a supervisory perspective, a single pan-European DGS would provide a stronger incentive for riskier banks to engage in more risk-averse behaviour to pay less in contributions.

3.6 Conclusions

The 2007–09 financial crisis highlighted the lack of an effective crisis-management framework in many parts of the world. In this context, deposit guarantees are very relevant because they safeguard deposits and strengthen financial sectors' overall stability by removing incentives for bank runs and thus limiting financial contagion.

Following the recent global financial crisis, new pieces of regulation were issued, and as far as deposit-insurance schemes are concerned, two characteristics – pre-funded deposit insurance schemes and risk-based premiums – received a great consensus.

In the United States the organization in charge of deposit insurance is the Federal Deposit Insurance Corporation (FDICI). The FDIC is a central player in the financial system because its official tasks include (besides insuring deposits) regulating the US branches and agencies of foreign member banks, supervising member banks according to agreements with their primary regulators and acting as receiver and liquidator of failed banks. The quarterly risk-based contributions are collected and managed in advance and utilized, if necessary, by the FDIC, which is usually appointed as receiver by the competent authority. The US model seems to function very well and is backed up by a fiscal budget, thus being able to cope with systemic failures.

In Europe Directive 2014/49/EU it was stated that contributions from banks to national deposit guarantee schemes (DGSs) must be calculated on the basis of their risk profiles. The establishment of a new framework for European DGSs implies a significant change in the amount of

contributions European banks have to transfer to their national schemes. The change will probably be more relevant for those countries where the scheme is currently ex-post funded. Furthermore, the change from flat-rate to risk-adjusted contributions should mitigate its effect for less risky banks within the same country. So the riskiness of banks has become a very relevant and difficult factor to analyze.

By considering this, a comparative analysis of the riskiness of European and US banks is performed in this research. From this analysis it is evident that US banks present much higher risk than European banks, as the Z-Score is lower. Moreover, in a European comparison German banks appear to be much less risky than the other European banks.

Large differences between EU and US banks emerge, also in the profitability trends (ROAA). In fact, whereas the financial crisis both European and US banks formerly reported record profit levels, only US banks are beating those nowadays, due to rapid growth since 2009.

Finally, it is relevant to notice that member states in Europe may allow DGSs to lend to other schemes within the EU on a voluntary basis, if the borrowing DGS is not able to fulfil its obligations because of a lack of available financial resources. Such provision works towards the creation of a network of lending between DGSs in Europe, but unfortunately it is far from leading to the establishment of a single pan-European scheme, funded by and including all banks in the Union to avoid potential distortion.

The establishment of a pan-European DGS is a difficult process because of the variety of legislation currently applied in member states. Such a heterogeneous framework hardly can be harmonized, even if, many countries with less-risky banking systems would actually pay lower contributions to a potential pan-European DGS. Moreover, a common scheme would carry many benefits in terms of lower administrative costs and better coordination with the common resolution framework in the Banking Union.

Also, in particular, the use of DGS funds for bank resolution should be allowed because, to a large extent, deposit guarantee schemes and resolution frameworks share the same function, that is, protecting depositors against the unavailability of their deposits, which may happen as a result of the failure of an individual bank or a systemic crisis. In fact, DGSs and resolution frameworks are mutually beneficial. However, the launch of a pan-European DGS seems now to be low on the agenda. This is something detrimental to a sound financial system, as a coordinated supervisory and resolution framework should be completed by the establishment of a single DGS to enhance the management of failing banks and establish a full banking union.

Appendix

Table X. A Variables source and definition

Variable	Definition	Source
Liquid assets/deposits and borrowings	Liquid assets = asset that can be converted into cash quickly and with minimal impact to the price received.	Bankscope (Bureau Van Dijk)
	Deposits and borrowings = deposits (Customer deposits: Current + Savings + Term), Money market instruments, CDs and other deposits.	
Loan loss reserves/gross loans	Loan loss reserves = includes the loan loss reserves calculated by banks using the Internal Ratings Based approach to calculating risk, given the expected loss.	Bankscope (Bureau Van Dijk)
	Gross loans = includes Net Loans + Less: Reserves for Impaired Loans/ NPLs.	
Loan loss reserves/ impaired loans	Loan loss reserves = includes the loan loss reserves calculated by banks using the Internal Ratings Based approach to calculating risk, given the expected loss.	Bankscope (Bureau Van Dijk)
	Impaired loans = includes all impaired loans to banks and customers.	
Equity/net loans	Equity = includes Common equity + Noncontrolling interest + Securities revaluation reserves + Foreign Exchange Revaluation Reserves+ Other revaluation reserves.	Bankscope (Bureau Van Dijk)
	Net loans = includes Residential Mortgage Loans + Other Mortgage Loans + Other Consumer/ Retail Loans + Corporate and Commercial Loans + Other Loans – Reserve against possible losses on impaired or non-performing loans.	
Equity/customer and short term funding	Equity = includes Common equity + Noncontrolling interest + Securities revaluation reserves + Foreign Exchange Revaluation Reserves+ Other revaluation reserves.	Bankscope (Bureau Van Dijk)
	Customer and short term funding = Total customer deposits + deposits from banks + Other deposits and shortterm borrowings.	

Equity/liabilities	Equity = includes Common equity + Noncontrolling interest + Securities revaluation reserves + Foreign Exchange Revaluation Reserves+ Other revaluation reserves. Total liabilities = includes Total interestbearing liabilities + Fair value portion of debt + Credit impairment reserves + Reserves for pension and other + Tax liabilities + Other deferred liabilities + Discontinued operations + Insurance + Other noninterestbearing liabilities.	Bankscope (Bureau Van Dijk)
Equity/total assets	Equity = includes Common equity + Noncontrolling interest + Securities revaluation reserves + Foreign Exchange Revaluation Reserves+ Other revaluation reserves. Total assets = includes Total earning assets + Cash and due from banks + Foreclosed real estate + Fixed assets + Goodwill + Other intangibles + Current tax assets + deferred tax + Discontinued operations + Other assets. As equity is a cushion against asset malfunction, this ratio measures the amount of protection afforded to the bank by the equity they invested in. The higher this figure the more protection there is.	Bankscope (Bureau Van Dijk)
Tier 1 ratio	Regulatory Tier 1 Capital/Risk-Weighted Assets including floor/cap per Basel II Regulatory Tier 1 Capital = includes all capital that is defined as Tier 1 by the regulator. Risk-Weighted Assets including floor/cap per Basel II = includes all risk-weighted assets disclosed by the bank as dictated by the Basel regulations. The floor and cap are local limits that regulators have placed on some instruments so that some banks could benefit by reducing its Risk-Weighted Assets on some instruments by moving to Basel II.	Bankscope (Bureau Van Dijk)
Total capital ratio	Includes all capital divided by total Risk-Weighted Assets	Bankscope (Bureau Van Dijk)
ROAA	Net Income/Average Total Assets. This is perhaps the most important single ratio in comparing the efficiency and operational performance of banks as it looks at the returns generated from the bank's assets.	Bankscope (Bureau Van Dijk)

Notes

1. The surveys were conducted in the years 1999, 2002 and 2005. Because country-level regulations change slowly over time, they use the previously available survey data.
2. In fact, the new legislation stipulates that five years after its entry into force, the commission will submit a report, and if appropriate, could put forward a new legislative proposal.
3. Schoenmaker, D. and D. Gros. A European Deposit Insurance and Resolution Fund, CEPS Working Document, No. 386, May 2012.
4. F. Allen, T. Beck, E. Carletti, P. Lane, D. Schoenmaker and W. Wagner, 'Cross-Border Banking in Europe: Implications for Financial Stability and Macroeconomic Policies', CEPR Report, London 2011.
5. This reduction will be made in three phases: 15 working days as from 1 January 2019; 10 working days as from 1 January 2021 and eventually 7 working days as from 1 January 2024.
6. IMF, Technical Note on Deposit Insurance, IMF Country Report No. 13/66, March 2013, p. 9.
7. For a review see Ellis (2013).
8. Risk measures used to determine risk-based premium rates for banks with assets less than $10 billion: (1) Tier 1 leverage ratio; (2) loan past due 30–89 days/gross assets; (3) nonperforming assets/gross assets; (4) no loan charge-offs/gross assets: (5) net income before taxes/risk-weighted assets; (6) rapid asset growth funded by brokered deposits: (7) weighted average examination component ratings (see Ellis D., 2013).
9. Sources and definitions for variables analysed are listed in the Appendix (Table X.A)

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4

Back to the Future: Prospective Bank Risk Management in a Financial Analysis Perspective

Rosa Cocozza

4.1 Introduction

There is a general tendency to consider that, being 2012 and 2013 years of regulatory repair, the overall condition of European Union (EU) banks has improved since they raised equity and cleaned up their balance sheets. Nevertheless, the selected regulatory strategies are not free from shortcomings. Within this context, the aim of the chapter is twofold. The leading target is the inference of the logical background of risk assessment by the European Banking Authority (EBA) by means of the analysis of the Key Risk Indicators (KRI), with reference to both their selection and construction. The objective is the appraisal of the signalling aptitude of the KRI in order to deduce the risk-management focus by committed authorities. The secondary goal is the assessment of the recalled trend within Euro area banks in order to verify whether the regulatory focus is effectively generalized across the European Economic Area (EEA). Therefore, the chapter is aimed at evaluating future trends in banking risk management within the supervisory framework according to the actual suasion pursuit.

The question concerning the assessment of the recent focus on relevant risk drivers is performed through the analysis of the KRIs provided by EBA. Since risk-management processes are based on a primary step that is the *identification stage*, we can extrapolate the logic of the supervisory emphasis by the analysis of the KRIs as proxies of *relevant risk factors*. Therefore, we can ascertain forthcoming risk-management efforts within the banking sector and verify whether *prospective* risk management is effectively *sustainable* risk management. Recent managerial and

supervisory concerns concentrate on credit risk by means of consistent allowances and impairments. The analysis is aimed at checking this focus perception and verifying whether the supervisory suasion can be effectively regarded as proactive within European banking. Given the regulatory and managerial consequences of the crisis, the research question is related to the effect of the suasion activity steered by supervisory authorities – especially by the EBA– towards deleveraging and de-risking. The basic question concerns the market appraisal of deleveraging and de-risking by analysing the market performance of banks. The answer to the first question can be found in the Key Risk Indicators (KRI) reported by EBA in the Risk Dashboard as a part of the regular risk assessment conducted by the EBA itself and as a complement to the Risk Assessment Report.

The EBA risk dashboard summarizes the main hazards and exposures in the banking sector in the European Union (EU). Considering the overall progression of the European System of Financial Supervision (ESFS) in the perspective of proper risk management, EBA plays an important role in promoting convergence of supervisory practices being mandated to assess risks and vulnerabilities in EU banking. From a balanced scorecard perspective, the KRI and the Risk Dashboard constitute the kernel of the process enabling supervisory authorities to *translate vision and strategy* to the EU banking system. They enable authorities to track financial results while simultaneously monitoring progress in building the capabilities and acquiring the *intangible assets* they need for future growth. In a sense, they are the complement for regulatory measures and capital adequacy targets. Under these considerations, the study of the KRI gives the opportunity to infer the logical background of risk assessment by EBA. The objective is the critical appraisal of the signalling aptitude of the KRI in order to deduce the risk management focus by committed authorities and to assess whether the emerging hub is effectively comprehensive since, as is known, we see only what we look at and we find only what we look for. The underlying idea is therefore to look at the KRI as in an Enterprise Risk Management (ERM) process – effected by an entity's board and applied in a strategy setting and across the enterprise – designed to identify potential events that may affect the entity, to manage risk to be within its risk appetite and to provide reasonable assurance regarding the achievement of entity objectives. In other terms, supervisory authorities play the role of the *entity's board*, and the banking system is the *enterprise* and the *objective* is the optimization of efficiency/stability trade-off of the financial system in such an extreme scenario as we are experimenting during these years. By looking

at the KRI in this perspective, we can go up the rivertrying to reach the ultimate mission in order to state whether it is all-inclusive. Recent managerial alarms concentrate on credit risk by means of consistent allowances and impairments.

The second objective is the evaluation of the of the market's perception of the de-risking and deleveraging. The valuation of the market perception can be tested by means of the impact on some specific risk indicator for banks with relevant variables in terms of risk-weighted assets and debt–equity ratio. Since the research is focused on market perception, a sample of listed banks across the eurozone has been selected and treated to test the impact of deleveraging and de-risking. The study is aimed at verifying both the market perception and whether the supervisory suasion can be regarded as proactive within the European banking system.

Preliminary results confirm the attention and the widespread trend suggesting the opportunity for authorities to broaden key risk indicators in order to avoid potential myopia and future unsustainability.

The chapter is structured as follows: the next section outlines the context and the literature framework for deleveraging and de-risking as a consequence of the regulatory control system. The third section concerns the dataset and the methodology, showing the 'suasion activity' by EBA and the market appraisal. The third section presents the figures and targets of the EBA with an overview of the main risks and vulnerabilities in the EU banking sector, while the fourth section provides the market perception of the resilience-suasion activity performed by the analysis of major European listed banks. The fifth section concludes the chapter.

4.2 The cultural background

As a consequence of the crisis, the change in the banking business, mainly *deleveraging* and *de-risking*, is a topic focusing the attention of different observers. In the recessive context, the increasing attention to equity strengthening can be traced back to regulatory and supervisory issues, forcing the banking system to build larger buffers of high-quality capital and to reduce the riskiness of their portfolios (Cocozza et al., 2015). Liquidity and credit threats have been perceived as primary crisis drivers. As a consequence, they are among the main requirements for banks, according to the new Basel package that is not *business neutral* since it fixes many incentives towards a general reduction of risk-intensive business (Ötker-Robe and Pazarbasioglu, 2010). The introduction of

stress-testing and new capital requirements accelerated the process and influenced the balance sheets of European banks. Since capital is measured as a percentage of risk-weighted assets (RWA), there is the opportunity is to reduce risk by replacing/reallocating investments, even while the total size of the balance sheet remains steady. Yet, deleveraging should be regarded as a necessary process on the path to recovery from the crisis. In general, deleveraging has both supply and demand effects, where supply-side effects are to some extent driven by new regulatory requirements. Banks and the financial industry in general have been supporting regulatory reforms, even if they are not always able to evaluate the consequences, also negative, that may lead to an overestimation of the net benefits of new regulations. For example, additional capital requirements for systemically important financial institutions might be individually successful, but the wider, negative effects on the financial sector and the economy overall may not have been fully evaluated in their actual impacts. A particular shortcoming of existing regulatory reforms is that they do not address operational capability, which in many cases has been found worryingly lacking, especially in some of the large, globally active banks (Weihnger, 2012).

In the regulatory perspective, promoting a more resilient banking sector *hedges* the risk of spillover from the financial sector to the real economy (BCBS, 2009). Consistently, to address the market failures revealed by the crisis, even the rating agencies forced banks towards a restored credibility by means of leverage reduction, as a fundamental market signal for the creditworthiness of the financial system; hence, consultants are concentrating on the banking business change, especially in the eurozone (Figure 4.1), by promoting attention towards risk-weighted indicators as leader targets in successful management (Sinn et al., 2013).

Therefore, a combination of supply-side factors motivates the deleveraging pressure on European banks, as well as market conditions – with less profitable opportunities of investment because of general deleveraging even of firms – contributed to shrink assets and boost capital ratios. Therefore, part of the current deleveraging is due to the new regulatory environment, in which banks are preparing for the forthcoming severer capital and liquidity requirements. Regarding the effects of these reforms, estimates by the banking industry (IIF, 2011) emphasize the negative output effects; moreover regulatory reforms will also have an impact on the structure and business models of the financial industry. Many of the new regulations will not have the desired effects and no amount of capital would be sufficient to make banks really safe and avoid their taking of undue risks. Indeed, it was argued that such requirements

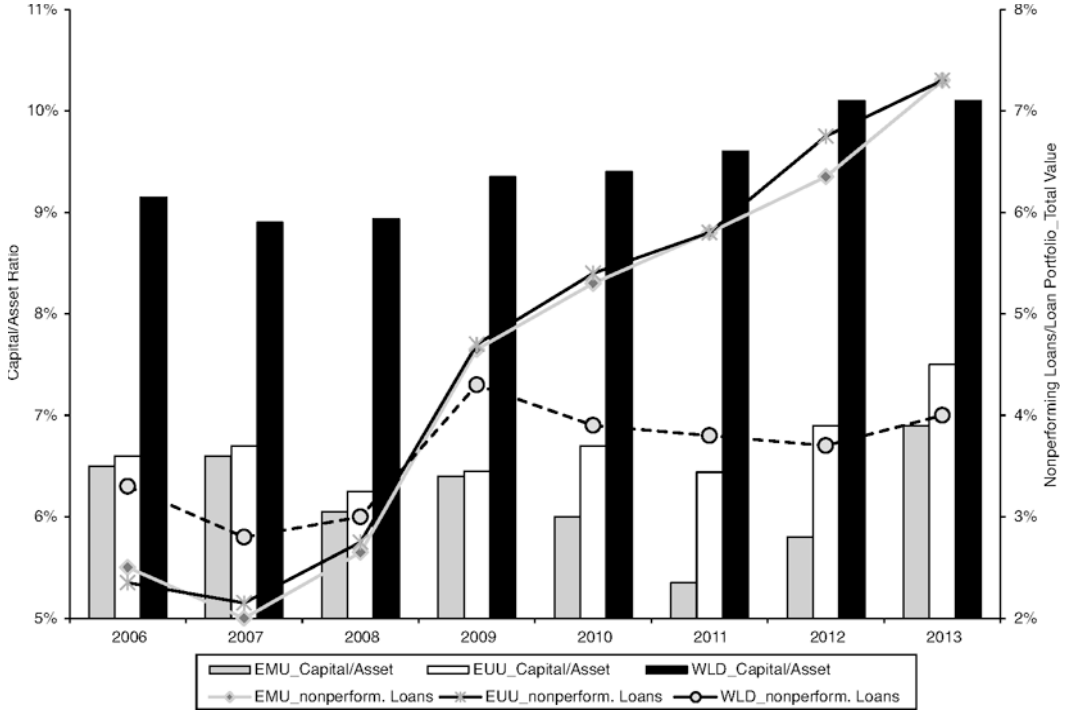


Figure 4.1 Bank capital and nonperforming loans

Data Source: The World Bank, World Development Indicators.

may even increase risk-taking as they put pressure on returns on equity (Wehinger, 2012).

The deleveraging implementation can take different forms, both internal and external. As far as the internal feature is concerned, banks could seek to increase the amount of retained earnings by both boosting profits and reducing dividend payout, if appropriate. The actual opportunity to increase profits depends on the possibility of expanding lending activity that is not always effectively performing; furthermore, the decision to cut dividends can be detrimental in terms of market value of shares. The external strategy encompasses the issue of new equity: as in the previous case there are different expenses to consider, especially in terms of governance and, once again, of shares' market value. An apparently less costly third set of adjustment strategies involves changes to the asset side of the bank's balance sheet by reducing the volume through asset sale and/or lending growth rate slowdown. Last but not least, a bank can seek to reduce its risk-weighted assets by replacing riskier (higher-weighted) investments with safer ones, by giving rise to what is addressed as *de-risking*.

Whatever the strategic decision, regulatory capital ratios will increase, thereby giving rise to both deleveraging and capital reinforcement, at least from a supervisory perspective. Nevertheless, this positive "regulatory impact" is not totally free from negative traits: the foreseeable reduction of the Return on Equity (ROE), the potential credit crunch in the form of reduction in the general availability of loans (or credit) or a tightening of the conditions required to obtain a loan, the suboptimal asset allocation because of regulatory arbitrage. This is also confirmed by recent studies (Weihnger, 2011) that have looked at the return impact of new regulations estimating that Basel III would reduce an average bank's ROE by about four percentage points in Europe and about three percentage points in the United States. A recent survey of European banks (Deloitte, 2012) found that a large majority indicated higher capital and liquidity requirements as the main drivers of deleveraging and divestment plans.

Under these circumstances, there are many concerns about a too-rapid capital built up because of considerable short-term macroeconomic costs by inducing banks to pull back from lending to finance investment. As a consequence an initial group of studies has tried to evaluate the potential macroeconomic impact of stronger regulation by studying the relationship between increases in bank capital and rises in lending spreads as well as changes in lending volumes (Cohen and Scatigna, 2014). A second area of interest is related to the measures adopted by banks to improve capital ratios and, more specifically, on the reasons underlying

topic choices as the result of financial and economic conditions, or also of business-model and strategic decisions (Caselli et al., 2014). In both areas of research the mainstream is the assessment of the effects of a general repair acquainted repair tendency of the banking system.

The present study can be placed within the recalled cultural context, although the perspective of the analysis is original, since the chapter tries to evaluate future trends in banking risk management within the supervisory framework according to the actual suasion pursuit.

4.3 The conceptual framework: EBA focus and KRI analysis

The first research question concerning the assessment of recent focus on relevant risk drivers regards the breakdown of the data provided by EBA. The second objective is the assessment of the revealed trend within similar banks, not included in the EBA dataset, in order to verify whether the focus is effectively generalized across the European Economic Area (EEA). Once the first step is completed, main findings are compared by means of econometric analysis with the market performance of a consistent bank stock index across the EEA in order to verify whether the emerging trends are effectively diffused in the eurozone as a consequence of the 'suasion activity'.

The first step of the analysis is based on the dataset of Key Risk Indicators (KRI) provided by the EBA. The EBA KRI is an original set of 53 indicators collected on a quarterly basis by national supervisors, from a sample of 57 European banks in 20 European Economic Area (EEA) countries from 2009 onwards.[1] The banks in the sample cover at least 50 per cent of the total assets of each national banking sector. In October 2013, the EBA published its first risk dashboard, summarizing the main risks and vulnerabilities in the European banking sector. The most recent data refer to December 2013. As stated by EBA, the majority of the indicators are not publicly available; therefore these data provide a unique and valuable source of information. The data are extracted and elaborated directly on the EBA Risk Dashboard Interactive Tool as supplied by EBA (www.eba.europa.eu/risk-analysis-and-data/risk-dashboard). Table 3.1 reports the full list of the KRI. The logical methodology is that of a financial analyst: understanding the risk and profitability of banks in the EEA by means of available KRI in order to *restore* or, better, infer the risk map driving the institutional focus.

By reviewing Table 4.1, we can easily identify four main areas of interest: Capital Adequacy (1 to 3) and Capital Requirement breakdown (4 to 11),

Table 4.1 Full list of key risk indicators

1	Tier 1 capital ratio
2	Total capital ratio
3	Tier 1 ratio (excluding hybrid instruments)
4	Credit risk capital requirements of total capital requirements
5	Standardized approach capital requirements of total capital requirements
6	Securitization capital requirements of total capital requirements
7	IRB approach capital requirements of total capital requirements
8	Market risk capital requirements of total capital requirements
9	Operational risk capital requirements of total capital requirements
10	Settlement and delivery risk capital requirements of total capital requirements
11	Other capital requirements of total capital requirements
12	Past due (>90 days) loans to total loans and advances
13	Impaired loans and past due (>90 days) loans to total loans
14	Coverage ratio (specific allowances for loans to total gross impaired loans)
15	Past due (>90 days) loans and debt instruments to total loans and debt instruments
16	Coverage ratio (specific allowances for loans and debt instruments to total gross impaired loans and debt instruments)
17	Coverage ratio (all allowances for loans and debt instruments to total gross impaired loans and debt instruments)
18	Impaired financial assets to total assets
19	Impaired debt instruments to total debt instruments
20	Accumulated impairments on financial assets to total (gross) assets
21	Impairments on financial assets to total operating income
22	Return on equity
23	Return on regulatory capital requirements
24	Cost–income ratio
25	Return on assets
26	Net interest income to total operating income
27	Net fee and commission income to total operating income
28	Dividend income to total operating income
29	Net realized gains (losses) on financial assets and liabilities not measured at fair value through profit and loss to total operating income
30	Net gains on financial assets and liabilities held for trading to total operating income
31	Net gains on financial assets and liabilities designated at fair value through profit or loss to total operating income
32	Net other operating income to total operating income
33	Net income to total operating income

(*Continued*)

Table 4.1 Continued

34	Loan-to-deposit ratio
35	Customer deposits to total liabilities
36	Tier 1 capital to (total assets – intangible assets)
37	Debt securities to total liabilities
37	Debt securities to total liabilities
38	Deposits from credit institutions to total liabilities
39	Equity to total liabilities and equity
40	Cash and trading assets to total assets
41	Cash, trading, and AFS assets to total assets
42	Financial assets held for trading to total assets
43	Financial liabilities held for trading to total liabilities and equity
44	Loans and advances (excl. trading book) to total assets
45	Debt-to-equity ratio
46	Off-balance sheet items to total assets
47	Total assets
48	Total loans
49	Total customer deposits
50	Total operating income
51	Impairments on financial assets
52	Past due (>90 days) loans and debt instruments; total gross impaired loans and debt instruments
53	Risk-weighted assets

Credit Risk, Asset Quality and Impairment (12 to 21), Profitability (22 to 33), Balance Sheet structure (34 to 46) including periodical differences of basics (47 to 52) and risk-weighted assets (53). These areas are less extensive than the list of main risks and vulnerabilities under consideration, as shown by the Risk Dashboard risk factors, and mainly concentrated on asset quality, impairments and allowances, as reported by Table 4.2 showing the comparative list.

The KRI focus suggests that the prevailing – expected or solicited – set of adjustments to deleveraging is about the asset architecture by reducing the volume through asset sale and/or lending growth rate slowdown as well as de-risking as shown by Figure 4.2. As expected, the Return on Equity (ROE) is inversely correlated to deleveraging (DER), strongly analogous in the dynamic to the Risk-Weighted Asset (RWA) to Total Asset (TA) ratio (Figure 4.3).

The EBA database illustrates that capital positions have been significantly strengthened and that funding conditions have recovered

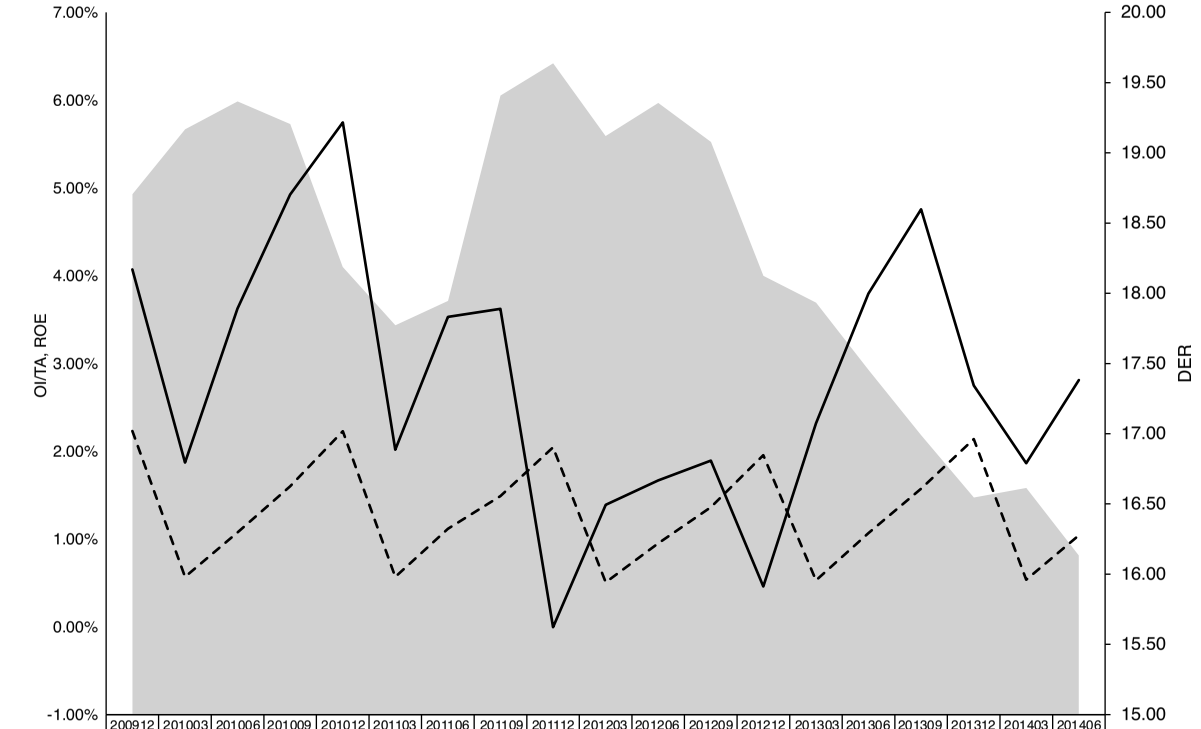
Table 4.2 KRI versus risk factors in the risk dashboard

KRI as in the Risk Dashboard Interactive Tool Q1 2014
• Capital Adequacy
• Credit Risk and Asset Quality
• Profitability
• Balance Sheet Structure
Risk Factors as in the Risk Dashboard Q1 2014
• Credit Risk (Asset Quality)
• Market Risk
• Operational Risk
• Concentration Risk and others
• Reputational and Legal Risk
• Profitability Risk (Margins, Asset Quality, Provision)
• Liquidity Risk
• Funding Risk
• Regulatory Risk
• Fragmentation Risk
• Sovereign Risk

(Chart 4). By looking at the dynamic of the Debt–Equity Ratio (DER), constituents it can be easily verified that the deleveraging is systematically and constantly improving, thanks to Equity (E).

A deeper insight into the loan/deposit ratio reveals that deleveraging is, in fact, due to a lending growth rate slowdown as shown by Chart 5, presenting a decreasing trend in the loan-to-deposit ratio. Therefore, deleveraging is a given, but the causes are not really unambiguous: capital ratios improved on the back of falling RWA, and the asset side has been severely affected by the clean-up of some major banks in preparation for the Asset Quality Review and stress test.

The analysis shows that credit risk is a major concern, but the question here is whether it is the sole element to concentrate on. The long-term sustainability of a provisioning policy within the balance sheet is a crucial point. If, as stated by EBA in the last Risk Assessment Report (EBA, 2014a) that 'the quality of some banks' loan portfolios continued to decline in 2013 and the first months of 2014 and remains a concern across the EU', then the stimulus towards asset-quality review by means of allowance and provision could no longer be pursuable, nor really efficient, by dramatically reducing profitability. At the same time, disregarding the effect of such a policy on other risk figures, such as interest-rate risk and liquidity risk, could be misleading. Moreover, de-risking and provisioning are only a part of a proper risk-management approach and, in a sense, they are not *proper risk management*.



	200912	201003	201006	201009	201012	201103	201106	201109	201112	201203	201206	201209	201212	201303	201306	201309	201312	201403	201406
DER	18.71	19.17	19.37	19.20	18.19	17.77	17.95	19.41	19.64	19.12	19.35	19.08	18.12	17.93	17.45	16.99	16.55	16.61	16.13
OI/TA	2.23%	0.57%	1.08%	1.60%	2.23%	0.57%	1.12%	1.49%	2.05%	0.51%	0.95%	1.36%	1.96%	0.53%	1.07%	1.57%	2.14%	0.54%	1.04%
RoE	4.07%	1.87%	3.62%	4.93%	5.75%	2.02%	3.53%	3.62%	0.00%	1.39%	1.67%	1.89%	0.46%	2.32%	3.80%	4.76%	2.75%	1.86%	2.81%

Figure 4.2 Profitability

Data Source: EBA KRIs.

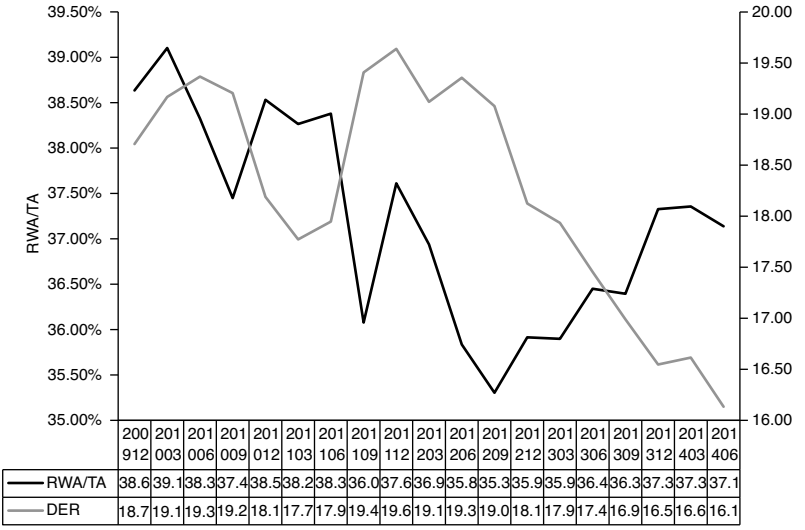


Figure 4.3 De-risking and deleveraging

Data Source: *EBA KRI*.

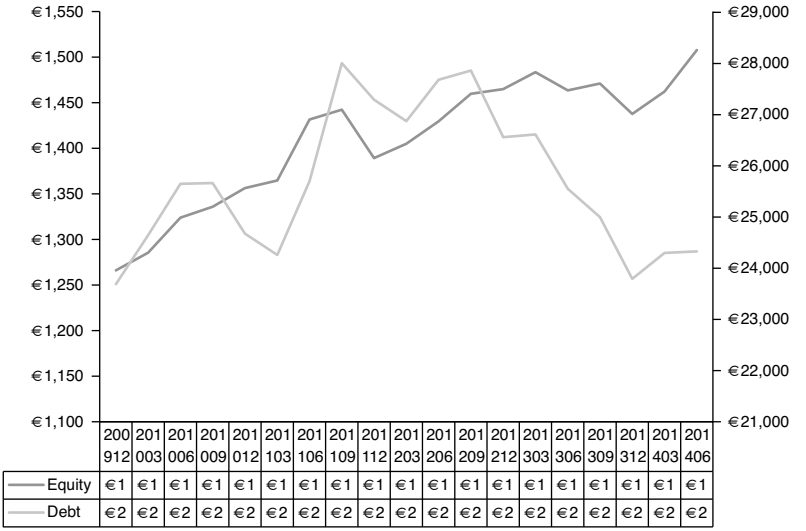
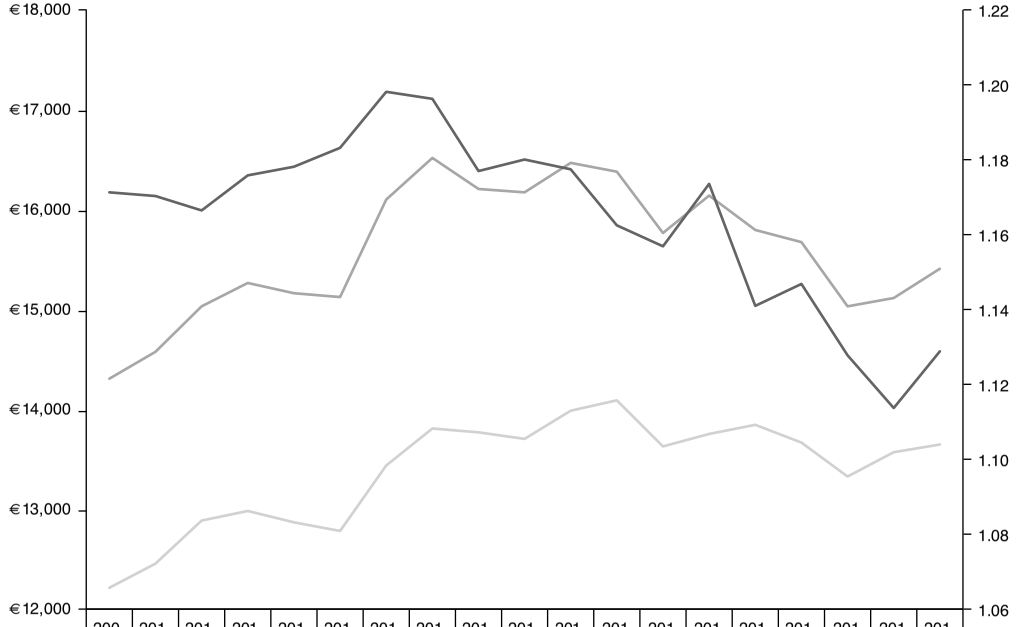


Figure 4.4 Debt and equity (millions)

Data Source: EBA KRI.



	200 912	201 003	201 006	201 009	201 012	201 103	201 106	201 109	201 112	201 203	201 206	201 209	201 212	201 303	201 306	201 309	201 312	201 403	201 406
Loan	€14	€14	€15	€15	€15	€15	€16	€16	€16	€16	€16	€16	€15	€16	€15	€15	€15	€15	€15
Deposit	€12	€12	€12	€12	€12	€12	€13	€13	€13	€13	€13	€14	€13	€13	€13	€13	€13	€13	€13
Loan-to-Deposit ratio	1.17	1.17	1.17	1.18	1.18	1.18	1.20	1.20	1.18	1.18	1.18	1.16	1.16	1.17	1.14	1.15	1.13	1.11	1.13

Figure 4.5 Loans and deposits (millions)

Data Source: *EBA KRI*.

4.4 The market appraisal

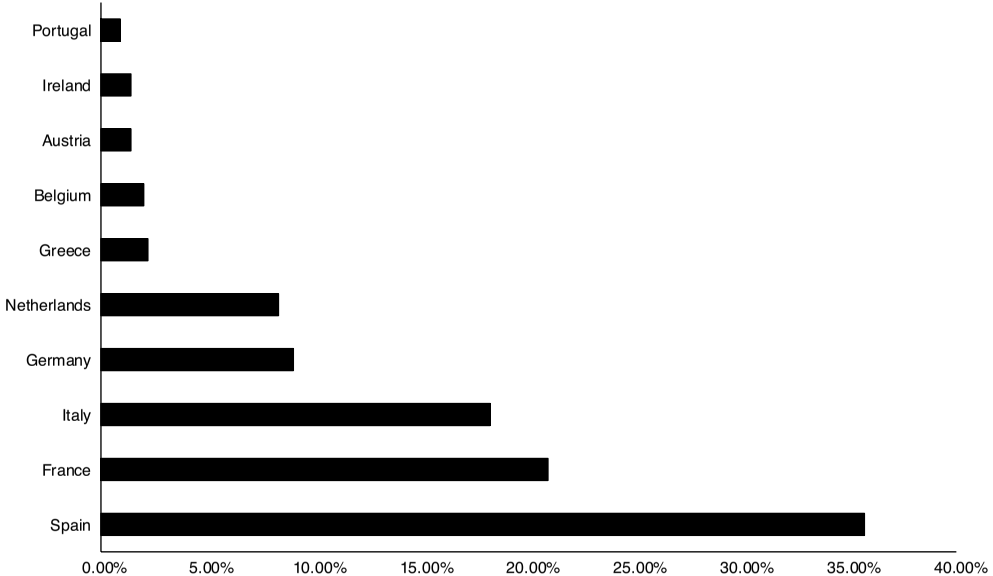
The second question of the analysis tries to evaluate the market perception of resilience strategies adopted by European banks. As far as the market awareness measure is concerned, the evidence can be found in the dynamic of some measure of bank-specific risk. To this end the tracking error volatility (TEV) of a bank's stock price was selected since it measures how closely a portfolio follows the index to which it is benchmarked. As is known, actively managed portfolio are expected to deviate from the benchmark in order to generate active returns. To test the market appraisal of de-risking and deleveraging strategies, we tested the relationship and the impact of relevant balance-sheet index on TEV. The analysis, performed on panel data, was enriched by a number of variables likely to influence the specific risk profile, with a focus on bank size, economic conditions and regulatory environment. The general relationship we tested is the following, where i denotes the bank and t identifies time:

$$\begin{aligned} \text{TEV(it)} = {} & \text{RWA(it)}, \text{DER(it)}, \text{lnTA(it)}, \Delta\text{GDP(it)}, \text{PF(it)}, \\ & \text{MC(it)}, \text{D2007}, \text{D2009} \end{aligned} \tag{4.1}$$

4.4.1 Dataset and variable selection

Being TEV defined as the standard deviation of the difference between the portfolio and index returns, it was calculated as the annualized standard deviation of the difference between individual banks and the EURO STOXX (ES) daily log-return – the so called tracking error (TE). Closing prices were extracted from the Datastream database. As is known, the ES Index is a broad, yet liquid, subset of the STOXX Europe 600 Index. With a variable number of components, the index represents large, mid- and small-capitalization companies of 12 eurozone countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain) covering about 95 per cent of the free-float market cap of the represented countries.

Banks in the sample are the constituents of EURO STOXX ® Banks (ESB). The ESB is a sector index in the eurozone covering the banking industry (Figure 4.6), whose components are categorized according to their primary source of revenue, using the market standard Industry Classification Benchmark.



	Spain	France	Italy	Germany	Netherlands	Greece	Belgium	Austria	Ireland	Portugal
CW	35.70%	20.90%	18.20%	9.00%	8.30%	2.20%	2.00%	1.40%	1.40%	0.90%

Figure 4.6 Country weighting of EuroStoxx banks

Data Source: Eurostoxx Factsheets.

The detailed list of the sample banks is reported in Table 4.3. The sample covers approximately half of the euro-area market according to the reported values of monetary financial institutions' total assets (Table 4.4). Individual bank data sourced from the BankScope database of Bureau van Dijk. The chosen time span is 2007–2013, starting with the crisis eruption. The actual sample comprises all the banks in the EuroStoxx Banks with only the exclusion of ING because of missing relevant data. The pooled dataset was finally made up by 182 observations, including 31 banks, covering 9 countries in the eurozone and spanning 7 years.

Table 4.3 Sample banks

Eurostoxx Components	**Country**
Alpha Bank	GR
Bank of Ireland	IE
Bankia	ES
Bankinter	ES
Bca Monte Dei Paschi Di Siena	IT
Bca Popolare Di Milano	IT
Bca Popolare Di Sondrio	IT
Bca Popolare Emilia Romagna	IT
Bco Bilbao Vizcaya Argentaria	ES
Bco Comercial Portugues	PT
Bco Popolare	IT
Bco Popular Espanol	ES
Bco Sabadell	ES
Bco Santander	ES
Bnp Paribas	FR
Caixabank	ES
Commerzbank	DE
Credit Agricole	FR
Deutsche Bank	DE
Erste Group Bank	AT
Eurobank Ergasias	GR
Grp Societe Generale	FR
Ing Grp	NL
Intesa Sanpaolo	IT
Kbc Grp	BE
Mediobanca	IT
National Bank Of Greece	GR
Natixis	FR
Piraeus Bank	GR
Raiffeisen Bank International	AT
Ubi Bca	IT
Unicredit	IT

Table 4.4 Market coverage of the sample

Year 2013 (December)	Banks Total Assets MM (Source: ECB)	Sample Total Assets MM (Source: BankScope)	Incidence SampleTA/ BanksTA
Austria	915,105.00	330,515.90	36.12%
Belgium	1,021,568.00	241,306.00	23.62%
Germany	7,528,947.00	2,161,061.00	28.70%
Spain	3,151,729.00	2,656,304.40	84.28%
France	7,881,631.00	5,082,405.00	64.48%
Greece	407,407.00	354,222.90	86.95%
Ireland	1,016,950.00	132,137.00	12.99%
Italy	4,048,131.00	2,138,234.40	52.82%
Netherlands	2,249,789.00	1,080,624.00	48.03%
Portugal	515,124.00	82,007.00	15.92%
Euro area	30,444,433.00	14,258,817.60	46.84%

Since deleveraging can take different forms, and resilience is mainly regarded as the result of the replacement of higher-weighted assets with safer ones, we concentrate on these two main occurrences, by means of the debt/equity ratio (DER) and the ratio of Risk-Weighted Assets to Total Assets (RWA). The higher the DER and the RWA, the riskier the bank, given a fair market appraisal of the resilience strategies.

It is necessary to consider that the specific risk can be also a function of the total asset value since, as a general rule, higher worth portfolios can be better diversified and therefore less risky. Therefore the natural logarithm of total asset (lnTA) measures how bank size influences riskiness level. Considering that big banks may have greater diversification and an efficiency gain from size advantages, the expected sign is positive.

Some measure of economic performance of individual banks is also required. As an internal control variable the ratio of the intermediation margin to the total assets was selected, given the wider informative content ascribed to the comprehensive margin. The expected sign on this variable is negative, since a higher margin on the core business of the bank gives a larger buffer for the (negative) impact of risk factors other than interest rates (on the banking book) and markets (on the trading book).

As a market-control variable, a proxy of the book-to-market ratio, calculated from Bankscope dataset, was incorporated into the model in order to take into account market mispricing. As is known, a ratio greater than one indicates an undervalued company, while a ratio less than one means a company is overvalued. Therefore, if a company is

overvalued the relationship with the specific risk dynamic should be positive. Considering the average value of the ratio is higher than one within the sample, we expect a positive sign.

Specific bank risk certainly depends even on the local economic environment, and the average annual growth rate per capita (ΔGDP) accounts both for cyclical conditions of the macroeconomic setting as well as for procyclicality of financial regulation. In this perspective favourable economic conditions can lead to more efficient banking institutions. Furthermore, a higher growth rate of the economy can give rise to a lower level of credit and counterparty risk, since it is easier for debtors to meet obligations. Thereby, the sign of the GDP variable should be negative. Data for GDP are from the World Economic Outlook Databases by the International Monetary Fund.

Finally, two more general effects are considered within the model. Firstly, in order to investigate the impact of the crisis and the specialty of the dynamic within the year 2007, a dummy set equal to zero for 2007 and one for all the other years has been set, to isolate the crisis explosion (D2007). Secondly, a dummy has been set that tries to identify the suasion effect of the strengthening of regulation. To this end, by a dummy taking the value of zero up to 2009 and 1 afterwards, we tried to analyse the impact of the growing attention towards credit risk, considering as watershed the issue in December 2009 of the consultative document by the Basle Committee on Banking Supervision, titled,

Table 4.5 Description of selected variables

Name	Description	Measure	Data Source	Expected Sign
TEV	Tracking Error Volatility (bank, year)	Percentage	Datastream	
RWA	Risk-Weighted Asset/Total Asset	Percentage	BankScope	plus
DER	Debt/Equity	Unscaled value	BankScope	plus
lnTA	Natural log Total Asset	Unscaled value	BankScope	minus
INTM	Intermediation Margin/Total Asset	Percentage	BankScope	minus
EQMC	Equity/Market Capitalization	Percentage	BankScope	plus/minus
ΔGDP	Annual Growth Rate	Percentage	IMF	minus
D2007	0 for 2007, 1 otherwise	Binary		plus
D2009	0 for 2007–09, 1 otherwise	Binary		minus

Table 4.6 Descriptive statistics of selected variables

stats	TEV	RWA	DER	lnTA	INTM	EQMC	ΔGDP
mean	0.5515385	0.5376374	16.99132	26.1411	0.0267582	1.745	–0.0032967
sd	0.2346853	0.1816725	8.201601	1.238321	0.0100241	1.043571	0.0249
min	0.25	0.14	8.14	23.66	0	0.31	–0.07
max	1.88	0.88	67.43	28.42	0.06	6.5	0.05
p25	0.4	0.42	11.74	25.09	0.02	1.01	–0.02
p75	0.65	0.7	20.09	27.18	0.03	2.24	0.02
N	182	182	182	182	182	182	182

'Strengthening the resilience of the banking sector' (BCBS, 2009). Table 5 provides the synopsis of variables and Table 6 the corresponding descriptive statistics.

As far as the methodology is concerned, since the panel adopted here is unbalanced, we used a regression model to take into account measurement error and unobservable variables. In particular, we use the random-effects model, since the Hausman test for the available data does not reject the use of the random-effects model against the use of the fixed-effects model. Standard errors are robust to heteroskedasticity. However, as a robustness check, estimates based on a fixed-effects model were also estimated, and results are available upon request.

4.4.2 Results

Table 4.7 provides a full depiction of the correlation matrix of relevant variables. We report in Table 4.8 the results of the Generalized Least Square Regression secluding the proxy of the book-to-market ratio, which did not make a real improvement in the model.

The results confirm that the market allocates higher specific risk to banks exhibiting a higher relevance of RWA and a higher DER, although the role of leverage (and therefore de-leveraging) is less than de-risking, which significantly contributes to risk shrinkage. The size of the intermediation portfolio, proxied by lnTA, was not significant in any specification of the model we tested. Therefore, we can infer that the market does not really appreciate the diversification gain due to size effects: The strong influence of the core business performance (NIMT) accounts for the appraisal of *traditional* earnings, while the negative sign suggests that the market does really appreciate the potential for an actual buffer against credit risk.

The relationship with the GDP is, as expected, negative and significant.

Table 4.7 Correlation matrix of selected variables

	tev	rwa	der	lnTA	INTM	eqmc	ΔGDP
TEV	1						
RWA	–0.0642	1					
DER	0.0839	–0.6874***	1				
lnTA	–0.0336	–0.8025***	0.5214***	1			
NIMT	–0.1862**	0.5764***	–0.5574***	–0.3057***	1		
EQMC	0.2788***	–0.1148	0.0843	0.0778	–0.2197***	1	
ΔGDP	–0.3618***	–0.1391*	0.1861**	0.1815**	–0.1006	–0.0692	1
**α = 5%	***α = 10%						

Table 4.8 Random-effects generalized least squares regressions panel data

Variable	Coefficient	Standard error
Dep. Variable TEV		
RWA	0.4148057	0.1842495
DER	0.0109193	0.0026106
lnTA	–0.0106719	0.0422421
NIMT	–6.232761	2.195752
ΔGDP	–1.236567	0.5648086
Dummy crisis	0.3146484	0.434376
Dummy regulation	–0.0785023	0.0284251
Constant	0.4087625	1.1506
R^2 within	52.90%	
R^2 between	6.82%	
R^2 overall	23.68%	

The two dummies are both significant. The dummy D2007, as stated, has the value of 1 for years subsequent to 2007; its positive sign takes into account the effect and the persistence of the crisis as elements contributing to the riskiness of the banking business. The dummy D2009, taking the value of 1 for years subsequent to 2009, could be interpreted as the effect of regulatory pressure and moral suasion activity within the euro area. The negative sign implies that the market favourably considers the business evolution after 2009, thus evaluating the sample banks as less risky. This increasing favour could be also the result of the focus on credit risk, both for regulatory and managerial purposes.

As a consequence it is possible to infer that, according to the present dataset, the resilience of the European banking system, pursued by means of de-risking and deleveraging, is positively appreciated by the market, recognizing lower specific risk to de-risking strategies more than

deleveraging ones. This appraisal is enhanced by the contribution of actual profits at the level of the intermediation margin, thus giving rise to an implied scepticism towards the quality of the investment portfolio, as confirmed by the statistical irrelevance of the size effect for the asset side of the balance sheet.

4.5 Conclusions

The main findings regard an effective and widespread focus on credit risk as a leading risk driver, both from an institutional perspective and market appraisal. A secondary result is the focus on a 'coverage' risk management by means of allowances and impairments. The evidence seems to be confirmed, even by the listed banks dataset, thus supporting the hypothesis that credit–risk focus is not only a question of banks exposed to proper asset-quality review, but is a sort of proactive target within the market.

The results give rise to a major consideration: the focus on credit risk could create a disregard of other fundamental risk drivers with reference to both managerial practices and recovery presides. The analysis of risk and vulnerabilities of banks should include other relevant risk indicators. The topic here addressed needs to be re-evaluated as long as the KRI database grows and, in progress, separate analysis for different countries or banks sizes could give rise to interesting results. The sustainability in the long run of a credit-risk control by allowances and impairments could be extremely difficult, especially when profits are not high. As a consequence, prospective risk management could be not really sustainable risk management. At the same time a new question arises: *is de-risking proper risk management*?

Note

1. The name of the country is disclosed if the reporting [insitutions] are more than three. The sample discloses France, Germany, Italy, Great Britain, Greece, Spain, Sweden.

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5
Financial Innovation in Banking

Francesca Arnaboldi and Bruno Rossignoli

> 'The only thing useful banks have invented in 20 years is the ATM' (P. Volcker, 2009)

5.1 Introduction

Innovation has been a core topic for scholars, because of its important contribution to economic growth and to the stability of financial systems (Levine, 1997; IMF, 2006; Lerner and Tufano, 2011). New financial products, such as the securitisation of assets, were believed to have tremendous potential for the diversification and efficient management of risk (Merton, 1992; Mendoza et al., 2009; Trichet, 2009). The financial crisis that started in 2007 changed those beliefs, as excessive risk-taking in some specialized innovating products brought down the financial system and produced the deepest and most prolonged economic crisis since the Great Depression. Recent studies now blame excessive growth of the financial economy as detrimental to the growth of the real economy (Levine, 2005; Rajan, 2005; Piazza, 2010; Shin, 2010; Johnson and Kwak, 2012). Innovation is a double-edged sword: the right kind of innovation and favourable conditions that may spur banks to invest in new technologies would help the financial system fulfil its functions and, as a consequence, deliver growth; but too much innovation or innovation that is not properly used, can have serious consequences for the overall economy (Stiglitz, 2010; Beck et al., 2012).

The features of innovation in the banking sector are quite different from the characteristics usually encountered in other sectors. First, and in contrast to innovation in the manufacturing sector, a unique definition of financial innovation can be hardly found. For Frame and White (2004), financial innovation is defined as product and organizational

innovation, which allows cost or risk reduction for the single bank and/or an improvement of the services for the financial system as a whole, but other definitions have been proposed as well. Second, banks are not the only developer of financial innovation. The banking sector is also an end user of innovations developed in other sectors. Sometimes, banks jointly develop innovation with non-financial firms, such as software houses or specialized technology firms. Very often, innovation happens thanks to interaction with clients, and so is spread over departments.

Because of these features, the measurement of financial innovation is quite a challenge. Our chapter is closely related to recent literature addressing the open question of how to measure financial innovation. Studies of manufacturing innovation traditionally focus on research and development (R&D) spending. However, R&D is unlikely to be a satisfactory measure in banking, since banks do not usually have an R&D department that launches new products and services. Most new services are developed in an incremental way, often through 'trial and error' and in all parts of the business.

A count based on the listings of new securities is not fully satisfactory either, since much of the innovation in financial services is not related to publicly traded securities, such as insurance and banking products (Lerner and Tufano, 2011). Furthermore, new securities are often minor variants of existing securities, issued by banks to differentiate themselves from competitors. Some studies on innovation in the banking industry attempt to catalogue one particular type of innovation, such as credit default swaps or securitization (Tufano, 2003). However these results cannot be easily generalized to other products. A recent suggestion is to consider patents by financial institutions (Arnaboldi and Claeys, 2014; Hall et al. 2009; Hunt, 2008), but Boldrin and Levine (2013) point out that academic studies have typically failed to find much of a connection between patents, innovation and productivity growth.

Lerner (2006) develops a measure of financial innovation based on news items in the *Wall Street Journal* related to new financial products, services, or institutions. However, some innovation might not be reported in newspapers because it has no direct appeal to the reader.

This chapter supplements existing research with an alternative measure for financial innovation based on a bank's annual reports. The annual report is the main official document a firm has to communicate to the general public, and it offers broad information on the bank's business. Following recent scandals, regulators and external auditors pay closer attention to the quality of information provided.[1] The accounting

authorities have changed accounting rules in an attempt to provide investors with a more accurate picture of the firm (Lehnert, 2014).

We analyzed more than 450 annual reports, from 2005 to 2008, produced in published 81 banks listed on the New York Stock Exchange (NYSE), on the London Stock Exchange (LSE), on Borsa Italian and on Euronext – in search of innovations. In 2014, the total market capitalization was €25.2 trillion, of which about 7 per cent came from the banking industry. The banks comprised in the dataset – the primary business of which is deposit-taking and loan-making – accounted for 85 per cent of total assets and 75 per cent of market capitalization of banks listed on the above-mentioned stock exchanges and with similar specialization.

We transformed qualitative information on various innovations – from the launch of a new product to the implementation of a new organizational structure – into a quantitative database that characterizes innovation in banking. Following Lerner (2006), we then browsed news in the financial press and on the banks' websites, to capture innovations that might not have been mentioned in the annual reports. We provided significant descriptive traits characterizing banks active in innovation.

This chapter documents the main features of innovating banks in a regression framework, focusing on four main groups of variables, which is bank size, market concentration, efficiency and risk, which have been proved as relevant to financial innovation by the existing literature. Higher market share in less-concentrated and less-traditional banking systems is positively related to innovation. The relationship between market share and innovation is stronger for banks incorporated in the United States. In addition, a lower quality of loan portfolio shows a significant positive relation with innovation. In particular, lower quality of loan portfolio is positively related to innovation for European banks, whereas the opposite holds for US banks. If, in normal times, riskier banks innovate more, when the crisis hits, less risky banks take the lead on innovation.

Two limitations should be acknowledged at the outset. The period covered in this study is relatively limited, but this protects the study from strong shifts in the demand for financial innovation and from the impact of the global financial crisis on all aspects of banks' business. In addition, from 2008 the supply for financial innovations dramatically dropped, since all major banks adopted a conservative approach to innovation, being highly concerned about solvency, liquidity, cost and capital adequacy. The second limitation relates to the methodology

employed. Since the measurement of financial innovation is still in the early stages, we prefer to pursue a relatively simple method to identify financial innovation and to analyze its features.

5.2 Literature review

5.2.1 Definition of financial innovation

In the literature, financial innovation has been variously defined.[2] According to the European Central Bank (ECB 2003), financial innovation is primarily a product and organizational innovation that allows cost- or risk-reduction for banks and/or a service improvement for the financial industry as a whole. Similar considerations can be found in Frame and White (2004) and in Tufano (2003), who define innovation by employing a few key concepts, such as the completion of incomplete markets, the overcoming of agency problems and information asymmetries, the reduction of transaction, research, or marketing costs, the response to taxation and regulation changes and the link to globalization, risks and technological shocks. Financial innovation comes from the combination of two or more of the above-mentioned factors.

From the point of view of the impact on the industry, innovation may be radical, revolutionary or incremental (Gardner, 2009). Radical innovation changed the whole industry, but it has occurred from time to time in banking. Revolutionary innovation tend to be less risky than breakthroughs, but also less profitable. Incremental innovation consists of a minor improvement of something already existing, has relatively lower risk and a positive payback. It is far more common than a radical and revolutionary one. Financial innovation can also be defined by investigating its origins, and it is usually considered as the bank's response to external economic forces (Llewellyn, 2009; Silber, 1983).

In addition, Pavitt (1984) points out that labour-intensive industry, such as the banking sector, shows the innovation process dominated by 'providers', thus granting a minor direct contribution to innovation. Most innovations are produced in other industries and then transferred into the banking sector, particularly as far as technology is concerned. This is the case, for example, of a new risk-management platform implemented by banks thanks to new processors provided by software houses. The bank's innovation depends on the technological innovation produced by the supplier. In fact, banks do not simply copy suppliers' innovation but add financial contents to them. A major driver in financial innovation is the development, broadly defined, of financial technology (Frame and White, 2012; Wall, 2014). Advances in technology

have been critical not only in retail banking (for example, automatic teller machines), but also to obtain, store and process data required to estimate statistical models (for example, valuation and risk management). Therefore, we include in our investigation technological innovation as reported by banks.

5.2.2 Financial innovation and the banking industry

Financial innovation has led to an expansion in the financial sector's ability to spread risk. The increase in the risk-bearing capacity of economies, as well as in actual risk-taking, has increased the range of financial transactions and has created greater access to finance for firms and households (Rajan, 2006). Whereas literature generally recognizes the benefits of financial innovation, recent studies take a more sceptical view of the positive effect of financial innovation on the banking industry (Rajan, 2005; Gennaioli et al., 2012). The main problem lies in risk, either neglected or with extremely severe consequences, which financial innovation adds to the banking business.

In response to demand, financial intermediaries create new products and services that are usually considered as good substitutes for the traditional ones. At some point, however, new securities are revealed to be vulnerable to risk previously neglected or underestimated by investors. Some recent examples of this narrative include the collapse of collateralized mortgage obligations market in the early 1990s, of the securitization of mortgages during the 2000s, and of the money market funds sector in 2008 (Gennaioli et al., 2012). Because the risks are neglected, financial innovation is excessive, but as risks are eventually recognized by investors, the market involving financial innovation becomes fragile and banks that originated these products are negatively affected.

In addition, financial innovation has altered managerial incentives, which in turn have changed the nature of risks undertaken by banks, with some potential for distortions (Rajan, 2006). Typically, new incentives lead managers to take risks that generate severe adverse consequences with small probability but, in return, offer generous compensation the rest of the time. These risks, known as tail risks, can have serious consequences on banks' profitability, safety and soundness and on the industry as a whole.

5.2.3 Adoption and diffusion of innovation

In contrast to the abundant literature on manufacturing innovation, few studies have empirically investigated financial innovation (Frame and White, 2004). Since the streams of innovations do not appear to be

uniform across all firms, industries or time periods, innovation literature has investigated the environmental conditions that may favour (or obstruct) innovation (Cohen and Levine, 1989; Cohen, 1995).

Among these conditions, the size of the firm seems related to the adoption and diffusion of innovation. Larger firms appear better suited to innovate, because innovation implies fixed costs that can be more efficiently recovered if the firm is large (Schumpeter, 1943). A larger-size firm implies that the sale of the innovative product or service is likely to be large, yielding a greater return on the initial investment in the innovation. More recently, literature finds that smaller firms could be better innovators, due to superior managerial control and less bureaucracy (Scherer and Ross, 1990; Lerner, 2006).

Size relative to the market is also important. A higher market share increases the incentive of banks to innovate (Bhattacharyya and Nanda, 2000). This literature identifies the following testable hypothesis.

Hypothesis 1: Banks' size is positively related to innovation.

In addition to (absolute or relative) giant size, Schumpeter (1950) suggests that monopoly is conducive to rapid innovation. Banks in more concentrated markets may have more funds to invest in innovative projects, thanks to rents deriving from a dominant position or because they can more easily access funds and lower the pressure for a positive outcome, which in the end might result in innovations. Furthermore, market power allows firms to generate enough returns from innovation because that power reduces the impact of the free rider problems associated with new ideas. Following this literature, we test the following hypothesis:

Hypothesis 2: Concentration of the banking industry is positively related to innovation.

Innovations are expensive to develop and diffuse. Banks retain many highly compensated and highly skilled employees to design new products and services (Lerner and Tufano, 2011). Internal human capital is a key for any innovation policy (Mohen and Roeller, 2005; Ingham and Thompson, 1993), but generous hiring policies may increase labour costs disproportionally. In addition, the distribution of new products requires considerable resources invested in marketing, sales and delivery channels. At industry level, a higher number of employees is usually related to traditional banking systems in which clients still prefer bank branches and physical interaction, or to banking systems that are less

cost-efficient because of generally higher personnel expenses (Berger et al., 1993). Following the above literature, we test the hypothesis below.

Hypothesis 3: Bank cost efficiency is negatively related to innovation.

A recent strand of literature argues that banks that are particularly active in innovation have been riskier than their less-innovative peers (Diamond and Rajan, 2009; Bebchuk and Spamann, 2010). Alderson and Fraser (1993) find that early issuers of auction-rate preferred stocks in the 1980s and early 1990s tended to be higher risk. Risk-averse investors were more active in the redemption of these stocks. Risk-averse firms are often reluctant to invest in innovating projects, even if these projects are value-enhancing (Xiao and Zhao, 2012). In addition, when macroeconomic conditions are more unstable, uncertainties and risks enhance innovation to alleviate those risks, as happened during the 2007–09 financial crisis. Greater instability is likely to be associated with a faster pace of innovation (Frame and White, 2004). Following these studies, we test the hypothesis below.

Hypothesis 4: Bank risk is positively related to innovation.

5.3 Data and methods

To select our sample we consider domestic banks listed on the New York Stock Exchange, the London Stock Exchange, Borsa Italiana, and Euronext, and which were active at the end of 2008 (107 banks). We believe this approach to be more robust in classifying innovation than including both domestic and foreign banks, because foreign banks' strategies are strongly influenced by their parent banks (Claessens et al., 2001). We cannot disentangle in-house innovation from innovation developed abroad and then transferred to the foreign bank.

Since we are interested in institutions that can be fairly referred to as deposit-taking and loan-making institutions, we exclude those banks that are not classified in Bankscope as commercial banks, cooperative banks, Islamic banks, bank holding and holding companies.[3] We also remove delisted banks, because not enough yearly data are available. Given our focus on bank characteristics related to financial innovation, concentrating on banks that were continuously operating is all the more important. If banks merged during the period of observation, we

aggregate their financial statements and treat them as a single composite bank for the entire period (Casu et al. 2013). Table 5.1, Panel A presents 2008 figures on the final sample of 81 banks classified accordingly to the stock exchange where they are listed.

Twenty per cent of the sample is formed by banks listed on Euronext, 37 per cent on the London Stock Exchange and Borsa Italiana (LSE), and 43 per cent on the New York Stock Exchange (NYSE). The average bank size is about 300 billion euro per total assets and 14 billion euro per market capitalization. Euronext banks are larger per total assets but account for lower market capitalization. Data are quite dispersed, since total assets span from 0.2 euro to more than 2,500 billion euro, and market capitalization from 0.59 euro to 120 billion euro. Average profitability, measured by return on equity, is negative (–6 per cent): Euronext banks in particular underperformed compared to their peers (–11 per cent). On average, the cost-to-income ratio is 80 per cent and banks listed on LSE are more efficient than their competitors. Investigating the business mix, it was found that 58 per cent of total assets were invested in loans, as banks in the sample were loan-making and deposit taking institutions. Table 5.1, Panel B shows the country and stock exchanges breakdown of the innovators and innovations, coded according to the guidelines described in the next section.

5.3.1 Coding guidelines

The data were coded according to the content-analysis methodology (Schwartz-Ziv and Weisbach, 2013; Krippendorff, 2004; Lieblich et al., 1998). The content analysis methodology is a 'systematic replicable technique for comprising many words of text into fewer content categories, based on explicit rules of coding' (Stemler, 2001). This methodology involves constructing a quantitative database by categorizing or coding different aspects of qualitative information. We did all coding manually because the coding guidelines that we define require a comprehensive understanding of the content of the annual reports. Three features have to be present simultaneously to identify financial innovation in a bank's annual reports: strong discontinuity with the past, actual improvement of service for clients, and profit enhancement. We exclude innovation promoted by changes in regulation or legal provisions, since usually these changes affect the banking system as a whole.[4] This choice skims the dataset from redundant observations.

The coding guidelines are as follows: (1) group organizational model: we include in this category innovative changes in the group structure, such as the acquisition of an asset-management company or a leasing

Table 5.1 Summary statistics for banks

Panel A

Stock Exchanges	Number of banks	Total assets (bn euro)				Average market capitalisation (mn euro)			
		Mean	*Min*	*Max*	*St. dev.*	*Mean*	*Min*	*Max*	*St. dev.*
Euronext	16	467.1	2.3	2,075.6	654.3	12,641.3	197.7	3,213.2	15,375.6
LSE	30	348.0	0.2	2,515.7	670.4	14,659.7	58.5	120,260.1	25,585.8
NYSE	35	179.9	1.5	1,478.8	406.7	14,205.9	81.6	97,068.9	27,217.8
Total	81	299.8	0.2	2,515.7	573.0	14,061.3	58.5	120,260.1	24,358.4
		Return on equity (%)				Cost to income ratio (%)			
		Mean	*Min*	*Max*	*St. dev.*	*Mean*	*Min*	*Max*	*St. dev.*
Euronext	16	–11.0	–134.9	13.3	37.1	84.2	52.6	185.4	32.7
LSE	30	–7.2	–111.8	15.9	29.2	70.9	30.5	214.3	31.2
NYSE	35	–2.4	–47.7	24.9	17.9	86.1	51.0	386.4	59.6
Total	81	–5.9	–134.9	24.9	26.7	80.1	30.5	386.4	46.0
		Net loans to total assets ratio (%)							
		Mean	*Min*	*Max*	*St. dev.*				
Euronext	16	52.0	2.7	82.5	26.8				
LSE	30	55.3	4.4	90.5	24.6				
NYSE	35	63.9	18.1	82.3	13.9				
Total	81	58.3	2.7	90.5	21.5				

Note: This table provides descriptive statistics for key bank-specific features at the end of 2008 (Panel A). Banks are grouped by the stock exchange they are listed on. Panel B shows the distribution of innovators and innovations by country and by stock exchange.

Panel B

Country	Innovators (%)	Innovations (%)
Belgium	4%	5.1%
Portugal	6%	11.0%
Netherlands	1%	1.9%
France	9%	13.3%
United Kingdom	10%	9.3%
Italy	27%	26.3%
United States	43%	33.1%
Stock Exchange	Innovators (%)	Innovations (%)
Euronext	20%	31.3%
LSE	37%	35.6%
NYSE	43%	33.1%

Source: Authors' own.

company – an acquisition by a banking group not yet operating in the asset management or leasing businesses. This group may start the new business through an already-existing subsidiary or division, or establishing a new, legally separated firm; (2) organizational structure: this category includes innovating organizational changes implying a new structure for the bank, but without any direct impact at group level; (3) operating systems: this category includes innovations in operating systems, processes, and internal controls, provided they are not tied to regulation changes; (4) information and communication technology (ICT): this category includes innovations with a primarily technological content, such as, for example, new voice-recognition software for telephone banking. While technological innovation can span the different categories, it is included in this category only if the technology is clearly identifiable and prevalent; (5) delivery channel: this category includes innovation in delivery channels, like the launch of electronic banking in a bank that previously had only physical branches; (6) product: this category includes all new products launched by banks, such as the introduction of a new mortgage.

We coded data on innovation from: the bank's consolidated and unconsolidated annual reports; bank's websites and financial press, namely *The Wall Street Journal*, *The Financial Times*, *Il Sole 24 Ore*, *The Economist*, and *Bloomberg Businessweek*. If a bank and its holding are both listed, we investigate all reports and control for double-counting of innovation. Innovation is thus a score variable ranging from zero to six per bank per year, depending upon the number of categories in which each bank innovates.[5]

We are aware that the score variable measures the range of innovation and not its intensity, but we believe it is a good proxy of innovating activity. Much of the literature on financial innovation considers a highly stylized world in which there are few types of securities and simple financial entities, such as banks or exchanges (Lerner and Tufano, 2011). In reality there is a vast range of different financial products and services and a variety of processes that financial institutions employ to do business. By focusing on banks that innovate in various areas of their business, we try to grasp the real-world complexity.

We are also aware that banks' innovation can be appropriated by competitors. Automatic teller machines, first launched by Barclays Bank in 1967, have been rapidly adopted by the whole industry. However, followers did not simply copy, but changed and improved, the machines. Since we study innovation at bank-level, appropriated innovation has to be adapted to the bank's existing procedures and customer base anyway, thus bank-specific innovative content changes the original idea.

5.3.2 Innovation features

Analysing data on innovation obtained through the above-described coding guidelines, banks cover 783 innovation categories or areas (INN) over the four-year period (Table 5.2). On average each bank innovates in 2.4 categories per year. In fact, innovation decreases from 225 in 2005 to 165 in 2008. This reduction is explained not only by the lower number of innovation categories per bank (2.8 in 2005 versus 2.0 in 2008, per bank on average), but also by the lower number of banks that innovate (86 per cent in 2005 versus 82 per cent in 2008 of banks in the sample).

Table 5.2 Innovation areas per year (all banks)

	Innovation areas (*INN*)							*INN* per bank per year (avg)
Year	Group organisational model (1)	Organisational structure (2)	Operating systems (3)	Information and communication technology (4)	Delivery channel (5)	Product (6)	Total	
2005	32	34	40	39	28	52	225	2.8
2006	34	35	29	43	23	50	214	2.6
2007	29	22	23	36	19	50	179	2.2
2008	28	26	19	25	19	48	165	2.0
Total	123	117	111	143	89	200	783	2.4
(%)	*16%*	*15%*	*14%*	*18%*	*11%*	*26%*		

Note: This table describes the coding guidelines for innovation areas (*INN)*, defined as a score variable which ranges from zero to six according to the number of categories, where bank *i* innovates in year *t*.

Source: Authors' own.

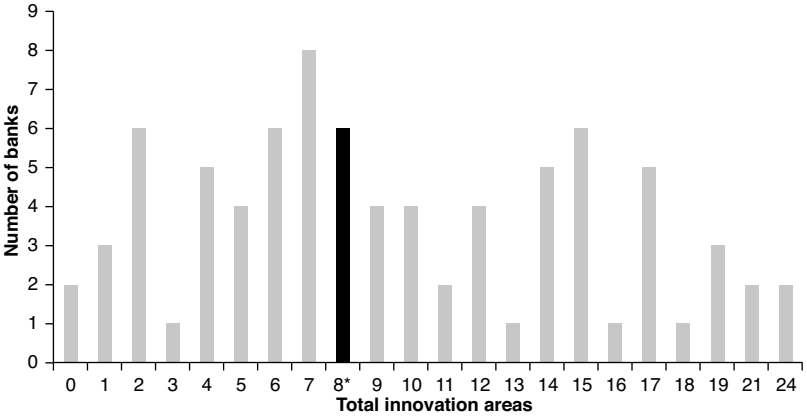

Figure 5.1 Distribution of number of banks to total innovation areas (all years)

Note: This figure shows the distribution of the number of banks to total number of areas where they innovate over the four-year period. Asterisk (*) indicates the median of the distribution.

Source: Authors' own.

Among all categories, product innovation prevails (26 per cent of total), followed by ICT innovation (18 per cent of total). Group organizational model, operating systems and organizational structure are all about 15 per cent, while innovation in delivery channel scores 11 per cent of total.

Figure 5.1 presents the distribution of banks to the number of categories they innovate over the four-year period.

We rank banks according to the total number of innovation categories they promoted from 2005 to 2008 and classify as innovating banks those credit institutions above the median (eight innovation categories) and as less-innovating banks those below the median. The first subsample is formed by 46 banks, while 35 institutions belong to the less-innovating group. Two banks promoted innovation in all 6 categories every year, totalling the maximum score, equal to 24, while 2 banks did not promote any innovation in the entire period.

5.3.3 Bank-specific and banking industry variables

This section presents the main variables of interest and conducts a preliminary descriptive analysis. Table 5.3 provides some univariate evidence of the differences between innovating banks and their less-innovating peers.

Table 5.3 Test for equality of means – main variables (innovating and less-innovating banks)

Variable	Description	Variable name	Obs	Mean (t) of banks below the median (less-innovating banks)	Obs	Mean (t) of banks above the median (innovating banks)	Test for equality of means (p-value)
Bank size and concentration							
Size	Logarithm total assets	size	137	16.17	179	18.22	0.0000***
Market capitalization	Market capitalization (yearly average)	emktcap	139	6,387.98	174	28,731.08	0.0000***
Relative size (%)	Bank total asset/country credit institutions total asset	rize	137	1.00	179	10.00	0.0000***
Concentration of the banking system	Herfindahl-Hirschman index	hhi	140	249.99	184	564.25	0.0000***
	Share of the five largest banks (%)	c5	140	25.72	184	39.68	0.0000***
Size of the banking system	Total assets of all credit institutions (standardized)	scta	140	0.31	184	–0.21	0.0000***
Banking system staff	Number of employees/number of banks	nenb	140	441.70	184	506.70	0.0266**
Efficiency							
Cost to income	Cost to income ratio (%)	Ci	136	62.85	173	73.69	0.0197**
Labour cost	Personnel expenses/total assets	cost2	136	0.02	173	0.01	0.0132**
Cost to total assets	Overheads/total assets	cost	131	0.20	172	0.09	0.0359**
Bank labour productivity	Customer deposits/number of employees (standardized)	sblp3	110	–0.19	133	0.14	0.0119**
scpc	Overheads/number of employees (standardized)	scpc	110	0.12	130	–0.14	0.0377**
scpc	Gross loans/number of employees (standardized)	sblp1	110	–0.14	133	0.17	0.0219**
scpc	Net intermediation income/number of employees (standardized)	sblp	114	0.14	135	–0.14	0.0254**
Risk							
Total asset growth	Annual growth rate of total assets	tag	136	0.09	172	0.18	0.0020***
Volatility of returns	Standard deviation ROE	roev	133	2.81	152	3.92	0.2245
Equity	Equity to total asset ratio	capital	137	0.13	175	0.07	0.0000***
Quality of loan portfolio	Reserves for impaired loans/gross loans	loq3	119	0.02	164	0.02	0.6008

Notes: This table presents results of the test for equality of means between innovating (above the median of the distribution of number of banks to total innovation areas) and less-innovating (below the median of the distribution of number of banks to total innovation areas) banks for the main variables of interest. */**/***indicate significance at 10, 5 and 1 per cent levels.

Source: Authors' own.

5.3.3.1 Size and concentration

A bank's absolute size is measured by total assets and by market capitalization. In our sample, innovating banks are significantly larger than less-innovating banks.[6] Innovating banks' relative size, measured by the ratio of bank-to-market size, is also larger (ten times).[7] The relative size of a bank is related to market structure. We employ the Herfindahl-Hirschman Index (HHI), which refers to the size of the bank in relation to the industry as the primary measure of market concentration in our specification. We use the market share of the five largest banks as a control, and both measures suggest that innovating banks work in highly concentrated markets.[8]

We complement this information by investigating the size of the banking system, which is often used as an indicator of potential development of economies (Dermine, 2006). We measure the total assets of all credit institutions to gross domestic product (GDP) finding that innovating banks are located in smaller banking systems, thus being the big fish in the smaller (and highly concentrated) pond. Such a preeminent position might be beneficial in terms of innovation. Then we compute the ratio of bank employees to the number of banks per year, per country. This additional measure indicates that innovating banks are located in overstaffed banking systems.

5.3.3.2 Efficiency

The cost-to-income ratio (CI), which shows the ability of the institution to generate gross profits from a given revenue stream, is considered one of the most important efficiency-based indicators for banks (ECB, 2010). The cost-to-income ratio is higher in innovating banks.

We further investigate cost-efficiency by focusing on the ratios of personnel costs and overheads to total assets and on bank labour productivity. The first two ratios are lower in innovating banks. As for bank labour productivity, core deposits are the primary funding source for most banks and, as a result, banks place great significance on them because favourable operating results depend, in part, on a core deposit base. Therefore, banks try to retain and prudently expand the deposit base (The Federal Reserve Board, 2013). As shown in Table 5.3, the customer deposits per worker ratio is higher in innovating banks, indicating a higher efficiency in managing the deposit base. In addition, cost per employee is lower in innovating banks. Banks use deposits in a variety of ways, primarily to fund loans and investments. Innovating banks' employees generate more gross loans per worker, but lower net intermediation income, which in part could be explained by a lower quality of loan portfolio.

5.3.3.3 Risk

Bank risk can be variously measured. As the ECB (2010) pointed out, asset growth should be funded by a commensurate amount of additional capital. Persistently high growth of assets can be an alarming signal because it can imply excessive risk-taking and a build-up of vulnerabilities, which would eventually jeopardize sustainable growth. In particular, microeconomic evidence from large international banks suggests that loan growth represents an important driver of risk (Altunbas et al., 2011; Foos et al., 2010; Laeven and Majnoni, 2003; Keeton, 1999). Indeed, innovating banks experience faster total asset growth. High volatility of returns can be a second signal of bank instability and risk. We then test the volatility of return on equity, but the difference between the two groups of banks is not significant. Both measures can be effected by reverse causality, since the relation between innovation and return is complex. We address this problem in the regression framework.

The crisis has highlighted the crucial importance of banks' capital and funding capacity (Demirguc-Kunt et al., 2010; Shleifer and Vishny, 2010; Beltratti and Stultz, 2012). The primary function of equity is to support the bank's operations and to act as a cushion to absorb unanticipated losses and declines in asset values that could otherwise cause a bank to fail (The Federal Reserve Board, 2013). A bank's solvency promotes public confidence in the bank and the banking system as a whole by providing continued assurance that the bank will honour its obligations and provide banking services. By exposing stockholders to a larger percentage of any potential loss, higher equity levels also reduce the subsidy provided to banks by deposit insurance and other elements of the safety net. Innovating banks equity-to-total-asset ratio is lower than their less-innovating peers, thus suggesting lower capital adequacy and higher risk.

Alternative approaches to measuring banks' risk may require a deeper analysis of the way in which banks run their business. We thus investigate the quality of the loan portfolio, measured as the ratio of loan loss reserves to gross loans, which indicates how much of total portfolio has been provided but not charged off. It is a reserve for losses expressed as percentage of gross loans. This ratio can be also seen as a sign of different (safer or riskier) reserve policies, thus results should be carefully interpreted. Given a similar charge-off policy, the higher the ratio the poorer the quality of the loan portfolio will be, but differences are not statistically significant between the two groups of banks.[9]

5.3.4 Control variables

We test, for equality of means, an additional set of control variables that is expected to better describe innovation. Results are reported in Table 5.4.[10]

5.3.4.1 Age

Older firms seem better placed to extend existing product lines than to create new ones. Nevertheless their advantage of experience stimulates innovation (Lerner, 2006; Prusa and Schmitz, 1994; Arrow, 1962). However, the literature typically suggests that younger firms are more likely to innovate, since they have a long-term horizon in which to recover from the initial investment, a lower chance of cannibalization of existing products or services, and fewer scope diseconomies (Aaron and Lazear, 1990). Indeed, innovating banks are younger than their less-innovating peers.

5.3.4.2 Profitability

The relation between innovation and profitability is complex. If investing in financial innovation is a rational response to a lagging competitive position, it is not surprising that less-profitable firms tend to be innovators (Silber, 1983; Lerner, 2006). However, considering the high initial investment, more profitable firms seem to be better placed at innovating. In fact, our preliminary analysis confirms that innovating banks are less profitable. We test the mean of various profitability measures, but only few of them significantly differ between the two groups. Return on assets (ROA) compares bank net income to its assets. According to this ratio, innovating banks underperform less-innovating banks.[11] We wish to capture a measure of relative profitability, which is not affected by capital-structure choices, thus we measure the net interest income-to-total-asset ratio. Following Lerner (2006) we also test the ratio of earnings before interest, debt, taxes, depreciation and amortization (EBITDA) to revenues. We measure revenues in terms of net interest income but the ratio does not show significant differences between the two groups.

The significant market measure of profitability is the price-to-earnings ratio (P/E). Less-innovating banks seem overpriced, but a higher ratio may also suggest lower bank risk.[12]

The financial crisis highlighted the relevance of risk when investigating banks' performance. Therefore, simple performance measures, such as return on equity (ROE), are limited because they are not

Table 5.4 Test for equality of means – control variables (innovating and less-innovating banks)

Variable	Description	Variable name	Obs	Mean (t) of banks below the median (less-innovating banks)	Obs	Mean (t) of banks above the median (innovating banks)	Test for equality of means (p-value)
Age of the bank	Logarithm (2008 – year of establishment of bank)	agebank	140	4.50	184	4.01	0.0001***
Profitability							
Return on assets	ROA (%)	roa	131	1.06	167	0.59	0.0135**
Profitability index	Net interest income/total assets	pindex	131	0.20	172	0.09	0.0359**
EBITDA to revenues ratio	EBITDA/net interest income	ebitda	107	4.58	129	0.07	0.2968
Price earnings	Price to earnings ratio	pe	113	19.65	127	13.62	0.0004***
Business mix							
Investment in loans	Gross loans/total assets	mix2	131	0.60	177	0.55	0.0227**
Country specific							
Education	Tertiary education participation rate (%)	edr	140	4.94	184	4.25	0.0000***
Employment	Total employment rate (%)	emr	140	45.23	184	44.29	0.0566*
Macroeconomic	GDP growth	ggdp	140	1.55	184	1.36	0.0000***
	Long term yield	yrate	140	4.48	184	4.39	0.1824

Notes: This table presents results of the test for equality of means between innovating (above the median of the distribution of number of banks to total innovation areas) and less-innovating (below the median of the distribution of number of banks to total innovation areas) banks for control variables. */**/*** indicate significance at 10, 5 and 1 per cent levels.

Source: Authors' own.

risk-sensitive. Return on equity failed to distinguish the best performing banks from the others in terms of sustainability of their results during the crisis (ECB, 2010). One possible refinement to our performance analysis would be to rely on risk-adjusted returns instead of plain returns. Indicators could be related to the total return of an investment, the most popular one being economic value added (EVA), or to the underlying level of risk associated with banks' activity, such as the risk-adjusted return on capital (RAROC). However, it is difficult to calculate these indicators without having access to banks' internal data, this being out of the scope of the present work.[13]

5.3.4.3 Business mix

The existing product mix influences bank's strategic innovation, in particular product innovation. Specialization has proved to enhance the probability of innovation in the financial sector (Boot and Thakor, 1997). The bank business model typically suggests that bank assets can be invested in lending and securities. If investment in lending prevails, usually banks follow the traditional deposit-taking and loan-making business model. We investigate what percentage of assets of the bank are invested in loans, computing the gross-loans-to-total-assets ratio. Less-innovating banks invest a higher percentage of assets (60 per cent) in loans than their innovating peers (55 per cent).[14]

5.3.4.4 Country-specific

Innovation can be spurred by a higher level of education and a higher participation rate of the workforce (Nickerson and Sullivan, 2003; Kroll and Stahlecker, 2009). Higher education makes clients more receptive to innovation while, at the same time, it boosts the education level of the labour force, thereby raising productivity. In fact, innovating banks are located in countries with a lower tertiary education-participation rate and lower employment rate. This is consistent with banks not usually having a research and development department and sometimes using innovations developed in other sectors.

We include a set of controls for macroeconomic conditions. The GDP growth and long-term yield are often used as indicators of potential development of the financial sector. We investigate the country of incorporation of banks using dummies, which aim at capturing country specificity, as in reporting. Since we coded data starting with information available on annual reports, their clarity and length may affect our analysis. Alternatively, we use a dummy of the main stock exchange on which the bank is listed, since transparency and

accountability of annual reports may be enhanced by specific market regulation.

For reasons unrelated to our set of explanatory variables, we use a trend variable to check whether innovation may be growing or shrinking over time. We also control for a financial crisis effect, which would reduce innovation, using a dummy.

Finally we control for geographical proximity. Firms located in regions with more financial innovations innovate more (Krugman, 1991; Lerner, 2006). Knowledge spillovers are likely to be concentrated geographically, in part because financial innovation can be easily copied.

5.4 Research design

We have previously investigated financial innovation on an anecdotal level (Table 5.2 and Figure 5.1). To better understand the features of innovating banks, we constructed a score dependent variable on innovation (*INN*) which ranges from zero to six according to the number of categories where bank *i* innovates in country *j*, in year *t*. We describe the features of innovation launched by bank *i* in market *j* at some point in time ($INN_{i,j,t}$) by a bank's size, efficiency, and risk variables and by banking systems' concentration and efficiency variables ($X_{i,j,t}$), presented in section 5.3.1 and summarized in Table 5.3. The idea is to see whether, in the aggregate, innovation is related to some specific characteristics of the bank or of the industry. Equation (5.1) below recognizes that reverse causality can be a problem, thus we allow some banks' variables to affect *INN* with an annual lag ($X_{i,t-1}$).[15] However, some results may be still affected by endogeneity.

We control for a set of variables ($Y_{i,j,t}$), presented in section 5.3.4 and summarized in Table 5.4. We do not include all variables presented in tables 5.3 and 5.4 at the same time, indeed some variables can be seen as alternatives. We thus test various combinations of variables to check the robustness of our results.

Table 5.5 reports correlations among bank-specific variables of interest. Our variable correlations are within the conventional limits and, as a consequence, we continue to include them in our full model.

We estimate estimate the following model:

$$INN_{i,j,t} = \alpha_i + \beta_i X_{i,j,t} + \square_i X_{i,t-1} + \sigma_j Y_{i,j,t} + \varepsilon_{i,t} \quad (5.1)$$

We estimate (5.1) by random effects, since we have reason to believe that differences across banks have some influence on the degree of

Table 5.5 Correlation matrix

		1	2	3	4	5	6	7	8
1	Age	1							
2	Relative size	–0.138**	1						
3	EBITDA to revenues	0.154*	0.021	1					
4	Cost income	–0.216***	–0.051	–0.050	1				
5	Reserves for impaired to gross loans	–0.104	–0.038	–0.006	0.158**	1			
6	Equity to total asset	–0.144**	–0.274***	0.057	0.127*	0.396***	1		
7	Total asset growth	–0.021	0.144**	–0.010	–0.030	0.000	–0.035	1	
8	Volatility of ROE	–0.141**	0.068	–0.073	0.252***	0.225***	0.028	–0.003	1

Notes: This table reports correlation coefficients and their significance between selected variables of interest; */**/***indicate $p < 0.05$, $p < 0.01$ and $p < 0.001$ respectively. Variables are as those described in Table 5.3.

Source: Authors' own.

innovation. Using random effects we may include time-constant controls among the explanatory variables or slow-changing variables over time. We compute the Breusch-Pagan Lagrange multiplier, which helps to decide between a random effects regression and a simple OLS regression, and we reject the null, finding that random effects regression is appropriate.[16] This specification requires that a bank's characteristics, which may or may not influence the independent variables, are clearly identified. The problem with this is that some variables may not be available, which leads to omitted variables bias in the specification. We compute the Ramsey test for omitted variables, and the results indicate that our specifications pass the test (Wooldridge, 2009).

Considering Equation (1), in which innovation is the dependent variable and bank characteristics are the independent variables, we could face an additional problem. Banks with low profits would spend relatively little on innovations, and the variations across such banks would be small. For more profitable or larger banks the amount of discretionary investment would be higher. The average amount spent on innovation would be higher, and there would also be greater variability among such banks, resulting in heteroskedasticity (HS). We use both Breusch-Pagan and White's tests for HS and since we fail to reject the null hypothesis of homoskedasticity at any reasonable level of significance, HS does not appear to be a problem.

We finally compute variance inflation factors (VIFs) of our regression coefficients. They are all below conventional thresholds, which would indicate a problem with multicollinearity (Neter et al., 1989).

5.4.1 Results

The results from estimating Equation (1) are presented in Table 5.6. Column 1 reports the findings of the baseline model, which investigates the bank-specific variables, whereas in column 2 banking-system variables are included. Columns 3 and 4 present country- and trend-control variables respectively.

Table 5.6 Bank-specific, banking system and country-specific determinants of innovation

	(1)	(2)	(3)	(4)
Independent variables	**Baseline model**	**with banking system**	**with country-specific**	**with trend**
Constant	0.61	2.96**	1.68	2.89***
	[1.044]	*[1.249]*	*[1.182]*	*[0.574]*
Age	0.22	–0.08		
	[0.182]	*[0.198]*		
Relative size	4.97***	9.26***	8.95***	9.11***
	[1.808]	*[2.419]*	*[2.459]*	*[2.509]*
Cost income	–0.00	–0.00	–0.00	–0.00
	[0.004]	*[0.004]*	*[0.002]*	*[0.002]*
EBITDA to revenues	0.00	–0.00	–0.00	–0.00
	[0.013]	*[0.012]*	*[0.005]*	*[0.005]*
Total asset growth	0.72*	0.68	0.79*	0.57
	[0.423]	*[0.428]*	*[0.467]*	*[0.395]*
Total asset growth (lag)	0.89*	0.83*	0.69	0.45
	[0.474]	*[0.487]*	*[0.534]*	*[0.553]*
Volatility of ROE	–0.04*	–0.04*	–0.03**	–0.03**
	[0.022]	*[0.022]*	*[0.017]*	*[0.015]*
Volatility of ROE (lag)	0.01	0.01	0.02	0.02
	[0.056]	*[0.055]*	*[0.048]*	*[0.049]*
Equity to total assets	–4.14	–5.38	–5.61*	–5.29
	[4.038]	*[3.875]*	*[3.246]*	*[3.250]*
Reserves for impaired to gross loans	–4.95	–2.99	–3.49	–2.69
	[8.771]	*[8.426]*	*[5.550]*	*[5.460]*
Reserves for impaired to gross loans (lag)	39.04**	44.77***	49.52**	45.47**
	[17.884]	*[17.056]*	*[20.190]*	*[19.692]*
HHI		–0.00**	–0.00*	–0.00*
		[0.001]	*[0.001]*	*[0.001]*
Number of employees to number of banks ratio		–0.00**	–0.00***	–0.00**
		[0.001]	*[0.001]*	*[0.000]*

(*Continued*)

Table 5.6 Continued

	(1)	(2)	(3)	(4)
Independent variables	**Baseline model**	**with banking system**	**with country-specific**	**with trend**
GDP growth			0.08	
			[0.075]	
Long term yield			0.14	
			[0.268]	
Time trend				–0.19**
				[0.082]
Observations (*bank*)	169 *(54)*	169 *(54)*	169 *(54)*	169 *(54)*
R-squared between	0.48	0.58	0.59	0.58
Ramsey's test (Prob>F)	0.2624	0.3252	0.1173	0.1082
Theta (median)	0.55	0.49	0.48	0.50
Rho	0.50	0.42	0.41	0.43
White's test (Prob>chi2)	0.1922	0.3127	0.7381	0.8914
Mean VIF	1.93	2.26	2.15	2.14

Note: This table gives results from a panel random effects model of *INN* (defined as a score variable that ranges from zero to six according to the number of categories in which bank *i* innovates in year *t*) on a baseline vector of bank characteristics: (column 1), banking system variables (column 2), country-specific variables (column 3), and a model including a time trend (column 4). Panel model standard errors are reported between brackets. Asterisks indicate significance at 1 per cent (***), 5 per cent (**) and 10 per cent (*) levels. Columns 3 and 4 present heteroskedasticity robust standard errors.

Source: Authors' own.

5.4.1.1 Size and concentration

The main variable of interest is bank size relative to the market. Consistent with Hypothesis 1, we find that bank market share is significant with a positive sign. Holding other variables fixed, if a bank increases its market share by 1 per cent, innovation increases by 5 per cent. Our result shows that a larger market share allows the innovating commercial bank to extract greater margins from a given innovation and, as a consequence, gives it greater incentives to engage in innovating activity. This is consistent with previous evidence on investment banks.

In section 5.3.4 we pointed out that geographical effect encouraging innovation may exist. Financial innovation can be easily copied by competitors, and peer pressure pushes innovating banks to innovate more to keep their leading position. Thus it is not unlikely that banks located in regions with more financial innovation innovate more. We try to capture the geographical effect interacting a dummy for a bank incorporated in the United States with selected independent variables (Table 5.7, column 1).[17]

Table 5.7 Geographical and financial crisis effects on innovation

	(1)		(2)	
Independent variables	**geographical effect**	***standard error***	**financial crisis effect**	***standard error***
Constant	3.43***	*[0.920]*	3.29**	*[1.287]*
Age			–0.09	*[0.203]*
Relative size	7.01***	*[2.493]*	9.65***	*[2.651]*
Cost income	–0.00	*[0.005]*	–0.00	*[0.004]*
EBITDA to revenues	–0.01	*[0.014]*	–0.00	*[0.012]*
Total asset growth	0.51	*[0.425]*	0.82*	*[0.429]*
Total asset growth (lag)	0.27	*[0.528]*	0.72	*[0.485]*
Volatility of ROE	–0.03	*[0.026]*	–0.02	*[0.024]*
Volatility of ROE (lag)	0.03	*[0.056]*	0.02	*[0.055]*
Equity to total assets	–6.51*	*[3.861]*	–8.75**	*[4.203]*
Reserves for impaired to gross loans	–0.39	*[8.467]*	–10.71	*[9.052]*
Reserves for impaired to gross loans (lag)	36.49*	*[19.657]*	54.09***	*[17.398]*
HHI	–0.00	*[0.001]*	–0.00**	*[0.001]*
Number of employees to number of banks ratio	–0.00**	*[0.001]*	–0.00**	*[0.001]*
Time trend	–0.17*	*[0.089]*		
Geographical effect (dummy US)	–0.05	*[0.613]*		
interaction with relative size	13.01**	*[5.482]*		
interaction with reserves for impaired to gross loans	–44.47*	*[23.390]*		
interaction with volatility of ROE	0.03	*[0.045]*		
Financial crisis effect (dummy year 2008)			–1.10**	*[0.513]*
interaction with relative size			–0.35	*[1.997]*
interaction with equity to total asset			9.03*	*[4.642]*
Observations *(bank)*	169 *(54)*		169 *(54)*	
R-squared between	0.61		0.59	

Notes: This table reports results from a panel random effects model of *INN* (defined as a score variable which ranges from 0 to 6 according to the number of categories where bank *i* innovates in year *t*) on a vector of bank characteristics, banking system variables and interaction effect between selected significant variables and a geographical dummy for banks incorporated in the United States (column 1); and a year dummy for 2008 (column 2). Panel model standard errors are reported between brackets. Asterisks indicate significance at 1 per cent (***), 5 per cent (**) and 10 per cent (*) levels.

Source: Authors' own.

The idea is that significant independent variables might have a different relationship with innovation if banks are incorporated in the United States rather than in the EU. We estimate the relation between bank market share and innovation, for both EU banks and US banks, holding other variables fixed. The difference (+13) is economically large and statistically significant. There is evidence that the impact of the market share on innovation is lower for banks incorporated in the EU than for those incorporated in the United States.

We also investigate the financial crisis effect interacting a year dummy for 2008 with market share (Table 5.7, column 2).[18] The coefficient of the year dummy is negatively significant but, in fact, innovation has followed a declining trend since 2005. All major banks were highly concerned about the turmoil that started in 2007, and they may have adopted an even more conservative approach to innovation in 2008. As for banks' market share, the difference between the two periods is economically large (–35 per cent) but not statistically significant at the usual levels.

When we add banking-system variables (Table 5.6, column 2), results hold, except the immediate relation of total asset growth with innovation. Concentration in the banking system, as measured by the HHI, is negatively related to innovation at a 5 per cent significance level, against Hypothesis 2.[19] The economic impact is, however, modest. As in the case of Belgium, when banking system concentration decreases by 10 per cent from 2007 to 2008, innovation increases by 0.014 per cent. A possible explanation has been offered by Scherer (1984). The competitive pressures, which are absent in the world of monopoly, could boost innovation. Lower concentration in the banking industry may enhance the likelihood to innovate, as banks, which compete harvest to retain customer base and get new clients, are pushed to launch new products, or to be more efficient through process innovation.

We then tested the average number of bank employees, computed using country-level data (Table 5.6, column 2). A higher number of employees is usually related to traditional banking systems in which clients still prefer bank branches and physical interaction. We find that the average number of bank employees is negatively related to innovation at 5 per cent significance. A 1 per cent increase in the average number of bank employees decreases innovation by 0.001 per cent. When banks have a higher market share and grow faster in less concentrated and less traditional banking systems, they enjoy a preeminent position, which is positively related to innovation.

5.4.1.2 Efficiency

Contrary to Hypothesis 3, bank cost efficiency is not related to innovation (Table 5.6, column 1). A possible explanation for not being able to detect any relationship is that we have data on total costs but not on costs specifically related to innovation, such as R&D expenses. Alternatively, we tested bank labour productivity using various specifications summarized in Table 5.3. None of the ratio appear to be significantly related to innovation, and goodness of fit of the model is lower than in the previous specifications.[20]

5.4.1.3 Risk

Among bank-risk variables, total-asset growth and the volatility of returns appear with one lag in our regression framework (Table 5.6, column 1). Both variables are significant at the 10 per cent level. As for the annual rate of growth of a bank's total assets, if it increases from 10 to 11 per cent (+10 per cent), innovation increases immediately by 7.2 per cent, then after one year, by 8.9 per cent. Innovation is positively linked to the percentage variation of total assets, since fast-growing banks increase their market share relative to competitors, thus enjoying greater benefits from a given innovation.

On the other hand, banks with higher volatility of actual (that is, accounting) profits are less innovative. The practical effect on innovation is modest, however, since a 1 per cent increase in the standard deviation of ROE immediately reduces innovation by 0.04 per cent, whereas the first lag variable has no significant impact on innovation. In an industry where funds are scarce, banks with a stable pattern of returns may devote more resources to innovation. Consistent with this interpretation, we find that risk-averse banks innovate more. Interacting returns volatility with geographical effect, no significant difference among banks incorporated in the European Union or in the United States is detected (Table 5.7, column 1).

Surprisingly, we do not find any relation of the equity-to-total-asset ratio with innovation (Table 5.6, column 1). A possible explanation may be that the level of equity cannot be easily reshuffled on a short-term horizon, thus being unrelated to the decision to innovate. Nevertheless, as a measure of bank risk, this ratio should be affected by the financial turmoil. We thus interact the financial crisis effect with the equity-to-total-asset ratio (Table 5.7, column 2). Indeed the pre-crisis impact of equity to total assets on innovation is –8.75, whereas in 2008 it is +0.28 (or about 30 per cent). The difference between the two periods is large

(+9) and statistically significant. Before the financial crisis, risk was positively related to innovation but, when crisis hit, the sign of the relation changes. Riskier banks were more deeply affected by the crisis and, as a consequence, were less focused on innovation.

We finally test the quality of the loan portfolio, measured by the reserves for impaired loans to gross loans (Table 5.6, column 1). The relation is significantly positive at the 5 per cent level, with a lag, and the magnitude of the coefficient gives an idea of the economic importance: if the ratio increases from 10 to 11 per cent (+10 per cent), innovation increases by 390 per cent after one year. If reserves for impaired loans increase more than gross loans, either the bank covers loan losses adequately if margins are satisfactory and can sustain the cost of innovating; or the bank has a lower quality of loan portfolio and decides to innovate to reduce impaired loans – for example launching new products or changing its organizational structure or technology.

When we interact the quality of the loan portfolio with geographical effect (Table 5.7, column 1), the relationship is significantly different between European and US banks. In particular, lower quality of the loan portfolio is positively related to innovation for European banks, whereas it is negatively related for US banks. Hypothesis 4 is thus related to mixed evidence.

5.4.2 Control variables

Control variables are expected to provide important insights into bank innovation. The age of the bank and its profitability are not related to innovation in any specification. As for efficiency variables, this result supports the view that without detailed information on cost or profits directly related to innovation – that is R&D expenses or profits from selling innovation – it is not possible to detect any significant relationship.

In Table 5.6, column 3 we include a set of controls for the economic cycle and the level of interest yield.[21] Results hold, and we additionally find that the equity-to-total-asset ratio is negatively related to innovation at a 10 per cent significance level. Holding all other variables fixed, if a bank increases equity ratio by 1 per cent, thus increasing the protection afforded to the bank by the equity invested in it, innovation falls by 5.6 per cent. Bank risk is thus positively related to innovation, and banks try to reduce risk through innovation.

In Table 5.6, column 4, we control for the phenomenon of finding a relationship between two or more trending variables simply because

each is growing over time (Wooldridge, 2009). Allowing for a time trend in Equation (1) explicitly recognizes that innovation may be growing or shrinking over time for reasons essentially unrelated to the explanatory variables.[22] The time trend is statistically significant at the 5 per cent level, and its coefficient implies an approximate 0.2 per cent decrease in innovation per year, on average. Innovation is trending downward over time. In an industry in which funds are scarce, banks feel the need to be more liquid, and reducing innovation is a possible response to this need. Consistent with this interpretation, the number of innovation categories dramatically dropped from 2005. In this specification, total asset growth is not statistically significant anymore. Previous results show a spurious relationship between innovation and total asset growth due to the fact that both are trending downward over time.

5.4.3 Additional tests

As reported in Table 5.6 we have a main sample of 54 banks and 169 observations. In Table 5.8 we repeat the same exercise on three different sub-samples to assess the robustness of our results.

Recalling Figure 5.1, which presents the distribution of banks to the number of categories they innovate over the four-year period, we rank banks according to the total number of innovation categories they promoted from 2005 to 2008, and we drop less-innovative banks according to various thresholds. First, in columns 1 to 4 we drop banks belonging to the 1st decile of innovation distribution, and we estimate Equation (5.1) on a reduced sample of 47 banks and 145 observations. Then we drop banks that have not innovated in any categories over the four-year period under scrutiny (columns 5 to 8), and, as a consequence, the sub-sample is formed by 46 banks and 141 observations. Finally, we exclude banks up to the 1st quartile of innovation distribution (columns 9 and 10) and report results on a sub-sample of 42 banks and 125 observations.[23]

Our results remain unchanged in the specifications with banking system and trend variables for all sub-samples (columns 2, 4, 6, 8, 9 and 10). In the baseline model (columns 1 and 5) total asset growth still has a positive effect on innovation but is significant only at the 11 per cent level. When we add the set of country-specific control variables (columns 3 and 7), both volatility of returns and the equity-to-total-asset ratio have negative signs but are no more significant at the usual levels.

Table 5.8 Robustness test

	Dropped banks up to 1st decile of innovation					Dropped banks with zero innovation over the 4-year period			Dropped banks up to 1st quartile of innovation	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Independent variables	**Baseline model**	**with banking system**	**with country-specific**	**with trend**	**Baseline model**	**with banking system**	**with country-specific**	**with trend**	**with banking system**	**with trend**
Constant	1.11	4.18***	1.21	3.43***	1.06	4.14***	1.32	3.51***	4.70***	4.11***
	[1.102]	*[1.260]*	*[1.336]*	*[0.628]*	*[1.104]*	*[1.259]*	*[1.339]*	*[0.641]*	*[1.238]*	*[0.734]*
Age	0.14	–0.23			0.15	–0.21			–0.19	
	[0.188]	*[0.193]*			*[0.188]*	*[0.193]*			*[0.185]*	
Relative size	4.59**	9.77***	8.88***	9.02***	4.59**	9.72***	8.90***	9.01***	9.01***	8.44***
	[1.903]	*[2.357]*	*[2.227]*	*[2.447]*	*[1.909]*	*[2.356]*	*[2.220]*	*[2.426]*	*[2.276]*	*[2.341]*
Cost income	–0.00	–0.00	–0.00	–0.00	–0.00	–0.00	–0.00	–0.00	–0.00	–0.00
	[0.004]	*[0.004]*	*[0.004]*	*[0.002]*	*[0.004]*	*[0.004]*	*[0.004]*	*[0.002]*	*[0.004]*	*[0.002]*
EBITDA to revenues	0.00	–0.01	–0.01	–0.00	0.00	–0.01	–0.01	–0.00	–0.01	–0.01
	[0.013]	*[0.012]*	*[0.011]*	*[0.005]*	*[0.013]*	*[0.012]*	*[0.011]*	*[0.005]*	*[0.011]*	*[0.006]*
Total asset growth	0.75	0.69	0.91*	0.58	0.76	0.70	0.90*	0.58	0.35	0.27
	[0.467]	*[0.467]*	*[0.485]*	*[0.434]*	*[0.471]*	*[0.472]*	*[0.489]*	*[0.443]*	*[0.477]*	*[0.391]*
Total asset growth (lag)	1.17**	1.13**	0.91	0.62	1.07**	1.04*	0.83	0.55	1.02*	0.66
	[0.537]	*[0.545]*	*[0.553]*	*[0.537]*	*[0.543]*	*[0.550]*	*[0.557]*	*[0.535]*	*[0.557]*	*[0.532]*
Volatility of ROE	–0.05*	–0.05**	–0.04	–0.04**	–0.05*	–0.05**	–0.04	–0.04**	–0.06**	–0.05***
	[0.026]	*[0.025]*	*[0.026]*	*[0.018]*	*[0.026]*	*[0.025]*	*[0.027]*	*[0.018]*	*[0.025]*	*[0.018]*
Volatility of ROE (lag)	0.01	0.00	0.02	0.02	–0.00	–0.00	0.02	0.01	–0.01	0.00
	[0.061]	*[0.059]*	*[0.059]*	*[0.058]*	*[0.062]*	*[0.059]*	*[0.059]*	*[0.058]*	*[0.058]*	*[0.058]*

Equity to total assets	−0.52	−3.49	−5.09	−4.42	−0.28	−3.42	−5.09	−4.45	−6.31	−7.31
	[5.240]	*[4.873]*	*[4.712]*	*[4.285]*	*[5.255]*	*[4.875]*	*[4.700]*	*[4.329]*	*[4.841]*	*[4.501]*
Reserves for impaired to gross loans	−7.38	−3.25	−2.91	−2.03	−7.22	−2.97	−2.66	−1.86	1.62	2.66
	[9.826]	*[9.171]*	*[8.936]*	*[6.282]*	*[9.844]*	*[9.174]*	*[8.922]*	*[6.339]*	*[9.070]*	*[5.979]*
Reserves for impaired to gross loans (lag)	36.17*	40.87**	48.27***	40.92**	35.58*	40.02**	47.32***	40.29**	30.62*	31.17*
	[19.459]	*[17.775]*	*[17.716]*	*[18.992]*	*[19.520]*	*[17.806]*	*[17.717]*	*[18.873]*	*[17.587]*	*[17.288]*
HHI		−0.00***	−0.00**	−0.00**		−0.00***	−0.00**	−0.00**	−0.00***	−0.00**
		[0.001]	*[0.001]*	*[0.001]*		*[0.001]*	*[0.001]*	*[0.001]*	*[0.001]*	*[0.001]*
Number of employees to number of banks ratio		−0.00***	−0.00***	−0.00***		−0.00***	−0.00***	−0.00***	-0.00***	−0.00***
		[0.001]	*[0.001]*	*[0.001]*		*[0.001]*	*[0.001]*	*[0.001]*	*[0.001]*	*[0.001]*
GDP growth			0.14*				0.14*			
			[0.075]				*[0.076]*			
Long term yield			0.30				0.30			
			[0.261]				*[0.262]*			
Time trend				−0.26***				−0.26***		-0.20**
				[0.074]				*[0.076]*		*[0.085]*
Observations *(bank)*	145 *(47)*	145 *(47)*	145 *(47)*	145 *(47)*	141 *(46)*	141 *(46)*	141 *(46)*	141 *(46)*	125 *(42)*	125 *(42)*
R-squared between	0.44	0.60	0.62	0.60	0.43	0.60	0.62	0.61	0.64	0.65

Notes: This table shows results from a panel random effects model of *INN* (defined as a score variable that ranges from 0 to 6 according to the number of categories where bank *i* innovates in year *t*) on a baseline vector of bank characteristics (columns 1 and 5), banking system variables (columns 2, 6 and 9), country-specific variables (columns 3 and 7), and a model including a time trend (columns 4, 8 and 10). Columns 1 to 4 give results on a sub-sample, where banks up to the first decile of innovation distribution have been dropped. Columns 5 to 8 show results on a sub-sample formed by banks that innovate at least in one category over the four-year period under scrutiny. Columns 9 and 10 show results on a sub-sample where banks up to the 1st quartile of innovation distribution have been dropped. Panel model standard errors are given between brackets. Asterisks indicate significance at 1 per cent (***), 5 per cent (**) and 10 per cent (*) levels. Columns 3, 4, 7, 8 and 10 present heteroskedasticity robust standard errors.

Source: Authors' own.

5.5 Conclusions

We propose an alternative measure for financial innovation, based on banks' annual reports. To identify financial innovation we focus on three features that have to be present simultaneously: strong discontinuity with the past; actual improvement of service for clients; and profit enhancement. This is the kind of innovation that should be encouraged by regulators, since it enhances the functions of the banking system and, as a consequence, leads to the growth of the real economy. We find that product innovation prevails both in Europe and in the lower quality of US loan portfolios, but innovation falls from 2005. Not only do banks innovate in fewer categories, but also fewer banks engage in innovation.

Using test of equality of means we show that innovating banks hold, on average, a larger market share, are younger and more cost-efficient but less profitable than less-innovative peers. Bank risk, as measured by various ratios, is higher for innovative banks that invest a lower percentage of their assets in traditional lending activity. These results are partly consistent with the previous literature on financial innovation.

We then describe innovation in a regression framework and find that banks enjoy a preeminent position, which is related to larger innovation, when they experience a higher market share in less concentrated and less traditional banking systems. A stable pattern of returns and a lower quality of loan portfolio are also positively related to innovation. The latter may result from a more adequate coverage of loan losses – which once again allows banks to innovate – or by the need to improve quality of portfolio through innovative products and processes.

The relationship between market share and innovation is stronger for banks incorporated in the United States. Similar evidence is found for the quality of the loan portfolio, which significantly differs between European and US banks. In particular, a lower quality of loan portfolio is positively linked to innovation in European banks, whereas the opposite is true in the United States. As a final remark: if in normal times risk is positively related to innovation, when the crisis hits, less risky banks take the lead on innovation.

Notes

1. The Sarbanes-Oxley Act, passed in 2002, enhanced financial disclosure by US public firms. Similar legislation has been enacted in various European countries, such as Legge 262/2005 in Italy or Loi sur la Sécurité Financière in France in 2003.
2. For a comprehensive review on financial innovation, see, among others, Frame and White (2004), and Lerner and Tufano (2011).

3. According to Bankscope classification, commercial banks are mainly active in a combination of retail banking (individuals, SMEs), wholesale banking (large corporates) and private banking (not belonging to groups of saving banks, co-operative banks). Cooperative banks have a cooperative ownership structure and are mainly active in retail banking (individuals, SMEs). An 'Islamic bank is an institution that mobilises financial resources and invests them in an attempt to achieve predetermined islamically acceptable social and financial objectives. Both mobilisation and investment of funds should be conducted in accordance with the principles of Islamic Shari'a'. Bank holdings and holding companies are typically holding companies of bank groups. We are aware of differences among these groups, but for the sake of readability, we refer to them as commercial banks in the remainder of the chapter.
4. For instance, the Single Euro Payments Area (SEPA) abolishes the distinction between national and cross-border payments within the Euro area (Directive 2007/64/EC). The new system has been generally adopted, becoming a standard (systemic innovation).
5. If all 81 banks in the sample would innovate in all categories, the total score would have been 486 innovation per year, 1944 innovation over the four-year period.
6. We gather balance sheet and market data for banks on Bureau Van Dijk's Bankscope and Thomson Reuters Datastream.
7. Data available on bank size on comparable standards do not distinguish between domestic and foreign assets. As a consequence, we are forced to ascribe to the country of incorporation assets which may be located in another country. However truly global players [number fewer than five in our sample. AQ: Correct? yes]
8. Both ratios are computed at country level, thus all banks incorporated in the same country show the same ratio per year.
9. We also test the net loans-to-total-asset ratio, which indicates the relevance of the loan portfolio as a percentage of a bank's total assets or, alternatively, the percentage of total assets tied up in loans, and the loan loss provisions on net interest margin, which is the relationship between provisions in the profit and loss account and the interest income over the same period. Ideally this ratio should be as low as possible and in a well-run bank if the lending book is higher risk this should be reflected by higher interest margins. None of these ratios seem to provide significant information.
10. Data are gathered from Eurostat, the European Central Bank Structural Indicators, the International Monetary Fund World Economic Outlook database, the Federal Deposit Insurance Corporation and the Bureau for Labour Statistics.
11. Traditionally, ROA is considered a more reliable profitability indicator than ROE, in terms of efficiency performance, since it is adjusted for the leverage effect. However, this ratio is quite flat across time (ECB, 2010).
12. Earnings per share (EPS), price to book value (PBV) and stock abnormal return also have been tested, but results – unreported – do not significantly differ among the two groups. To compute stock abnormal returns we use historical betas, computed using monthly returns on a five-year rolling window.
13. We use a proxy and compute the ratio of return on equity to its volatility for each bank over the sample period. The test for equality of means is not significant (unreported).

14. Bankscope data definitions identify the asset side of bank balance sheet into loans, other earning assets and non-earning assets. Loans include residential mortgage loans, other mortgage loans, other consumer/retail loans, corporate and commercial loans and other loans. Other earning assets include reverse repos and cash collateral, trading securities, derivatives, available for sale securities, held to maturity securities, at-equity investments, and other securities. Non-earning assets include cash and due from banks, fixed assets, goodwill and other intangibles. We also tested differences in securities investment (other earning assets to total assets ratio) but they are not significant between the two groups (unreported results).
15. Having lagged explanatory variables, however, reduces the number of observations to 169 and the number of banks under scrutiny to 54.
16. We report theta (θ) to check whether the random effects estimator is biased and rho (ρ) to control whether the random effects estimates are close to the pooled OLS estimates. As θ goes to one, the bias term goes to zero and, as a consequence, the random effects estimator tends to the fixed effects estimator. If theta is close to zero, a larger fraction of the unobserved effect is left in the error term and the random effect estimator is biased and identical with the pooled OLS estimator. We compute the Hausman test which fails to reject the null hypothesis, meaning that the random effects and fixed effects estimates are sufficiently close so that it does not matter which one is used (Wooldridge, 2009). Focusing on rho, if it is close to zero the random effects estimates are closed to the pooled OLS estimates.
17. We could not use a geographical dummy for each country under scrutiny because of the paucity of data.
18. We do not include time trend since it is correlated with the year dummy.
19. Results are confirmed using C5 rather than HHI (unreported).
20. Unreported results.
21. R-squared between is larger, omitting Agebank, which therefore has been dropped.
22. For instance, total asset growth may have a trend. If we regress total asset growth on trend, we obtain a coefficient on the trend equal to –0.003. Although the standard errors on the trend coefficient are not necessarily reliable, the coefficient estimate reveals a downward trend. The joint significance test between Agebank and trend is not significant and R-squared between is larger if Agebank is dropped.
23. We could not test the baseline model and the model with country-specific variables on this last sub-sample because of heteroskedasticity (the sub-sample is too small). The same issue applies to a sub-sample formed by banks above the median of the innovation distribution.

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6

Risk and Efficiency in European Banking – Does Corporate Governance Matter?

Magnus Willesson

6.1 Introduction

Recent regulatory developments and implementations, such as the GL44 (EBA, 2011) and Basel II/III accords, are steps toward the further development of strategies for more all-embracing and more-detailed regulation to reduce bank risk and to operate banks more properly. Before, and especially after, the financial crisis of 2007 and 2008, several regulatory initiatives were initiated to reduce risk within the banking industry. The Basel I accord emphasized capital regulation, whereas Basel II and III include capital regulation and matters of managerial responsibility in terms of organizational, supervisory and market disciplinary motives for risk governance. In this respect, the upcoming regulatory efforts devote even more detailed attention to internal control mechanisms. For instance, 'Trust in the reliability of the banking system is crucial for its proper functioning and a prerequisite if it is to contribute to the economy as a whole. Consequently, effective internal governance arrangements are fundamental if institutions, individually, and the banking system, are to operate well' (EBA, 2011, 3). By emphasising the 'corporate structure and organization' (to avoid possibilities to use non-supervised structures), the 'management body' (to emphasize an identified problem related to bank oversight), 'risk management frameworks', 'internal control', 'systems and continuity' (comprising guidelines on information and communication) and 'transparency' (including public disclosure), the GL44 aims for a more resilient banking system (EBA 2011, 4–6).

Any new regulatory effort is made with good intentions. Basel III (BCBS 2010a; BCBS2010b) and complementary regulatory frameworks for banks (including GL44), and including their corporate governance are definitely further steps towards more detailed regulatory frameworks. This follows a general trend to take on the challenges of overcoming drawbacks posed by corporate development by means of more all-embracing and more-detailed regulation, which is a trend also identified in industries outside banking. Such regulations cost money. Consequently, the GL44 includes a cost–benefit analysis of the initiatives. In summary, it concludes that improved risk management is a benefit at the expense of relatively minor costs (EBA 2011, 49ff).

The conclusions – based on the academic literature's viewpoint regarding the effects of regulation and corporate governance on bank risk and bank efficiency – are not as obvious, as is stressed by the motivation of the regulatory development. Particularly in regard to questions regarding resources versus regulation, where existing literatures evaluate issues of corporate governance, risk and efficiency in banking are neither consistent in terms of results nor entirely integrated.

First, the deviation of the results may be because the regulatory effect spans several fields of research that are not yet integrated or able to give answers to all the questions asked regarding the effect of corporate governance on risk and efficiency. More precisely, these aspects are analysed based on two completely different areas of research – the literature on corporate governance (incorporating the effect of the board of directors), which has increasingly started to emphasize the link between corporate governance structures and performance (cf., Wintoki, Linck and Netter, 2012), and the literature on banking efficiency as part of a tradition of industrial organization, which has recently focused more on the banking efficiency in relation to risk (Fiordelisi, Marques-Ibanez and Molyneux, 2011), regulation and policy (Zhao, Casu and Ferrari, 2010) and competition (Chortareas, Girardone and Ventouri, 2011). Less literature has focused on the effect of the board on risk management and its consequences for efficiency, particularly for banks, although there are several examples of studies on board structure and performance (Andres and Vallelado, 2008) and board structure and bank riskiness (Ferrero-Ferrero, Fernández-Izquierdo and Muñoz-Torres, 2012). Furthermore, as advanced by Berger and DeYoung (1997), reduced efficiency may be because of poor management, bad luck, the preference of short-term performance over long-term performance or moral hazard.

Secondly, deviation among results may be because the theoretical framework of regulation is based on agency theoretical perspectives,

whereas banking behaviour may include other motives. The trend in banking regulation from Basel II and on is based primarily on the agency theoretical perspective (capital requirement, supervision and market discipline are all argued to decrease asymmetric information between market participants). There are several reasons why these assumptions do not necessarily work. In many studies on corporate governance, agency theory is contrasted by, for instance, legitimacy theory and signalling theory. These theories emphasize managerial behaviour and motivation comply the regulatory framework intends to have effect reasons but because management is expected to do so, being used as a signalling instrument to signal the positive aspect of actions or serve as a hygienic factor to avoid a negative reputation (cf., Willesson, 2014). From a policy standpoint, it may be an illusion to use more of the same regulatory medicine based on agency theory when the regulatory effect is low on bank risk and bank behaviour. A more detailed regulation may have an effect on the agency theory dimensions, including reduced information asymmetries, yet lead to other problems related to risk and responsibilities. Consequently, policy implications regarding the relationship between corporate governance, risk and efficiency are not due only to finding empirical relationships between them. Additionally, the traditional conflict described by agency theory, the conflict between owners and management, is complemented by another conflict – the one between a company's owners and managers on one side and regulators and taxpayers on the other side, in an extension analysed under the influences of moral hazard.

This chapter focuses on banks' corporate governance and evaluates its effect on both risk and efficiency along with the relationship between risk and efficiency. The primary objective of banking regulation is to enhance the management of risk, and this chapter advances the study of whether risk and efficiency are affected by corporate governance in European banking. If the results indicate other outcome (and the considered corporate governance variables in this study are important to banks) the current regulatory effort is simply producing extra costs (even tough regulatory prescriptions argue that the cost is minor) and it does not reduce risk contrary to what is motivated by regulation.

The relevance of the chapter arises from growing attention to the regulation of corporate governance (in terms of both causal relationships and theoretical relevance) by investigating whether corporate governance influences the banks' efficiency and risk. Although the existing academic literature pays attention, more or less, to the causality of governance risk, and efficiency one by one, this study integrates the

frameworks to analyse the effect of corporate governance, risk and efficiency. Furthermore, a critical viewpoint of the agency theory dimension of the regulatory frameworks responds to whether the attention to governance regulation will actually improve risk management at minor cost or require other theoretical aspects of regulation. The study outcome is, however, limited by data availability.

The remainder of the chapter is organized as follows: section 6.2 discusses the banking-related literature of efficiency and risk and corporate governance related to risk and performance. Section 6.3 emphasizes the methodological framework and presents the data. Section 6.4 presents and discusses the empirical results. Finally, section 6.5 concludes our results.

6.2 Literature review

The literature including aspects of efficiency, risk, regulation and corporate governance in banking is divided into separated areas in terms of both association between variables and the focus. From a banking efficiency standpoint, one of the first studies to pay attention to risk in a study of banking efficiency was Mester (1996), who brought risk into the cost frontier to control for the risk preferences of managers. The efficiency results control for risk in two ways: estimating the probability of failure based on the level of financial capital relative to bank size, and on asset quality measured in terms of nonperforming loans relative to bank size. The motivations behind these adjustments consider capital and quality to avoid miscalculating a bank's level of inefficiency derived from the production of risky loans or derived from less resource spending to ensure that loans are of a high quality. Berger and DeYoung (1997) further develop theoretical motivations for studying risk (problem loans) and efficiency. Poor management is one explanation, but the underlying driver between efficiency and risk could also be explained by bad luck (external events) that require additional resources from the bank for managing problem loans, which results in lower efficiency, skimping (the preference for short-term performance over long-term performance) and moral hazard (which is not considered a link between risk and efficiency but can often explain the level of problem loans). In summarising Berger's and DeYoung's (1997) reasons for operating efficiency due to bad luck or bad management, the managerial effort is either on resources spent or on actions taken to solve operational problems. These apply to both day-to-day operations and loan portfolio management. Their study of US banks is replicated by Williams

(2004) on European banks. Williams extends the discussion of managerial differences to include principal agency theory (expense preference behaviour) aspects to find evidence for management behaviour for efficiency. Empirically, one difference is to control for size, which could relate to differences in management.

Among others, Kwan and Eisenbach (1997) reveal that there is a link between capital, risk and efficiency, which partly leads to paying additional attention to risk measures other than capital. One motive for their study is that moral hazard may explain contradicting risk results for capital positions. Moreover, there has been a recent extension of the literature, particularly after the financial crisis, that suggests that bank risk is not dependent only on its capital structure (Tan and Floros, 2013). Consequently, later studies (Altunbas et al., 2007; Fiordelisi, Marques-Ibanez and Molyneux, 2011; Ferrero-Ferrero, Fernández-Izquierdo and Muñoz-Torres, 2012) deviate between the riskiness of a bank and capital structure. Several examples of bank risk include standard deviation of return (Berger and Mester, 1997), loan loss provisions (Altunbas et al., 2000; Altunbas et al., 2007), the ratio of nonperforming loans to total bank loans (Fiordelisi, Marques-Ibanez and Molyneux, 2011), Z-score (Chortareas, Girardone and Ventouri, 2012) and expected default frequency (Fiordelisi, Marques-Ibanez and Molyneux, 2011).

Recent developments in the efficiency literature have controlled for a variety of governance structures, including bank type (where mutual banks tend to be more efficient; Girardone, Nankervis and Velentza, 2009) and prudential regulation as part of a regulatory structure that imposes riskiness on the banks (Färe, Grosskopf and Weber, 2004; Zhao, Casu and Ferrari, 2010; Deng, Casu and Ferrari, 2014). Because many of these studies suggest that deregulation has a negative effect on bank efficiency, a comparison to the regulatory reforms on corporate governance will also be assumed to have a negative effect on banks' efficiency. This may cause managerial responses to compensate for the reduced efficiency of the regulatory burden by taking on a riskier operation. However, as noted by Färe, Grosskopf and Weber (2004) it depends on the type of regulation and, as noted by Barth, Caprio and Levine (2004), the encouragement of private monitoring may improve bank performance.

One general explanation for differences among banks in regard to efficiency and risk could be poor management. However, few studies describe in detail what bad management really is and how it affects efficiency and risk. There is literature in the area of corporate governance

that emphasizes firm performance and explains the effect of management along with the influence of external factors. Consequently, the underlying driver of the relationship between problem loans goes beyond that of moral hazard, skimping and bad luck. A small number of studies address the relationship between corporate governance and banking performance (Andres and Vallelado, 2008; Leaven and Levine, 2009; Andres et al., 2012, Erkens, Hung and Matos, 2012) but – compared to the overall literature in corporate governance – the scope of these studies is limited. Recent empirical studies have suggested that the ownership structure appears to be neutral in terms of changes in productivity and efficiency. For instance, different ownership structures react with different speeds to the change in the regulatory environment (Zhao, Casu and Ferrari, 2010), and domestic private banks often perform better than government-owned banks (Girardone, Nankervis and Velentza, 2009), but there are differences that depend on the level of development in the country.

The vast majority of literature about corporate governance in banks has not considered all the knowledge from the more general corporate governance literature to explain efficiency or differences in efficiency among banks. Such studies include investor protection, stake holder interest, performance and risk. This is of course problematic when presenting the new regulatory reforms that assume good governance, low risk and minor costs. However, limited corporate governance variables are examined, suggesting that board structure and board independence (one general impression on board size is a U-shaped/convex and nonlinear relationship between board size and performance) can affect both bank performance (the performance variables are then not efficiency, but are income, ROAA or ROAE) and bank risk (Erkens, Hung and Matos, 2012; Pathan and Faff, 2013). The board independence variable is of particular interest with regard to the development of the regulatory framework because theoretical reasoning assumes that board independence has a positive influence on performance, but empirical findings suggest the opposite. Board independence decreases performance, which is explained by the fact that independent directors in banks are chosen more for regulatory compliance purposes, and that the market for high performing bank directors could be limited (Pathan and Faff 2013). Additionally, Andres and Vallelado (2008) consider the board activity (number of board meetings), which has a positive effect on performance (measured by Tobin's Q, ROAA and shareholders' market return) and is interpreted as boards' frequency of playing a proactive role in responding to improve value.

6.3 Methodological approach

The methodological approach of this study targets the empirical aim of the study to determine whether there is relevance in paying attention to banks' corporate governance relative to the their performance (measured by efficiency) and risk. Past experience is a necessity; we observe whether banks with a certain corporate governance structure are managed by lower or higher risk or lower or higher efficiency to find a non-regulatory relevance of the regulatory statements. At the same time, there is a natural link between the banks' management of risk and the banks' efficiency, which is the basis of the test model, extended with corporate governance variables and control variables:

$$\text{Efficiency} = f(\text{Governance, Risk, Control}) \tag{6.1}$$

$$\text{RISK} = f(\text{Governance, Efficiency, Control}) \tag{6.2}$$

In reality, and associated with endogeneity concerns, it is argued that a bank's performance may have an effect on the composition of corporate governance, which implies that a bank with better performance can recruit a 'better-performing management'. These concerns are not under further investigation in this chapter but were considered in the selection of the statistical model. The relationship between risk, efficiency and banking governance is endogenously related, as in most studies that incorporate corporate governance variables, which implies that using OLS-regression will result in an estimation bias (Bota-Avram, 2013). The IV approach (Bhagat and Bolton, 2013), or GMM dynamic panel data methodology (cf., Wintoki, Linck and Netter, 2012; Andres et al., 2012) are previously used examples of methodologies to address the endogeneity problems in banking and corporate governance. The use of a GMM dynamic panel data approach is delimited by the cross-sectional characteristics of the corporate governance data. Instead, we consider an IV related approach, three-stage least square regressions, using systems of equations in handling endogeneity. Three-stage least square regression considers not only the system of equations, but also the correlation structure between disturbances of the equation systems. By using it, we can consider the two equations, (6.1) and (6.2), simultaneously, with respect to the correlation of disturbances. Estimations that generate a positive R-squared imply that the three-stage model is more accurate than a linear model.

The estimations are based on data generated by two partly overlapping databases provided by Bureau van Dijk – the *BANKSCOPE* and *ORBIS* databases. In terms of banking, the *BANKSCOPE* database generates bank-specific accounting data (including interest rate margins and balance sheet ratios other than those related to debt and equity and assets) for a large number of banks, whereas *ORBIS* generates general (not bank-specific) accounting data and some data on the management of companies, which can be attributed to corporate governance. The *ORBIS* database includes a limited selection of banks. By merging the two databases, we can obtain a data set of a selection of banks with the possibility of studying both data specific to both bank and corporate governance characteristics.

The efficiency literature suggests that competition and regulatory reforms could have an effect on efficiency. For this reason, we delimit our study to banks under the same regulatory framework: European banks within the Basel framework, having IFRS as accounting standard. The regulatory frameworks have been introduced simultaneously and cannot be adjusted for.

Table 6.1 provides a numerical summary of the data of the sample. In summary, a total of 333 banks from 25 countries are included in the study.

One variable is used to measure efficiency; four different variables are used to measure risk; and six different variables are used to characterize corporate governance structures. The variables are defined and explained in Table 6.2.

The efficiency variable aims to estimate banking performance based on the production of banking services with respect to inputs. This relationship derives from a stochastic cost frontier intermediate approach (Translog) with three inputs (price of labour, price of physical assets and

Table 6.1 Summary of the sample of banks

	Number of banks	**Log of total assets**
Total number of banks*	333	15.50
...of which are commercial banks	*220*	15.78
...of which are non-commercial banks	*113*	14.94
...of which are listed	*168*	16.54
...of which are non-listed	*165*	14.42

**Banks from 25 countries are included in the sample: Austria (15), Belgium (4), Bulgaria (1), Croatia (2), Cyprus (3), Czech Republic (1), Denmark (29), Finland (5), France (47), Germany (29), Greece (6), Hungary (1), Ireland (2), Italy (97), Luxembourg (3), Malta (4), Netherlands (7), Poland (13), Portugal (6), Romania (2), Slovakia (2), Slovenia (1), Spain (16), Sweden (8), UK (29).*

Table 6.2 Variables under consideration for studying efficiency, risk and corporate governance (CG) in European banking

Variable	Definition	Interpreted as	Proxy for ...
Efficiency	Technical efficiency score generated by a stochastic frontier (Translog) cost function	A higher measure indicates a lower efficiency.	Bank performance
LogZ-score	Natural logarithm of (ROAA+E/TA)/σROAA. Three year rolling.	A higher measure indicates a lower probability of default.	Risk: Overall bank risk; risk of bankruptcy
StdROAA	Variability of return; σROAA	A higher standard deviation indicates a higher volatility of return, a higher risk.	Risk: Overall bank risk; absolute risk
Beta1	Standard deviation of stock/covariance to market, one-year estimate	A higher beta indicates a higher risk relative to the market.	Risk: Overall bank risk; systematic risk (listed companies)
Beta5	Standard deviation of stock/covariance to market, five year estimate	A higher beta gives higher risk relative to the market.	Risk: Overall bank risk; systematic risk (listed companies)
D/E	Debt divided by equity	Higher D/E indicates a higher capital risk.	Risk: Capital risk
Boardsize	The number of members of the board	Higher number indicates more members.	CG: Board structure
Independence	Ratio of the total number of board members owning shares in the company to the total number of board members.	A higher measure indicates a lower number of independent board members.	CG: Independence influence (increase or decrease) of performance
Boardage	The average age of the board of directors.	The experience of the bank boards.	CG: Life experience of the board
Boardexp	The average year the board members were appointed to the board.	Board experience at the bank. Higher measure implies a more experienced board.	CG: Bank experience of the board
Boardagespread	The standard deviation of the age of the board.	A larger measure implies a larger age spread among board members.	CG: Diversification in terms of the board's age
Genderspread	Measure of deviation from a 50%/50% gender diversification	A larger number implies a larger share of one gender versus the other (either male or female)	CG: Non-diversification, in terms of gender
Size	Log of total assets	A larger measure for larger banks	Control: Economies of scale and CG: differences in management requirements
Country	Country of bank's origin defined by the databases	Dummy variable for each of the 25 countries.	Control: Country's governance structure and competition
Inflation	Inflation	Rate of inflation	Control: Price of capital
Listing	Market listing	0 = non-listed 1 = listed	Control: Market listing
Commercialbanks	Non-commercial banks are banks categorized as savings banks, cooperative banks and micro-financing institutions in the *BANKSCOPE* database.	0 = commercial 1 = non-commercial banks	Control: Commercial bank or non-commercial bank focus

price of capital) and three outputs (net fees and commissions, loans and other earning assets). This approach is equivalent to the intermediate approach that is commonly used by banking studies and based on the work by Sealey and Lindley (1977).

A bank's riskiness is widely discussed in both regulatory contexts and academics. Four different types of risk are under consideration in Basel III – credit-, market-, operational- and liquidity risk – the first three of which have a direct effect on the banks' capitalization. The regulation of the management body from the GL44 could influence all these risks directly, by direct actions towards risk or, indirectly, to encourage less-risky (or perhaps higher-risk) operations. This implies that a bank's probability of failure is the most important target of regulatory incentives. The study is concentrated with four risk measures for overall risk (Z-score, standard deviation of return, beta and debt-to-equity ratio) partly related to previous efficiency studies, partly related to studies of risk management, and partly delimited by data availability. Efficiency studies include aspects of risk by two approaches: one that includes risk and other control variables in the frontier model, and one that considers risk as an explanatory independent variable for efficiency, an approach used on both stochastic and non-stochastic frontiers. The former is a way to control for managerial risk preferences (cf., Mester, 1996) because the efficiency scores of a bank can vary depending on the effort the management devotes to credit evaluation and the monitoring of loans. The latter (cf., Williams, 2004) is a way to determine risk and efficiency, determined for instance by credit risk (loans to assets) or asset quality (the ratio of loan loss provisions).

This study does not exclude references to risk for estimating risk determinants, but our data-set delimits our study of accounting-based measures and measures provided by the databases, which leads attention towards the banks' overall risk and credit risk. The possible theoretical motives for higher or lower risk-taking are not possible to observe by direct measures. However, one may interpret the results implicitly by moral hazard regarding the capital positions, and the bad management and expense-preference behaviour theories based on corporate governance variables related to a link between risk and efficiency. Furthermore, the size effect must give indications of differences in managerial challenges.

The capital-risk determinant is an unsolved question in the literature. Some previous studies suggest that more capital reduces riskiness, although some claim that risk is higher due to moral hazard. One empirical observation – when studying European banks during the financial

crisis – is that the riskiness not linear but u-shaped in regard to capital (Lindblom and Willesson, 2012; Haq and Heaney 2012). Consequently, we possibly need to consider higher risk than average for banks with either very high or very low capitalization. To control for this observation, the sample is divided into quartiles based on the banks' debt-to-equity ratio.

The three other risk measures aim to estimate the banks' overall risk, targeting regulatory incentives to avoid bank failure. Data limitations prevent us from considering previously used loan loss provisions (Altunbas, Liu and Molyneux, 2000; Altunbas et al., 2007) and the ratio of nonperforming loans to illustrate credit risk (Fiordelisi, Marques-Ibanez and Molyneux, 2011) and expected default frequency (Fiordelisi, Marques-Ibanez and Molyneux, 2011). These measures were not possible to estimate for a critical number of banks based on the two databases. The Z-score (Chortareas, Girardone and Ventouri, 2012) and standard deviation of return (Berger and Mester, 1997) are accounting-based risk measurements that aim to indicate the banks' overall risk in terms of both the default risk and the variability of returns. The standard deviation of return is included in the Z-score but is complemented by separate analysis and is an absolute risk measure. A market-based risk measure, the beta, complements the accounting-based measures and defines overall bank risk as a systematic risk relative to the market risk average. Both a short-term and a long-term estimation of beta are used. These betas are estimates published in the *BANKSCOPE* database but are naturally limited to listed banks.

The six corporate governance variables target board characteristics, including board size, board independence, board experience, and board age and gender as defined in Table 6.2. We control for a country variable to avoid general differences between countries (e.g., banking structure, competition), inflation and GDP to adjust for the drivers of bank performance that are irrelevantly affected by the corporate governance and three variables characterizing banks.

The data are unbalanced in terms of bank and risk categories, wherein the number of banks in the regressions varies. Table 6.3 presents the summary statistics of the efficiency, risk and governance variables. For the regressions, each risk variable as dependent variables is considered individually by altering the risk, efficiency, governance and control variables to eliminate the drawing of conclusions based on combinations between these categories. In terms of independent variables, collinearity issues prevent the testing of all variables simultaneously. Aside from corporate governance variables, the independent variables are lagged as

Table 6.3 Summary statistics of the efficiency, risk and corporate governance variables; values from 2013

Variable	*N*	*Mean*	*Standard deviation*	*Min*	*Max*
Efficiency	333	1.26	0.25	1.03	3.97
LogZ-Score	190	4.33	0.73	2.18	5.96
StdROAA	197	0.002	.003	0.0002	0.024
Beta1	150	0.88	1.40	–0.38	16.47
Beta5	147	0.36	3.19	–30.0	2.33
D/E	325	14.17	12.84	0.46	159.18
Boardsize	333	8.62	8.82	0	65
Independence	333	0.05	0.15	0	1
Boardage	231	59.40	6.87	38	87
Boardexp	187	3.80	2.73	0	12.2
Boardagespread	194	8.59	3.91	0.71	24.75
Genderspread	333	0.38	0.10	0	0.5
Size	333	15.50	2.37	10.55	21.39

independent variables. In the result tables, the years present as '12' or '13', referring to the years 2012 and 2013, respectively.

In the three-stage regressions, the corporate governance variables are included in both sequential equations. We also include country, inflation and GDP as exogenous variables, and the log of total assets is defined as an endogenous variable.

6.4 Results

The main findings are displayed by two regressions, which are indicative of all the regressions, where risk and corporate governance attributes are altered. In summary, we find that the governance variables are significantly associated with risk for the Independence, Boardsize and Genderspread. All the governance variables are significantly associated with efficiency, but vary depending on which risk variables are considered.

Table 6.4 presents the three-stage regression results, where the Z-score is a dependent risk variable and where we control for the efficiency and for the risk in terms of the D/E ratio. As observed, the risk estimation is vague, whereas efficiency is significant.

Independence is a negative indicator of risk. This implies that a lower independence measure indicates a higher risk measure. In other words, a higher level of independent board members indicates lower risk. The

Table 6.4 Three-stage least square regressions on governance variables to risk and efficiency, when Z-score is the risk measure

Equation	**Obs**	**Parms**	**RMSE**	**'R-sq'**	**chi2**	**P**
LogZ-score	99	6	0.6332427	0.1018	12.13	0.059275
Efficiency	99	5	0.1584854	0.0582	22.26	0.0005
	Coef.	Std. Err.	z	P > z	95% Conf. Interval	
LogZ-Score						
Efficiency_12	–0.9747596	0.360785	–2.70	0.007	–1.681885	–0.2676339
Size	–0.0069294	0.0400852	–0.17	0.863	–0.085495	0.0716361
Independence	–0.7638052	0.3730816	–2.05	0.041	–1.495032	–0.0325787
Genderspread	0.0675867	0.6409152	0.11	0.916	–1.188584	1.323757
Boardsize	–0.0009744	0.0076406	0.899	–0.13	–0.0159497	0.0140008
Boardexp	–0.0023381	0.0231278	–0.10	0.919	–0.0476677	0.0429915
_cons	5.584387	0.8879287	6.29	0.000	3.844079	7.324695
Efficiency						
Size	–0.0451952	0.0117548	–3.84	0.000	–0.0682341	–0.0221562
D/E_12	0.0080496	0.0019018	4.23	0.000	0.0043222	0.011777
Independence	0.1228947	0.0944127	1.30	0.193	–0.0621507	0.3079402
Genderspread	–0.283046	0.160159	–1.77	0.077	–0.5969518	0.0308598
Boardexp	–0.0118903	0.0058394	–2.04	0.042	–0.0233353	–0.0004454
_cons	2.014839	0.2034339	9.90	0.000	1.616116	2.413562

Note: Endogenous variables: logZ-score_13, Efficiency_13, Size Exogenous variables: Efficiency_12 Independence, Genderspread, Boardsize, Boardexp, D/E_12, Country, Commercialbanks, Listing, Inflation and GDP.

efficiency measure is negatively influenced by board experience in addition to the capital risk (D/E ratio).

One additional observation in Table 6.4 concerns the positive D/E-ratio associated with efficiency, implying that a higher capital risk indicate less efficient banks. These results are consistent with all the accounting based measures. The D/E-ratio is part of the banks' risk nature, which measure – as a dependent variable – is influenced by board experience (negative sign) and Genderdeviation (positive sign). Banks with more experienced boards have lower capital buffers and less diversified boards indicate lower capital buffers. The theoretical motive for analysing this measure is moral hazard. (These regressions are not shown).

In Table 6.5, we present the results where the one-year beta is the dependent-risk variable and the standard deviation of return is the independent-risk variable for efficiency. In terms of governance variables, only Boardsize is related to risk (a larger board reduces risk). Size is positively related to risk for this regression, which implies that there are differences in management requirements for large banks and for smaller banks, but it has no significant effect on efficiency. In other tests than

Table 6.5 Three-stage least square regressions on governance variables to risk and efficiency, when risk is the one-year beta

Equation	**Obs**	**Parms**	**RMSE**	**'R-sq'**	**chi2**	**p**
Beta1	69	6	0.4057684	0.3076	28.89	0.0001
Efficiency	69	7	0.1515006	0.1217	10.44	0.1651
	Coef.	Std. Err.	z	P>z	95% Conf.	Interval
Beta1						
Efficiency_12	–0.2850986	0.3252304	–0.88	0.381	–0.9225385	0.3523413
Size	0.1548959	0.035885	4.32	0.000	0.0845625	0.2252293
Independence	0.4925381	0.308028	1.60	0.110	-0.1111857	1.096262
Genderspread	–0.6260496	0.4996375	–1.25	0.210	–1.605321	0.3532219
Boardsize	–0.0219993	0.0080239	–2.74	0.006	–0.0377259	–0.0062726
Boardexp	0.0270494	0.0176983	1.53	0.126	–0.0076386	0.0617373
_cons	–1.178533	0.7725644	–1.53	0.127	–2.692732	0.3356654
Efficiency						
Size	–0.0171432	0.0174239	–0.98	0.325	–0.0512934	0.0170069
stdROAA_12	–9.558775	10.74058	–0.89	0.373	–30.60992	11.49237
D/E_12	0.0020172	0.0031926	0.63	0.527	–0.0042402	0.0082745
Independence	0.1285448	0.1157083	1.11	0.267	–0.0982394	0.355329
Genderspread	–0.3323359	0.1843826	–1.80	0.071	–0.6937192	0.0290474
Boardsize	–0.0040692	0.0030314	–1.34	0.179	–0.0100107	0.0018722
Boardexp	–0.0019543	0.0068923	–0.28	0.777	–0.0154629	0.0115542
_cons	1.686206	0.2644463	6.38	0.000	1.167901	2.204512

Note: Endogenous variables: Beta1, Efficiency_13, Size Exogenous variables: Efficiency_12, Independence, Genderspread, Boardsize, Boardexp, stdROAA_12, D/E_12, Country, Commercialbanks, Listing, Inflation and GDP.

the one presented, we observe that Genderspread and Independence may influence efficiency when using the one-year beta as a risk measure, but the results are not consistent.

Because we find corporate governance indicators related to risk when the beta is a dependent-risk variable (Table 6.5), automatically excluding non-listed companies, there is reason to believe that the listed companies are different from non-listed companies. However, when controlling for this expectation by separating the listed and non-listed banks in regressions that target the three accounting-based risk measures (results not shown) we observe only that the results are stronger for the listed companies than for non-listed companies.

To control our results based on capital risk and the observation from previous studies that it is not linear to risk, additional studies are conducted based on separating the debt-to-equity variable in quartiles. All the regressions are performed as they were for the entire sample, altering the risk and corporate governance variables, but dividing the banks into four categories depending on the D/E-ratio. In the presentation below,

quartile 1 is the lowest quartile (lowest capital risk) and quartile 4 is the highest quartile (highest capital risk). Analysing risk as a dependent variable does not deviate from previous findings when conducting this exercise, other than some minor observations. For instance that board independence reduces risk (negative to logZ-SCORE and positive to StdROAA) only for the higher-risk (quartile 3 and 4) quartiles. Board experience is positive to risk (logZ-SCORE) in the second quartile but is not significant for any result in other quartiles (Compare to Table 6.4). Board size is negative to risk (StdROAA) and Genderspread is negative to risk (Beta1) for the first quartile, but positive to risk (logZSCORE) for the fourth quartile. The inconsistency of all these observations makes them difficult to analyse any further. The finding of Independence is the most indicative result in terms of regulatory aims, as the effect relates to higher risk banks. The Genderspread results may be indicative for risk and board diversification, as diversification leads to lower risk, but these results are not significant for any other quartiles or risks (except for the capital risk mentioned above). We cannot exclude that these effects are due to other attributes not covered in the study, although we do observe that banks in different risk categories have different influences on risk. We observe some more consistent results related to efficiency when these are divided into quartiles based on the capital risk. The efficiency variable is influenced by the Genderspread variable for the two mid-quartiles with a negative sign. This implies that a lower measure generates a higher efficiency measure, which is interpreted as a less gender-diversified board being associated with higher efficiency when the D/E-ratio is in the two mid-quartiles. The two outer quartiles do not at all indicate any significant effect on efficiency based on gender diversification. However, as regulation aims to decrease default risk, the findings only in the mid-quartiles should be of no interest to the regulatory framework.

For the purpose of validating the model, we can conclude that the relationship between risk and efficiency is consistent with previous literature, and the results of corporate governance for risk and efficiency separately also follows previous studies regarding Independence, although the literature is inconsistent with respect to performance. The finding extends the prior literature by a risk component, indicating that a higher number of independent board members is associated with lower risk. We observe that board structure variables influence performance but do not influence risk with consistency. This implies that even if efficiency can depend on risk and corporate governance variables, this should not be taken as a legitimate assumption transferred to the

riskiness of banks and efficiency. Such a logic trap could lead to false conclusions, for which evidence of association are vague.

Based on our overall results, the regulatory statement that it does not cost much to regulate the management body is to some extent a relevant statement; the corporate governance variables have little effect on efficiency. However, the association to risk not clear, and efficiency is affected, which rather opens up for the opposite conclusion. Furthermore, the results cannot exclude that a change from the current optimal level can affect bank performance negatively.

We have not paid attention to the entire 'management body' in this study. Furthermore, even if we can observe results between the variables, we cannot actually know the actual effect when regulation changes the conditions for the banks. We cannot yet know whether the banks that change the characteristics of the management body will become more-efficient banks or less-risky banks. Their costs may increase due to adopting the regulatory framework and adjusting from a non-optimal level for that particular bank.

6.5 Conclusions

The primary objective of banking regulation is to enhance the management of risk, and the main objective of this chapter is to determine whether regulatory initiatives regarding corporate governance are relevant to risk. The purpose is to find the association in European banks between corporate governance-related variables, risk and efficiency. Using a three-stage regression, the effect of corporate governance variables on risk and efficiency are estimated simultaneously. In all, we find the results are consistent with previous studies in close areas, but we put more emphasis on integrating different research perspectives that traditionally pay attention to the risk, efficiency and banking governance separately. The main conclusion is that corporate governance attributes do not explain much of the bank riskiness but indicate variety in bank efficiency. The effect on risk is limited by the variables Independence, Boardsize and Genderspread, but the results are not clear and not entirely consistent.

More research is required to interpret the results, in terms of theory and regulatory frameworks, but we do observe a gap between the regulatory efforts and the existing research portfolio, which could lead to ineffective regulatory efforts. In the long run, this may be counterproductive because regulatory suggestions discourage private monitoring. However, the gap between research and regulation is influenced by data limitation and the inability to fit good measures.

Empirically, the results may be interpreted in terms of an association between risk and efficiency. We observe that corporate governance attributes have more of an effect on efficiency than risk. Because of the results and the prior literature in the area, one may observe an average efficiency loss due to corporate governance regulation. The diversification of the board in terms of gender may lead to both lower capital risk and lower efficiency. The results are not consistent, and regulatory attention to capital risk is not the same as bank risk. If not taking the capital risk into consideration in the first place, gender is not an indication of risk when analyzing the other risk measures. Yet, gender has negative effect on efficiency.

The vague indications of association between the risk, efficiency and corporate governance variables may be interpreted in different ways. Some of the observed associations between risk, efficiency and corporate governance variables support the statement that risk is reduced without having a strong effect on efficiency. On the other hand, the results may be interpreted as: corporate governance has a minor effect on risk, but an impact on efficiency. These findings make empirical conclusions, theoretical motivations and regulatory efforts more challenging. The results not only imply that a research strategy should include attention to risk and assume a relationship to efficiency or reverse relationship. They imply that agency theory contexts are not relevant on all occasions. Bank behaviour and risk can be explained by other theories or, if the regulation has implications for the bank, the conflict between the principal and the agent may not be between the board and management but between the regulatory initiatives and the management body.

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7
Towards a Macroprudential Policy in the EU

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7.1 Introduction

The financial crisis has led to the re-examination of policies for macroeconomic and financial stability and the development of a macroprudential policy (MAP) in a number of countries. This chapter depicts the state of the art of macroprudential policies with specific reference to the case of the European Union and the new supervisory architecture created by the introduction of the Single Supervisory Mechanism (SSM) in November 2014. The aim is to evaluate the current European supervisory architecture, focusing on the main challenges ahead, with specific reference to the development of MAP. The main research question regards the achievements and limits of the current supervisory architecture in the European Union (EU), concentrating in particular on the critical issues affecting the development of MAP.

We start by focusing on the institutional framework of MAP: relationships and/or conflicts with other policies (first and foremost monetary and microprudential), and the agencies involved and their mandate, accountability and governance issues. We then move on to analyze the operational framework of MAP: definition of objectives (intermediate and final) and the most suitable set of instruments.

The second part of the chapter deals with the introduction of MAP in the European Union and its initial operation, with the definition of intermediate and final targets and the toolkit of available instruments. As a consequence of the crisis, since 2011 the EU has been working towards greater integration of the supervisory function, as recommended by the de Larosière Report, with an institutional framework based on a microprudential pillar, with the establishment of the European System of Financial Supervisors (ESFS) and a macroprudential pillar, with the

setting-up of the European Systemic Risk Board (ESRB). The MAP architecture based on the ESRB and the National Macroprudential Authorities (NMA) is now undergoing review in response to the introduction of the Single Supervisory Mechanism (SSM) and the new role of the European Central Bank (ECB) as the supervisory authority with responsibility for the micro and macro supervision of credit institutions in the Euro area (so called 19+).

The final part of the chapter concludes with a critique of the current EU supervisory architecture (which is rather complex and cumbersome) and highlights the need for rationalization and simplification to enable it to function efficiently and without overlapping of competences, additional burdens for the institutions supervised and undesirable spillover effects. The key issues for the near future with regard to the specific theme of MAP are identified.

7.2 Macroprudential policy at a glance

Although macroprudential policy was already the subject of study before the crisis (Borio, 2003; Crocket 2000), since the collapse of Lehman Brothers it has been one of the main topics under discussion amongst academics and policymakers (Angelini et al., 2012; Borio, 2010, 2013; Galati and Moessner, 2011; Haldane, 2013; Lim et al., 2011).

One first point under consideration is the definition of MAP itself (Caruana and Cohen, 2014): to establish a common language among policymakers, it seems best to use the definition drawn up by the FSB, IMF and BIS (2011): '[A] policy that uses primarily prudential tools to limit systemic or system-wide financial risk, thereby limiting the incidence of disruptions in the provision of financial services that can have serious consequences for the real economy'.

The main issues under discussion relate to the definition of the institutional and operational frameworks of MAP (IMF, 2011). The institutional focus is on MAP's possible interactions and/or conflicts with the effects of other policies, the architecture of the competent authorities, and their mandates, governance and accountability; the operational focus concerns the definition of final and intermediate targets, the choice of the most suitable toolkit, the calibration of instruments, the establishment of information strategies, and the evaluation of MAP's effectiveness (Gualandri and Noera, 2014a).

The debate reveals differences of opinion in several key areas (Panetta, 2013). First of all there are difficulties in precisely defining systemic risk, the main target of MAP, since this risk has a number of dimensions with

no universally accepted measurement methods (Gualandri and Noera, 2014b): it may therefore be difficult to isolate the intermediate objectives and select the instruments best suited to targeting them. Moreover, macroprudential policy interacts significantly with other policies (monetary, fiscal, microprudential, competition and crisis management and resolution) (IMF, 2013a): findings in this area may be open to varying interpretations. Last but not least, the effectiveness of some of the instruments is only demonstrated by a limited number of cases in which they have actually been implemented in practice, mainly in developing countries (Lim et al., 2011). They have been only used in developed countries on a very few occasions – for example, dynamic provisioning measures have been in force in Spain since 2000 (Panetta, 2013). In 2011 a macroprudential pillar came into operation in the European Union, based on the European Systemic Risk Board, alongside a microprudential pillar, based on the European System of Financial Supervisors .

Below, we first describe the institutional framework of macroprudential policy before focusing on targets and instruments. First of all, we need to define the contents and perimeter of MAP within the broader context of economic policy, focusing on possible interactions, complementarities and conflicts with other policies, mainly microprudential and monetary.

7.2.1 Micro and macro prudential policies

The best way to define the action and perimeter of macroprudential policy is by examining its differences from and complementarities with microprudential policy (MIP), since they share a large number of tools (apart from the suffix "prudential" itself). MAP concentrates on the interactions between financial institutions, markets, infrastructures and the general economy, with a system-wide approach, in order to limit systemic risk; from this point of view it may be considered complementary to microprudential policy, which focuses on the stability of the individual financial institution, taking the financial system overall and the general economy as a given (CGFS, 2010). Borio (2003; 2010) compares the two perspectives, identifying the main differences:

- *proximate and ultimate objectives*: to limit financial-system-wide distress and thus prevent costs in terms of output (GDP) in the case of MAP; to limit the distress of individual financial institutions and ensure consumer (investors/depositors) protection in the case of MIP;
- *risk model for financial institutions*: endogenous in the case of MAP, exogenous in the case of MIP;

- *relevance of correlation and common exposure across institutions*: important for MAP, irrelevant for MIP;
- *calibration of prudential controls*: top-down in terms of system-wide distress (MAP); bottom-up, in terms of risk levels of individual institutions (MIP).

Possible interactions and/or conflicts between micro and macro policy are due to two main factors: they have several instruments in common, and they both rely on similar transmission mechanisms (IMF, 2013a, b, c; Viñals, 2013).

In response to the crisis, policymakers initially concentrated on redirecting typical microprudential instruments (capital and liquidity ratios, loan-to-value ratios, debt-to-income ratios, etc.) to limit systemic risk, the main macroprudential target. It is quite clear that conflicts may arise from the use of the same instruments for different targets.

In bad times, possible conflicts are more likely and mainly arise from the fact that macroprudential policy aims to introduce countercyclical policy, relaxing regulatory requirements (capital buffers) to avoid a credit crunch, while microprudential policy works to keep capital buffers in place to protect the health and financial stability of individual banks. On the other hand, as the present crisis testifies, the market itself may require higher capital buffers: the countercyclical action of MAP is therefore limited, as are the possible conflicts between the two policies. The situation is quite different when additional capital buffers are accumulated in periods of economic growth: in periods of recession, MAP may decrease these capital surcharges and maintain the minimum capital ratios required by microprudential policy.

In good times, the two policies are able to complement each other and work in the same direction: micro hand-in-glove with macro. Their joint action should lead to the accumulation of capital buffers to be run down in bad times, which will allow conflicts to be avoided when times become difficult (however, low rates of non-performing-loans, NPL, and good profits make it hard to generate a sense of urgency for this). Moreover, in good times MAP could discourage behaviours that it is difficult for microprudential policy to target. One interesting example from the recent crisis is the excessive exposure in specific areas (mortgage lending and wholesale funding): the implementation of MAP with loan-to-value (LTV) ratios and net-stable-funding-ratio (NSFR) type of instruments has the potential to limit the emergence of imbalances within individual institutions (Panetta, 2014).

On the other hand, strong microprudential supervision is also essential for MAP, both to ensure information on risk assessment and to allow the effective enforcement of MAP across institutions.

Therefore, there should be cooperation rather than contraposition between the two types of prudential policy, with the sharing of information, joint risk analysis and intensive dialogue. (CGFS, 2010, 2012; IMF 2013b, c; Panetta, 2014, Viñals, 2013).

7.2.2 Macroprudential and monetary policies

One key issue for properly defining the scope of MAP is the clarification of its relationship with monetary policy. On paper, MAP and monetary policy (MP) have different objectives (with MAP aiming at financial stability and MP targeting price and/or output stability); however, in terms of instruments the actual implementation of the two policies brings overlaps and even potential conflicts when it comes to setting priorities: for example, low policy rates are consistent with low inflation, but they may favour excessive credit growth and therefore the build-up of asset bubbles (IMF, 2013b). As a consequence, establishing dialogue and coordination between the two policies is essential (Viñals, 2013).

In a nutshell, MAP may support monetary policy in two main ways: on the one hand by addressing the undesirable side effects of monetary policy on financial stability and helping to counterbalance the excessive credit growth favoured by low interest rates and high liquidity; and on the other hand by mitigating systemic risk and creating buffers against adverse financial shocks: in this way it helps monetary policy to respond to the latter.

The policy design of MAP and the deployment of its tools depend crucially on how financial stability interacts with the macroeconomic targets pursued by central banks. Before the 2007–08 financial crisis, under the dominant-policy approach, virtually the only task of central banks was to assure the stability of the prices of goods (Bernanke et al., 1999; Goodfriend, 2002), while the idea that monetary policy should also prevent both speculative bubbles and financial imbalances was not generally accepted (Borio, White, 2004; Filardo, 2004). As a consequence, the theoretical and/or empirical literature concentrated on the former function, with little exploration of the latter. The financial crisis has made it clear that monetary policy can substantially contribute to combatting financial distress, raising the issue of how to govern the interaction among monetary-control instruments and macroprudential tools.

As a matter of fact there are both evident complementarities and potential trade-offs between MAP and MP (Angelini et al., 2012). For example,

excessively loose monetary policy may contribute to the build-up of financial disequilibria: an over-expansionary monetary policy stimulates moral hazard, fuels excess credit expansion and, through low interest rates, encourages unsustainable leverage both within the financial system and in the real economy. By the same token, a well calibrated monetary policy can usefully lean against the financial cycle, combatting the accumulation of financial imbalances before they get out of hand, instead of being asked merely to repair the consequences of the shock ex-post, when bubbles burst.

Close cooperation between macroprudential policy and monetary policy may make a very substantial contribution to financial stability (Angeloni and Faia, 2013; Angelini et al., 2011). However, monetary and macroprudential instruments could turn out to substitute for, rather than complement, each other, leading to the need for not only close coordination of policies, but also for the careful calibration of any intervention: for example, an active monetary policy might reduce the capital adequacy measures needed to assure financial stability and vice versa (Cecchetti and Li, 2008).

It is now generally accepted that monetary policy is very powerful in both encouraging or preventing the build-up of financial imbalances, as both the gestation and the repair of the recent financial crisis have clearly revealed (Onado, 2009). During times of economic growth, well-focused, coordinated macroprudential policy may help to mitigate the undesirable side effects of monetary easiness on financial stability, avoiding the need to modify the accommodating monetary stance too early. In particular, if the imbalance originates within the financial sector, MAP may be of substantial aid in addressing the shock (i.e., by easing capital buffers), reducing the need for monetary policy to slash rates to zero and/or to activate unconventional monetary measures (IMF, 2013a; Vinals, 2013). In other words, monetary and macroprudential policies tend to reinforce each other (CGFS, 2010). On the other hand, in the absence of MAP it is monetary policy alone that must safeguard financial stability and prevent and combat systemic shocks.

In addition, especially in view of the specific features of the eurozone, with a single monetary policy and countries asymmetrically exposed to shocks, MAP tools could be implemented selectively in different countries in order to address country-specific sources of shock (Angelini et al., 2012).

7.2.3 Architecture and governance

The cornerstones of MAP's institutional setting are the lean architecture of the authorities in charge, the clarity of their mandates, and

governance able to guarantee independence, accountability and credibility. In addition, transparency and an effective communication policy are also central to the conduct of MAP (IMF, 2013b; CGFS, 2012).

The first question is: Who should run MAP? Institutional arrangements may vary across countries, due to national factors such as financial structure, historical and political reasons, and considerations relating to the political economy. There are several different possible solutions, each of them with advantages and disadvantages. A first choice is a new (ad hoc) agency, as the in case of the creation of ESRB with the introduction of a macroprudential pillar in the EU in 2011. A new authority established from scratch will be free from any conditioning and/or conflict of interest due to other institutional tasks. On the other hand, it may lack both credibility and leverage over the other agencies and the central bank, which will take the relevant decisions.

A second solution is a joint committee/council comprising the central bank and other agencies, such as the bank and market regulators. The main strongpoint of this strategy, recently followed by the United States, is that these three agencies constitute the primary source of information for MAP, but there could be major problems regarding coordination.

The third choice is the central bank. Here, the advantages seem to outweigh the disadvantages: on the one hand, because it has the data, information flows and skills to perform system-wide analysis, the central bank has the leading role in macroeconomic surveillance and the interpretation of aggregate risks. Moreover, it undertakes market intelligence-gathering in fulfilment of its role as a market participant. Another key issue is that it meets (or should meet) the independence requirement; for this reason a central bank is able to impose policy interventions that may be unpopular in the short term. On the other hand, conflicts of interest with monetary policy function are likely to arise if the two are housed under the same roof: for this reason the creation of a dedicated committee is strongly recommended. This occurred in the United Kingdom with the establishment in 2013 of an independent British Financial Policy Committee (FPC) at the Bank of England and, in the European Monetary Union (EMU), with the introduction of the Single Supervisory Authority and the establishment of a Supervisory Board, an independent body at the ECB.

For these reasons, in our opinion, a key role for central banks seems to be the most efficient solution. One added benefit could derive from complementarities between macroprudential and monetary policies. This is one of the main reasons why central banks have a strong interest in the establishment of a macroprudential framework and in

Table 7.1 MAP authorities: key requirements

Principle 5: Macroprudential policy should be the responsibility of an independent central agency, formal committee arrangement or similar institutional framework. It should be conducted either as part of the central bank or involving the central bank in a key role, appropriately reflecting national circumstances.
Principle 6: Macroprudential authorities should be charged with a clear mandate and objectives and given adequate powers, matched with strong accountability.
Principle 7: Macroprudential policy communications strategies need to convey financial stability assessments clearly, link them logically to policy decisions, and manage public expectations about what can be achieved with macroprudential policy.

Source: Committee for Global Financial Stability (CGFS), *Operationalizing the Selection and Application of Macroprudential Instruments*, (2012).

the effective working of MAP. On the other hand, this advantage could become a drawback if conflicts of interest between the different policies prevail. Obviously, coordination between monetary and macroprudential policies must be pursued, provided possible conflicts with monetary policy are minimized or avoided in order to preserve the independence and credibility of monetary policy.

Regardless of who takes charge of MAP, the key requirements for the appointed authority are considered to be a clear mandate and objectives, independence, strong accountability, adequate powers and a suitable information strategy, as stated by the Committee of Global Financial Stability (2012) (Table 7.1).

7.3 Targets of MAP

7.3.1 General targets

The ultimate aim of the macroprudential perspective is to limit the costs to the economy arising from financial crises (Crocket, 2000). The key issue is therefore to maintain the stability of the financial system as a whole, preventing systemic risks. From the operational point of view, two different approaches in targeting MAP may be identified (Haldane, 2013; Caruana and Cohen, 2014):

1. a narrow target of protecting the financial system by increasing its resilience to shocks caused by the real economy. In this case,

macroprudential policy may be seen as the reinforcement of microprudential policy through the assignment of additional powers to regulators;
2. a more ambitious target: the protection of the real economy from shocks endogenously generated within the financial system. In this case, MAP is required to prevent and correct externalities and thus temper the financial cycle and is considered to be an additional, completely legitimate arm of macroeconomic policy: this implies an active approach (*leaning against the financial cycle*) to limit and even prevent the build-up of risks and financial imbalances (CGFS, 2010), by taming the financial cycle.[1]

Up to now, the feedback that has emerged from the adoption of the two approaches in the field is too limited to offer clear inputs for policymakers (Caruana and Cohen, 2014). However, there is strong evidence that macroprudential tools do strengthen the resilience of the banking system, while their effectiveness is more mixed in mitigating upturns of the financial cycle. Other factors appear to be important in this area: the joint working of MAP with other policies (monetary and fiscal), financial structures and the functioning of a variety of instruments.

7.3.2 Intermediate targets

Intermediate targets focus on key sources of financial vulnerability, which are the justification for MAP itself. Therefore, the correction of these externalities can be seen as MAP's intermediate target. The most important externalities are:

- *Leverage*: in this case the externalities relate to strategic complementarities. They arise when financial institutions take excessive correlated risks.
- *Liquidity and market risk*: where externalities are related to fire sales. They arise from the generalized sale of financial assets, which triggers an asset price collapse, with detrimental effects on balance sheets.
- *Interconnectedness*: with externalities related to interlinkages within the financial system, caused by the propagation of shocks by systemic institutions or through financial networks.

From the operative point of view, the ESRB (2013b) identifies five intermediate targets for MAP, on specific market failures documented in the literature, and specific macroprudential instruments or toolkits are therefore defined for each target.

The first intermediate objective is to *mitigate and prevent excessive credit growth and leverage*. The underlying market failures are mainly linked to: credit crunch externalities, with a sudden reduction in the availability of credit to the non-financial sector; endogenous risk-taking, with incentives that generate excessive risk-taking during a boom and, in the case of banks, a deterioration in lending standards; risk illusion with collective underestimation of risk; bank runs with the withdrawal of wholesale or retail funding in case of actual or perceived insolvency; and interconnectedness externalities due to the contagious consequences of uncertainty about events at an institution or within a market.

The second objective is to *mitigate and prevent excessive maturity mismatch and market illiquidity*. In this case, externalities mainly derive from: fire sales, which may lead to a liquidity spiral whereby falling asset prices induce further sales, deleveraging and spillovers to financial institutions with similar asset classes; bank runs; and market illiquidity due to the drying-up of interbank or capital markets in response to a general loss of confidence or very pessimistic expectations

The third intermediate objective is to *limit direct and indirect exposure concentrations*. In this case externalities stem from interconnectedness: fire sales with forced sale of assets at a dislocated price as a result of the distribution of exposures within the financial system.

The fourth is to *limit the systemic impact of misaligned incentives with a view to reducing moral hazard*. The externalities are moral hazard and the 'too big to fail' phenomenon, with excessive risk-taking due to expectations of a bailout in view of an individual institution's perceived importance to the system.

The final intermediate objective is to *strengthen the resilience of financial infrastructures*. The underlying externalities are interconnectedness, fire sales, risk illusion and incomplete contracts, with compensation structures that provide incentives for risky behaviour.

7.4 The MAP toolkit

The choice of toolkit depends on the intermediate objectives, with tools chosen on the basis of their effectiveness and efficiency (ESRB, 2013b; CGFS, 2012). In this section we present possible taxonomies of instruments and then introduce the toolkit defined by the ESBR.

7.4.1 The taxonomies of instruments

Defining a taxonomy of MAP tools and financial system vulnerabilities is no easy matter, since a number of different classifications of MAP

instruments are provided in the literature and have been adopted in the few actual case histories (Angelini et al., 2011, Davis and Karim, 2009, Panetta, 2013; ESRB, 2013b; BoE, 2011; Borio, 2010; Lim et al., 2011). From the literature and the small number of operational examples, it is possible to summarize the following classifications:

1. Instruments pursuing a system-wide approach versus a sectorial/cross-section approach (Borio, 2010; Panetta, 2013).
   System-wide instruments are calibrated on aggregate variables (such as total credit) and aim to reduce the build-up of imbalances and risks for the financial system as a whole. In the case of generalized credit bubbles, for example, the key instruments are anticyclical capital buffers and liquidity requirements. *Cross-section* instruments aim to cope with risk arising in a specific sector of the financial system, for example mortgage lending: in this case parameters such as loan-to-value (LTV) may be introduced. They are also introduced to reduce the level of risk-taking of specific intermediates – systemically important financial institutions, (SIFI) with additional capital requirements (Davis and Karim, 2009); or the riskiness of markets for financial instruments, such as over-the-counter (OTC) markets, by modifying the market structure and the terms and conditions of transactions. For cross-section instruments, one key aspect is the setting of the perimeter of the regulatory action – that is by defining what constitutes an SIFI or selecting the specific OTC markets to be regulated.
2. Instruments related to intermediaries' balance sheets, terms and conditions of financial transactions and market structures (BoE, 2011).
   (a) In the cases in which they have recently been adopted, MAP tools have mainly concentrated on three balance-sheet areas: credit, liquidity and capital (Lim et al., 2011; BoE, 2011; ESRB, 2013b).
   In the case of credit-linked instruments, the distinction is between; (a) instruments intended to influence lenders' behaviour – capital requirements, limits on leverage, variable provisioning, limits on net foreign exchange positions, credit ceilings and loan-to-deposit (LTD) ratio; and (b) instruments that influence borrowers' behaviour by setting limits on parameters such as LTV and loan-to-income (LTI).
   The most important liquidity-related tools are limits on net currency positions, maturity transformation limits and liquidity reserves.

Capital-related instruments consist of capital requirements/anti-cyclical buffers and restrictions on dividend distribution.

(b) Tools that influence the terms and conditions of financial transactions are mainly related to loans, and the most important aim is to reduce the size of mortgage loans as compared to the value of houses (LTV) or income (LTI). They also include the introduction of minimum margins or haircuts on guarantees and derivative transactions (BoE, 2011).

(c) One of the instruments that act on market structures is the requirement to trade in organized markets/platforms and/or the presence of a clearing house. Other actions in this field concern the strengthening of information transparency to reduce uncertainty on exposures and specific interconnections. Interventions to limit the build-up of exposures between intermediaries are also included (BoE, 2011).

3. Distinction between price-based and quantity-based tools.

Instruments may also be classified depending on whether they relate to a price or a quantity variable (or a combination of both) (Lim et al., 2011; Haldane, 2013).

Price-based instruments are mainly capital and liquidity coefficients, and the taxation of specific financial transactions (for example the so-called Tobin tax). *Quantity-based* instruments include limits on mortgage loans (LTV or LTI) and guarantee requirements for financial transactions (margins, haircuts, etc.).

7.4.2 The toolkit adopted by the ESRB

Both the ESRB and the British Financial Policy Committee have chosen an initial set of macroprudential tools (HM Treasury, 2012; ESRB, 2013b).

In the case of the ESRB, the number of instruments has been whittled down to 15 from the 45 originally identified. Among them are anticyclical capital buffers as introduced by Basel 3 (up to a maximum of 2.5 per cent of RWA, as decided by national regulators), leverage ratios and capital requirements for specific sectors. Also included are limits on LTV and LTD, LTI requirements and liquidity ratios (Basel 3 *net stable funding ratio* – NSFR). In the EU, MAP tools are established by two items of legislation, the CRR and CRD IV (Constâncio, 2014).[2]

The toolkit varies considerably in terms of the different types of instruments selected: among the 15 instruments chosen there are the typical prudential regulation tools, such as capital buffers, but also structural-

regulation instruments such as LTV and LTD; tools such as SIFI capital surcharges may be considered in both approaches.

In Table 7.2 we present the toolkit adopted by the ESRB in relation to the intermediate targets identified by the ESBR and described earlier. Using the taxonomies defined above, we have classified instruments in relation to:

- their different mechanisms of impact: via aggregate variables, such as countercyclical capital buffers and liquidity ratios; or specific sectors, such as sectorial capital requirements and also loan-LTV and LTI requirements, usually introduced in the mortgage market;
- the specific area targeted: (a) credit area with caps on debtors such as LTI and caps on creditors such as LTV, (b) liquidity area with liquidity coverage ratio (LCR), net stable funding ratio (NSFR) and loan to deposit ratio (LTD); (c) capital area: countercyclical capital buffers, macroprudential leverage ratios, sectorial capital requirements and SIFI capital surcharges;.
- market structures, transaction terms and conditions, such as margin/haircut requirements and CCP clearing requirements.

7.4.3 Instrument calibration: rules versus discretion

One critical issue in operating macroprudential policies is the proper calibration of instruments. It is part of the very nature of macroprudential policies to be pre-emptive – that is to be effective ex-ante (Goodhart and Perotti, 2013).

Pre-emptive tools may be either static (i.e., activated when some fixed critical threshold is reached) or time-varying (i.e., the threshold is not fixed but changes according to the general scenario). Both static and time-varying instruments may be either automatic or discretionary – triggered by MAP authorities case-by-case and requiring a formal decision process (Davis and Karim, 2009).

The rationale for static instruments arises from the difficulty for MAP authorities to spot financial distress in advance: since events of this kind are rare, past experience is a poor guide, because historical data has only limited statistical significance (Agur and Sharma, 2013). In view of the difficulty of calibrating both the timing and the intensity of intervention, some authors recommend reliance on fixed rules and automatic thresholds when applying tools, because full knowledge of the way authorities will respond influences the expectations of economic agents and exerts pre-emptive discipline on their behaviour (Davis and Karim,

Table 7.2 A taxonomy of the ESRB toolkit

Intermediate target	Instruments	Whole System	Specific Sectors	Credit: Caps on Debtors	Credit: Caps on Creditors	Liquidity	Capital	Mkt Structure	Transaction Terms & Conditions
Mitigate and prevent excessive credit growth and leverage	Countercyclical capital buffers	•					•		
	Sectoral capital requirements		•				•		
	Macroprudential leverage ratio	•	•				•		
	Loan-to-value requirements (LTV)		•		•				
	Loan-to-income requirements (LTI)		•	•					
Mitigate and prevent execessive maturity mismatch and market illiquidity	Macroprudential adjustments to liquidity ratios(e.g.LCR:Liquidity Coverage Ratio)	•							
	Macroprudential restrictions to funding sources(e.g.NSFR:Net Stable Funding)	•							
	Macroprudential unweighted limit to less stable funding(e.g.Loan-to-Deposit Ratio)	•							
	Margin/haircut requirements	•						•	•
Limit direct and indirect exposure concentration	Large exposures restrictions		•		•				
	CCP clearing requirements	•							
Limit misaligned incentives/ reduce moral hazard	SIFI capital surcharges		•				•		
Strenghten the resilience of financial infrastructures	Margin and haircut requirements on CCP clearing							•	•
	Increased disclosure								•
	Structural systemic risk buffers		•				•		

Source: Authors' elaboration from European Systemic Risk Board (ESRB) (2013b) 'Recommendation of April 4, 2013, on Intermediate objectives and instruments of macroprudential policy' (ESRB/2013/1), (2013/C 170/01), *Official Journal of the European Union*, 15 June.

2009). This is the approach generally adopted by microprudential regulation. The problem with fixed rules is that they tend to act pro-cyclically, amplifying undesirable side effects on financial activity and creating incentives for the circumvention of regulations (IMF, 2013b).

On the other hand, the alternative of adopting time-varying instruments introduces the issue of the degree of discretion left to MAP authorities. At one extreme, with fixed rules and static instruments, discretion is zero and the key factor is the quantitative calibration of the thresholds. The opposite extreme, in theory, is full discretionality, with action depending exclusively on the authorities' judgment. One example is the dynamic provisioning adopted by Basel 3 as an anticyclical buffer, which is triggered discretionally by the authorities, who also decide the value of the extra coefficient (between 0 and 2.5 per cent of RWA) on the basis of the credit/GDP ratio trend.

However, there are also contraindications to the adoption of time-varying instruments: when discretionality is broad, the regulator is exposed to a very high degree of external pressure (from the political system, lobbies, etc.), with the risk of either generating lengthy and overstretched decision-making processes (weakening the timeliness and effectiveness of action) or, even worse, of paving the way for 'capture of the regulator' by the regulated (Agur and Sharma, 2013).

A solution at some point on the scale between zero discretionality (implied by fixed rules) and full discretionality (i.e., no rules) appears to be preferable. A strategy of this kind could be based on a fixed time invariant baseline policy, supplemented, at the authorities' discretion, with time-varying instruments contingent to the general scenario (Agur and Sharma 2013; IMF, 2013b). Being fully state-contingent and mechanical, the baseline policy provides the financial system with the guidelines it requires, while the time-varying discretionary measures allow the authorities to adapt this policy, both to different cyclical phases and to the system's structural evolution (Vinals, 2013).

7.5 MAP in the EU

In 2011 a two-pillar pan-European supervisory system was put in place in response to the key critical points in the EU's supervisory architecture (or rather its lack of any such architecture) revealed by the crisis: (a) microprudential supervision based on the European System of Financial Supervisors with a key role for the three European Supervisory Authorities (ESAs) – the European Banking Authority (EBA), the European Securities and Markets Authority (ESMA) and the European Insurance

and Occupational Pensions Authority (EIOPA), and the presence of the National Supervisory Authorities (NSAs), with microprudential responsibility at the national level; (b) macroprudential supervision based on the European Systemic Risk Board and the National Macroprudential Authorities (NMAs).

With the establishment of the ESRB, an institutional framework for a European macroprudential policy has been accompanied by the definition of two operative levels: the ESRB itself and the NMAs. The ESRB, hosted and supported by ECB, is assigned the legal responsibility for identifying, preventing and mitigating systemic risk in the EU and also for issuing warnings. It defines inputs and guidelines for the prevention of systemic risks, to be introduced in the various countries on the basis of a "comply or explain" mechanism. Its powers are limited to warnings and recommendations, with the same mechanism applied. The ESRB, chaired by the governor of the ECB, is actually quite a large body and has no power to use macroprudential instruments directly, since the responsibility for the activation of MAP, and therefore for the calibration and timing of instruments, lies with the NMAs, while the task of the ESRB is to define the governance and operational frameworks within which the NMAs operate. The information flows the ESRB needs to fulfil its tasks are provided by the ECB and the three ESAs (ESRB, 2011a).

Since the ESRB was created, two of its main areas of intervention have related to the organizational features and governance of MAP in the member countries (ESBR, 2011b, 2012) and to operational frameworks, with the definition of intermediate targets and the related toolkit as described in the previous section (ESBR, 2013b).

In many EU member countries, the process for the definition of the MAP framework has already been launched in accordance with ESRB recommendations (ESRB, 2011b, 2013b). In the United Kingdom, the development of MAP is at an even more advanced stage (BoE, 2011, 2013; HM Treasury, 2012). In the second quarter of 2014, within the euro area macroprudential policy tools (all capital-related measures) had been activated by four countries: Belgium, the Netherlands, Slovenia and Estonia (Costancio, 2014).

The institutional framework in operation in the EU since 2011 was modified significantly with the introduction at the end of 2014 of the Single Supervisory Mechanism (SSM), which has responsibility for micro- and macro-surveillance of credit institutions of the euro area (and also of those of other EU states further to specific requests, under agreement with the ECB, (the so-called 19+). The SSM comprises the ECB and the national supervisory authorities (NSAs) of participating EU countries. As

far as macroprudential policy is concerned, the NMAs define and implement national MAP regimes, while the ECB has direct MAP powers for adjustment of the policy adopted by the NMA, in coordination with the ESRB.

The emerging European supervisory architecture is quite complex and fragmented, with the risk of overlapping competences, grey areas, and the need for rationalization to ensure that it is able to function efficiently and effectively. At the EU level the two-pillar supervisory system still exists, based on the working of the three ESAs, the ESRB, and the College of Supervisors (CoS) for cross-border groups, with different powers, tasks and perimeters of jurisdiction.

Figure 7.1 is a stylized presentation of the current supervisory architecture for credit institutions in the EU. Specific perimeters (all EU countries versus euro-area countries, financial intermediaries – credit institutions, insurance companies and investment firms – versus credit institutions only), mandates (limited versus full; micro prudential and/or macroprudential), and powers (limited versus extended) are considered regarding the ESBR, SSM, EBA and CoS. This enables us to focus on asymmetries and overlapping and grey areas with regard to the supervision of credit institutions in the EU.

While introducing a single supervisory framework in the euro area countries, the SSM adds a further element of complexity to the EU supervisory architecture, where three supervisory frameworks now coexist.

The most integrated framework is the SSM, but its perimeter is limited to the credit institutions of the euro countries, with the possibility for other EU countries to join. In the other EU countries the national supervisory authorities have full powers. The two pillar system still works, with limited powers and a broad perimeter: all countries and all kinds of financial intermediaries. In the specific case of MAP, in the SSM the power to impose macroprudential tools lies primarily with the National Macroprudential Authorities – not necessarily the National Supervisory Authorities – but the ECB has the power to impose its own measures (those introduced by the CRD IV and CRR) if this is deemed necessary. In the other countries these powers are assigned to the NMAs, with a limited role for the ESBR.

In this new framework, the redefinition of the role of the ESRB is one of the main issues, as we will see in the final section since, although its mandate only relates to macroprudential policy (with the NMAs), it extends to the whole financial system (credit institutions, insurance companies and investment firms and markets) and all EU member states, a perimeter larger than that of the ECB itself (ESBR, 2013a).

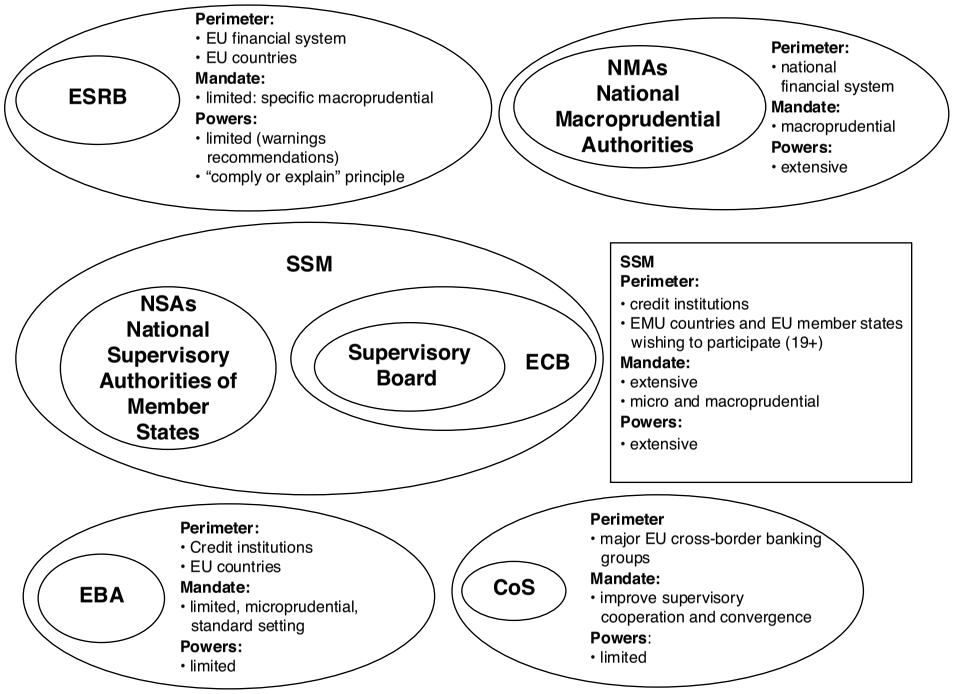

Figure 7.1 The EU supervisory architecture for credit institutions since November 2014

Source: Authors' elaboration.

7.6 Conclusions

Our survey allows us to draw some conclusions regarding the European supervisory architecture, focusing on the main challenges ahead, with specific reference to the development of a macroprudential policy in the EU.

The new European supervisory architecture is the result of an arduous path, which began with the Lamfalussy comitology process at the beginning of the new millennium and has been heavily influenced by national interests aiming to confine the supervisory function at the domestic level. The outcome has been the fragmentation of the supervisory function within the context of an integrated European financial market, even more incongruous in the euro area. This asymmetry, quite clear and widely criticized, was a key factor in the spread of the subprime crisis in Europe. The introduction in 2011, in response to the subprime crisis, of the two-pillar supervisory system based on the ESBR and ESFS, was again a compromise and the result of the determination of leading European countries to not entrust the ECB with the tasks and responsibilities of the supervisory function. The sovereign debt crisis finally led to the creation of the Banking Union and of a pan-European supervisory architecture, the Single Supervisory Mechanism, involving only the national banking systems of the Euro area.

As a result of this process, mainly driven by the urgency of the crisis and often influenced by national interests, the new architecture is particularly complex and fragmented, with the risk of overlapping competences, grey areas and additional costs for supervised institutions: there is a strong need for rationalization and simplification to ensure that it is able to function efficiently and effectively and avoid further costs for intermediaries and spillover effects in the case of asymmetrical intervention in different countries.

Within this framework, the implementation of MAP is our specific interest. The theme of macroprudential policy has been highlighted by the systemic nature of the crisis. As yet, we are only at the first stage in the implementation of MAP in different areas and evidence of its performance is very limited. As remarked by the review by Galati and Moessener (2014) the research (theoretical and empirical) on the effectiveness of macroprudential instruments is still in its infancy. To give clear inputs to policy makers, further studies and feedback are needed with regard to the connections and/or conflicts of interest with other policies (namely, microprudential and monetary), the effectiveness of narrow versus broad approaches, the set of instruments chosen,

the implementation of the decision process (rule-based versus discretion-based) and the evaluation of the efficacy of the policies adopted. Moreover, policymakers need to know much more about MAP's nexus with and influence on the financial system and the real economy, the so-called transmission mechanism, (Caruana and Cohen, 2014), bearing in mind that a country's financial structure could be a crucial factor in the effectiveness or otherwise of MAP.

Within this conceptual framework, the implementation of MAP in the euro area – from theory to practice we could say – is quite challenging from many points of view, and the factors concerned require further investigation and consideration by researchers, central bankers and policymakers in the EMU.

The first issue concerns the role of the ESRB further to the introduction of the SSM in the 19 Euro area states. In fact the ESRB's mandate with regard to MAP is limited in scope, but covers all financial institutions across the whole EU. Since 2011, the working of the ESRB has been affected by two main factors: first of all it is quite a cumbersome institution, and secondly, since 2012 the definition of the SSM has been a priority, placing a question mark over the future role of the ESRB itself. One possible solution is the strengthening of the ESRB, with a role independent of the ECB and the SSM. Another alternative is to limit its role to coordination between the SSM, the euro countries and other EU states, and the respective NMA authorities (Panetta, 2013). A third solution is to abolish it. In our opinion the first solution is not advisable because it would introduce even more complexity to the existing framework. The second solution is a non-solution because it would not rationalize and simplify the present architecture but, on the other hand it could help the working of the different supervisory frameworks that coexist in the EU: the SSM and the NMAs of countries in the SSM, and the NSAs and NMAs of the other countries. In our opinion the drastic option of abolishing the ESBR could be the most rational policy with a view to simplifying and rationalizing the current situation, but is only feasible if its main tasks are transferred to the ECB, which already has a strong role in the working of the ESBR.

With regard to the implementation of MAP in the euro area, in our opinion there are several key aspects for consideration.

The first regards the effectiveness of MAP: in our opinion the operation of the SSM could potentially yield good results, but it might also encounter significant obstacles. First of all, since MAP tools mainly operate through the banking sector and the euro area has a bank-based financial structure, where financial markets and non-bank intermediaries

are less well developed than in the United States or the United Kingdom, macroprudential policy may prove to be more important and powerful than in other countries with market-based economies (Panetta, 2014). One possible obstacle to the working of MAP in the euro area is that, given the lack of synchronization between the general business cycles of different national economies and of specific sectors within the various countries, the NMAs could decide to implement country and/or sector-specific macroprudential measures. These national regimes could have undesirable spillover effects on other countries, to be mitigated by the action of the ECB, which has the final responsibility for the macro supervisory function.

Finally the interactions of MAP with MP and MIP in the euro area must be carefully considered, their coordination strongly prioritized, and potential conflicts avoided. These aims should be pursued through the working of the Governing Council, which is the ultimate decision-making body for monetary, microprudential and macroprudential policies. The council will have a prominent role in matters related to macroprudential policy, while attempting to avoid possible tensions between the two prudential policies.

In the case of monetary policy, conflicts with MAP should be prevented by the creation of the Supervisory Board, an independent body within the ECB: the near future will clarify how this scheme works. One important interaction to be emphasized is that MAP should be seen as a complement (maybe an alternative) to the 'lean against the wind' stance of monetary policy (Panetta, 2014), which implies a specific call for monetary policy to explicitly consider bank risk-taking and financial stability. Another important point is that the financial cycle is not uniform across the various euro area countries: macroprudential policies adopted at the national level could, therefore, counterbalance the action of the single monetary policy.

Notes

1. One example is the double mandate entrusted to the Financial Policy Committee at the Bank of England (2013], with a clear ordering of ultimate targets: first of all financial stability, with the support of the economic policy of the Government (economic growth and stable employment) as secondary objective. Through the implementation of this approach, liquidity requirements were decreased in the United Kingdom in 2012, as an anticyclical action to stimulate the granting of loans by banks to foster economic growth. The mandate of the ESBR also commits it "*to ensuring financial stability and mitigating the negative impacts on the internal market and the real economy*"

Regulation (EU) No 1092/2010 of the European Parliament and of the Council of 24 November 2010 on European Union macro-prudential oversight of the financial system and establishing a European Systemic Risk Board, point 10.

2. CRD IV includes a Countercyclical Capital Buffer (Art. 130, 135–140), a Systemic Risk Buffer (Art. 133–134) and a Capital surcharge on systemically important institutions (Art. 131). The CRR includes (under Art. 458): minimum Capital Requirements, Large Exposure limits, the Capital Conservation Buffer, Sectorial Risk Weights (in the residential and commercial property sectors) and Intra-financial Sector Exposures. It also imposes Liquidity Requirements (LCR and NSFR) and requirements on Public Disclosure.

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8

Italian Banks Facing Basel 3 Higher Capital Requirements: Which Strategies Are Actually Feasible?

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8.1 Introduction

With the introduction of the Basel 3 regulatory framework, banks need to identify and evaluate the best strategies in order to achieve and respect the new prudential requirements – stricter capital adequacy, limited leverage ratio and minimum liquidity standards – and also to face the impacts on their business.

The main concern involves the potential negative effects on banks' profitability, especially in a context of shrinking margins and in an economic environment struggling to bounce back. Lower returns could derive in order to maintain higher volumes of liquid assets, to reduce the level of risk-weighted assets or to respect the new limits on leverage.

Briefly: the new prudential framework, enhancing the minimum capital standards and introducing tight requirements regarding the financial structure and the leverage ratio, could affect – directly or not – banks' economic, patrimonial and financial stability. For this reason, banks need to look for new management strategies to increase their capitalization in a context of decreasing banking profits.

The existing literature about this topic has already examined the main possible impacts on banks deriving from the new regulatory framework. This chapter aims to contribute to the debate about the strategies that banks could adopt to face the new capital requirements and the main potential effects that might follow.

In particular, this research aims to highlight, on one hand, what banking intermediaries would have needed to do in order to reach the patrimonial purpose; and on the other hand, the strategies effectively

adopted by banks and the results actually achieved between 2011 and 2013. The comparison between these two aspects allows us to derive considerations on the feasibility of the different strategic solutions – in terms of costs and benefits – and about the future directions that could be identified on the banks' path towards a difficult recovery.

The starting point of this analysis and of the getting considerations is the necessary recognition that the financial, patrimonial, economic and risk conditions that characterize the Italian banking system strongly affect the implementation of the different possible strategic interventions.

The accounting model suggested by Morelli (2011) and applied in our work to a properly selected sample of Italian banking groups allows us to highlight the different possible strategies that could be adopted by banks and to derive indications about their feasibility. Moreover we take into account the economic, financial and operational background that actually characterizes banks in recent years: the analysis of the financial statements and the strategic plans published by banks between 2011 and 2013 allows us to enrich the analysis, thinking over the actual intervention margins, the quality of the choices carried out by the banking groups included in the sample and the feasibility of their main planned solutions.

The chapter is structured as follows: Section 8.2 offers a brief review of the main recent studies on Basel 3 impacts on banks, with a specific focus on the banking strategies required to face the tighter capital standards. Section 8.3 describes the sample of banking groups selected and the dataset. Section 8.4 explains the analytical approach adopted. Section 8.5 examines the different strategic solutions pursuable by banks in order to achieve and maintain higher capital standards. In particular, with the exception of shareholders' equity increase, the growth in profitability and self-financing and the reduction in the risk and volumes of assets are taken into consideration. Section 8.6 reflects upon the actual feasibility of the strategic levers analysed and on the potential intervention margins, taking into account the Italian banks' profitability trend of the recent years and its possible future development. Section 8.7 concludes by summarizing the main significant results and proposing some closing remarks.

8.2 Literature review

Since the beginning of the financial crisis, several studies have accompanied the development of regulatory reform. As far as this chapter's main purpose is concerned, only the most relevant topics are taken into

consideration, ordered according to the regulatory development and banks' economic trends in the past few years. In the first stage, the attention of scholars, academics and field experts has been directed toward the recognition of the causes of the crisis, the determinant factors in the international diffusion of the financial and economic turmoil and the main features of the Italian banking and financial systems that contributed to limit its effects.

In a second period the debate has been mainly redirected towards the critical evaluation of the new regulatory framework established by the Basel 3 agreement, identifying its relevant strengths and weaknesses, meditating on the operative and strategic effects for banks and, more generally, considering the impacts on the overall financial and economic systems.

A considerable part of the relevant literature blamed the Basel 2 agreement as the main cause behind the financial crisis, predominantly highlighting its inability to weaken the effects.

However, some authors (Cannata and Quagliarello, 2009; Sironi, 2010; Chionsini and Romagnoli, 2011), considered those reflections unfounded. At the surge of the financial crisis, in fact, the Basel 2 agreement was not yet put into force in the United States, while in Europe only some banks were implementing it. Nevertheless, the common opinion about the limits of Basel 2 was unanimous: from the non-perfect international harmonization to the arbitrage possibilities between banking and trading books to the absence of appropriate quantitative measures to manage the liquidity risk and the lack of interconnection between 'micro' and 'macro-prudential' supervision (Birindelli and Ferretti, 2011; Chiosini and Romagnoli, 2011; Messori, 2009; Onado, 2009; Resti and Sironi, 2011).

The need for improvement in the prudential regulation of banks was therefore shared. However, the contents and management methods of some of the topics involved in the regulatory reform did not get such a widespread approval. Restricting to the aspects more deeply related to the purpose of this chapter, the proposals related to an increase of the capital required have been highly debated: the tighter limits to the Common Equity Tier 1 structure, from which is demanded the exclusion of preferred and privileged stocks (Paris, 2010; Birindelli and Ferretti, 2011); the deduction, from the regulatory capital of deferred tax assets (Zaccaria, 2010; Carosio, 2010); higher debt limits for banks adopting internal market and counterpart risk valuation models (Nasi, 2011; Carosio, 2010).

Beyond these studies on the analysis of the reform and on proposals to improve the weakest and potentially destabilizing aspects of it, other studies have considered the banks' situation in terms of adequacy to the new regulatory standards and the new rules' impact on the lending activity of banks.

Regarding the first topic, the studies that have been carried out highlighted a continuously improving situation between 2009 and 2013. In the *Quantitative Impact Study* (QIS) carried out in 2010, upon the 2009 consolidated data, on a sample of 263 banks coming from 23 different countries; the Basel Committee estimated, for the 22 Italian banks taking part in the survey, a common equity requirement of about €47 billion was needed to achieve the 7 per cent *Core Tier 1 ratio* (Basel Committee on Banking Supervision, 2010; Lusignani and Zicchino, 2011; Comana, 2010). Results from the assessments on 2011, 2012 and 2013 showed a clear improvement in the capitalization of the Italian banking system. Regarding the 13 Italian banks belonging to a sample of 212 banks of 26 different countries, the QIS conducted on June 2011 estimated a common equity gap needed to achieve the 7 per cent *Core Tier 1 ratio* of about €24 billion, almost half of the one that emerged at the end of 2009 (Basel Committee on Banking Supervision, 2012; Mieli, 2012; Signorini, 2012). In December 2012 and December 2013 the gap reduced to, respectively, 8.8 billion and 6.1 billion. Moreover, in October 2014 the ECB published the results of the Comprehensive Assessment conducted on a sample of European banks in order to evaluate their static and dynamic patrimonial resilience, both in a baseline and in an adverse scenario. The purpose was to verify the banks' capital adequacy to face all the risks taken by the banks. The exercise, based on 2013 financial statements, involved 15 Italian banks. A total €9.7 billion shortfall emerged from the exercise to be filled in order to reach an 8 per cent *Core Tier 1 ratio* in the case of 9 intermediaries. These gaps were completely filled considering the capital increases made by the Italian banks in the period between January and September 2014. However, looking at the results of the stress tests, taking into account all the capital increases and other strengthening measures adopted by banks, two banking groups still showed capital gaps for a total €2.9 billion, although exclusively under the adverse scenario. The remaining 13 groups hold capital in excess of the requirements established in the exercise amounting to €25.5 billion, in confirmation of the overall resilience of the Italian banking system.

As far as the effects brought by the regulatory interventions in terms of lending to costumers, the general concern was that the tightening of

capital requirements, together with the introduction of debt limits and new rules for the liquidity risk management, could have diminished the amount of available resources and increased the total cost incurred by banks for financing activity, causing a decrease in the amount of loans to customers and an increase in interest rates (Mussari, 2010; Curcio, 2010; Lusignani and Zicchino, 2011; Cosimano and Hakura, 2011; Kashyap, Stein and Hanson, 2010; King, 2010).

The attention of the institutions and the academics has also been addressed with regard to the valuation of operating strategies to be adopted in order to face stricter regulatory requirements.

Angelini and Gerali (2012) estimated the macroeconomic costs of the reform – in terms of effects on GDP, on the CPI, consumption, investments and real estate prices – depending on the strategy adopted by the banks against the tighter regulatory requirements. Strategies related to capital increase, decrease of shared dividends and rises in the spread of loans. From the results it emerges that in the first two cases – capital increase and decrease of dividends – the macroeconomic impact would be negligible, while the ROE would undergo a bigger contraction. Totally opposite effects, instead, would appear in the case of policies aiming at increasing profits through the implementation of higher fees and interest rates for the customers: there would be a weaker effect on the ROE, but on the other hand there would be a much bigger macroeconomic impact. It is a sign that banking strategies may move in totally different directions than what would be beneficial for the entire economy.

Tutino (2011) took into account the consequences of the new regulation on banking efficiency, and he highlighted the main impacts that new regulatory policies might have on banking management equilibrium, credit collection policies, financial structure choices, capital management and profitability. In such a scenario the author underlined the need for a careful redefinition of banking strategies, taking into consideration the requirements imposed by Basel 3, the national and international economic situation of the chosen business model, the role of competitors, the current and potential profitability levels. The latter is the perspective on which the work of Lusignani and Onado (2013) was focused. Based on the analysis of the systemic data from 1965 to 2011, it highlighted the continuous decline of the interest margin of Italian banks in the last twenty years and of the other revenues in the last ten years: it is a sign of an unstoppable degradation of the profitability and of a need, now more than ever, to find a long-term solution to the problem.

About this topic, the evidence raised from the study conducted by Birindelli and Ferretti (2011) is very interesting. This has to do with the main expectations and concerns of Italian banking intermediaries regarding the effects of the new regulations and the main strategies that banks could adopt to face it.

The survey sent on January 2011 to a sample of 20 listed Italian banking groups, examined the banks' perspective on: the new Basel 3 requirements and expected effects, main management strategies the banks were planning to implement in the regulatory framework, main effects in terms of cost of capital, profitability and correlation between credit and economy. According to the majority of the banks taking part in the survey, the regulatory reform was considered fundamentally indispensable; the most relevant impact in terms of management effects was attributed to the new standards regarding the *Common Equity Tier 1* structure; the capital increase – followed by the self-financing and the reduction in the risk of assets – was considered the main strategic direction to intervene on in order to respect the new capital limits required by the regulation; the effect on the credit distribution to the economy would have been substantially irrelevant. The same activity was repeated in January 2012 on a sample of 31 Italian banks, accounting for more than 70 per cent of the assets of the overall Italian banking system and differentiated by size of the intermediary according to the ranking made by the Bank of Italy.[1] The obtained results were similar (Tutino, Birindelli and Ferretti, 2012).

Morelli (2011) proposed an analytic approach – taken and empirically implemented in our work (Section 8.5) – based on the relationship between the capital and other management levers in banks. This allows us to evaluate the range and the efficiency of several operative levers on which we can operate in order to achieve the higher standards required by the new regulatory framework. The author kept the target *Tier 1 ratio* at 10 per cent and assumed the following hypothesis in order to measure the effects of the chosen approach: ROA of 0.46 per cent, a share of distributed dividends equal to the 50 per cent of net profits, an assets-weighted average riskiness equal to the 50 per cent of total, risky assets' growth of 7 per cent, with the possibility to resort only to self-financing – meaning profit retention and related dividend decrease – without the possibility of shareholders' equity increase. The conclusions achieved by the author – based on the described assumptions and the expectations resulting from the application of his own analysis model – affirmed that, in order to reach and maintain the targeted *Tier 1 ratio* to the value of 10 per cent over time, either an increase of profitability of 41 per cent, or

a decrease in dividends' distribution of 30 per cent or, again, a slowdown of the assets' growth of 29 per cent would be necessary.

Pittaluga, Chiorazzo and Morelli (2013), reviewing and developing the work already carried out by Morelli in 2011, but using a different approach, took into account also the opportunity to increase the value of total assets through new capital injections. Using simulations based on changes of capital requirements in middle- and long-term equilibrium scenarios, the authors observed how without a growth in the banks' margins of profit, in the long term the achieved *Tier 1 ratio* would be inclined to converge to the initial levels if the bank would not use continuous external capital injection. As a consequence, banks' ability to keep their capital levels, without using new capital emissions, necessarily implied an increase in their profitability.

For an overall view we reported on Table 8.1 the main analysed aspects. It should be noted that the cited contributions have to be considered in relation to the time of their composition and, especially for the least recent ones, that not all the factors could be taken into account at the time. Having said that, even if the contributions to the analysis and the debate about the value of the new regulatory framework are many, the management strategies actually feasible to the banks, starting from the real conditions characterizing Italian banks efficiency, are much less than those available.

The feasibility and the incisiveness of the specific management strategies banks may adopt have, in fact, to be compared with actual data, conditions and context perspectives.

8.3 Sample and data

The analysis was conducted considering a sample of ten Italian banking groups, selecting those that on 31 December 2011, showed a *Tier 1 ratio* lower than 11 per cent. The choice of such a high target *Tier 1 ratio* – calculated jointly considering the minimum requirement of 6 per cent, the 2.5 per cent related to the *Capital Conservation Buffer* and the additional 2.5 per cent deriving from the *Counter-cyclical Buffer* – may seem too careful, especially the component linked to the *Counter-cyclical Buffer*.[2]

Nevertheless, if we consider that in 2011 the average *Tier 1 ratio* of the overall Italian banking system was equal to 10 per cent, that the supervisory authority usually requires banks to reserve *Tier 1 ratio* levels higher than the regulatory minimum and that the *European Banking Authority* (EBA) asked 71 major European banks – among which were the first five

Table 8.1 Literature review – synthesis of the main analysed aspects

	Financial crisis and Basel 2: considerations on the main lacks	A critical analysis of the new Basel 3 regulatory framework	Banks' adequacy for tighter requirements	The main impacts on banks	Strategies viable for banks
Cannata and Quagliariello (2009)	X				
Messori (2009)	X				
Onado (2009)	X				
Sironi (2010)	X	X			
Chionsini and Romagnoli (2011)	X				
Resti and Sironi (2011)	X				
Zaccaria (2010)		X			
Paris (2010)		X			
Carosio (2010)		X			
Nasi (2011)		X			
Masera (2012)		X			
Curcio (2010)				X	
King (2010)				X	
Lusignani and Zicchino (2011)			X	X	
Cosimano and Hakura (2011)				X	
Kashyap – Stein – Hanson (2011)				X	
Comana (2010)			X		
Signorini (2012)			X		
Mieli (2012)			X		
Cannata, Bevilacqua et al. (2013)			X		
Morelli (2011)					X
Tutino (2011)		X			X
Tutino – Birindelli – Ferretti (2012)		X	X	X	X
Angelini and Gerali (2012)					X
Lusignano and Onado (2013)					X
Morelli – Chiorazzo – Pittaluga (2013)					X

Source: Authors' elaboration.

Table 8.2 Sample data – capital, risky assets, dividend payout ratio and profitability (percentage values)

	Tier 1_{2011}	$\Delta\%$ RWA_{2011}	$\%RWA_{2011}$	d_{2011}	ROA_{2011}	ROA^*_{2011}
GROUP 'A'	5.70%	5.69%	51.56%	87.00%	0.41%	0.41%
GROUP 'B'	6.50%	0.67%	78.54%	10.00%	0.24%	0.27%
GROUP 'C'	7.63%	6.14%	68.42%	48.00%	0.42%	0.42%
GROUP 'D'	7.77%	7.83%	80.47%	48.00%	0.25%	0.25%
GROUP 'E'	8.16%	5.90%	67.77%	74.00%	0.23%	0.23%
GROUP 'F'	8.23%	7.21%	79.68%	0.00%	–1.69%	0.85%
GROUP 'G'	8.60%	23.72%	88.23%	0.00%	–1.18%	–0.54%
GROUP 'H'	8.67%	0.76%	54.03%	34.40%	0.31%	0.31%
GROUP 'I'	9.32%	1.22%	49.68%	0.00%	–0.99%	–0.06%
GROUP 'L'	9.41%	9.74%	29.70%	93.03%	0.84%	0.84%
AVERAGE VALUE	8.00%	6.89%	64.81%	39.44%	–0.12%	0.30%

Source: Author's elaboration on the basis of the financial consolidated statements of the sampled banks.

Italian groups – to take the *Core Tier 1 ratio* even temporarily to 9 per cent,[3] our choice looks definitely more solid. The selection of the sample has been conditioned by the actual availability of the data needed for the analysis, especially regarding dividends. In particular, the sample consists of 1 major group, 6 large groups and 3 small groups, according to the classification designed by the Bank of Italy.[4]

The economic and financial data analysed have been extracted from the consolidated financial statements of the selected banking groups. Table 8.2 displays, for each banking group included in the sample, the following data with regard to 2011:

- the initial *Tier 1 ratio* level (Tier 1_{2011});
- the *risk-weighted asset* growth from December 2010 to December 2011 ($\Delta\%RWA_{2011}$);
- the *RWA ratio* ($\%RWA_{2011}$), resulting in the ratio between risk-weighted assets and total assets;
- the distributed profits during 2011, calculated as a share of the previous period's results (d_{2011});
- the '*ordinary*' *ROA* achieved in 2011 (ROA_{2011}), expressed as ratio between net profit and total assets;
- the '*adjusted*' *ROA*, calculated by eliminating from net profit the effects deriving from the goodwill extraordinary impairments that

in 2011 affected four of the ten sampled banking groups (ROA^*_{2011}). This in order to analyse data unaffected by such unusual events.

Since the aim of this study is not to reach individual conclusions regarding the single intermediaries but to acquire general indications about the possible strategies that could be effectively adopted by banks to reach the new capital requirements, the banking groups' identities have been omitted and replaced by the first ten letters of the alphabet.

There are some aspects deserving special attention. First, the sample average *Tier 1 ratio* (8 per cent) is lower than the minimal capital standards required by Basel 3: this is true when compared with both the 8.5 per cent – considering the minimum capital requirement of 6 per cent plus the *Capital Conservation Buffer* of 2.5 per cent – and the 11 per cent – considering also the additional 2.5 per cent related to the *Counter-cyclical Buffer*. Second, in 2011 the overall profitability of Italian banks has been strongly influenced by goodwill impairments. For four of the banking groups included in the sample such losses led to negative 'ordinary ROA' levels, which determined an average ROA for the whole sample of –0.12 per cent (ROA_{2011}). Excluding the effects of the goodwill impairment, the sample's economic results strongly increase: the average *adjusted ROA* reaches 0.30 per cent (ROA^*_{2011}). Considering their extraordinary nature, the analysis has been carried on taking into account the overall economic results in both ways, with and without goodwill impairments, in order to highlight, on one hand, the ordinary operational conditions and, on the other hand, to consider also the effects deriving from extraordinary events that may be able to affect the banks' future profitability. Finally, a certain heterogeneity emerges in the asset's riskiness ($\%RWA_{2011}$), which may suggest different intermediation models.

8.4 Methodology

The analysis conducted starts with the implementation of the analytical approach proposed in Morelli (2011). The adopted model allows us to identify the profitability level that could enable banks to achieve and keep a target *Tier 1 ratio* stable over time (*Stabilizing ROA*). Moreover, the model helps us to consider additional possible strategies that could be adopted as an alternative to a shareholders' equity increase: restrained assets' growth, lower risk-weighted assets, limitations to dividends distribution.

The accounting model has been elaborated starting from the breakdown of the *Tier 1 ratio* in its main determinants (8.1), assuming capital increases as exclusively related to higher retained earnings, without taking into account shareholders' equity injections as possible alternatives.

$$\%Tier\ 1_t = \frac{Tier\ 1_t}{RWA_t} = \frac{Tier\ 1_t}{RWA_t} + \frac{NP_t \times (1 - d_t)}{RWA_t} \tag{8.1}$$

$$\%Tier\ 1_t = \frac{Tier\ 1_{t-1}}{RWA_{t-1} \times (1 + \triangle\%RWA)} + \frac{NP_t \times (1 - d_t)}{RWA_t} \times \frac{RWA_t}{TA_t} \times \frac{TA_t}{RWA_t}$$

$$= \frac{\%Tier\ 1_{t-1}}{(1 + \triangle\%RWA)} + \frac{ROA_t \times (1 - d_t)}{\frac{RWA_t}{TA_t}} = \frac{\%Tier\ 1_{t-1}}{(1 + \triangle\%RWA)} + \frac{ROA_t \times (1 - d_t)}{\%RWA}$$

where: $\%Tier\ 1_t$ is the Tier 1 ratio; RWA_t are the Risk-Weighted Assets; TA, the Total Assets; NP_t is the Net Profit; d_t is the Dividend Payout Ratio; $\Delta\%RWA_t$, the Risk-Weighted Asset's Growth; $\%RWA_t$ is given by the ratio between the Risk-Weighted Assets and the Total Assets; ROA_t expresses the Return on Assets.

Assuming the *Tier 1 ratio* to be stable over time (8.2), it is possible to obtain an accounting equivalence (8.3) that allows showing in which way banks could work to achieve the target *Tier 1 ratio*.

$$\%Tier\ 1_{t-1} = \%Tier\ 1_t \tag{8.2}$$

$$\%Tier\ 1_t = \frac{\%Tier\ 1_t}{(1 + \triangle\%RWA)} + \frac{ROA_t \times (1 - d_t)}{\%RWA}$$

$$\%Tier\ 1_t - \frac{\%Tier\ 1_t}{(1 + \triangle\%RWA)} = \frac{ROA_t \times (1 - d_t)}{\%RWA}$$

$$\%Tier\ 1_t \times \left\{ \frac{\triangle\%RWA}{(1 + \triangle\%RWA)} \right\} = \frac{ROA_t \times (1 - d_t)}{\%RWA}$$

$$\%Tier\ 1_t = \frac{ROA_t \times (1 - d_t)}{\%RWA} \times \frac{(1 + \triangle\%RWA)}{\triangle\%RWA} \tag{8.3}$$

The (8.3) formula shows the link between the capital ratio and its determinants: profitability (ROA_t), assets' riskiness ($\%RWA_t$), risk assets growth ($\Delta\%RWA_t$), dividend payout ratio (d_t).

Starting from formula (8.3) it is possible to obtain the value necessary to reach the target *Tier 1 ratio* alternatively in terms of: profitability (*Stabilizing ROA*) (8.4), risk-weighted assets (8.5), dividend payout ratio (8.6) and risk assets growth (8.7). We specify that each formula allows the consideration of the different strategic lever, keeping unchanged the other, as if each strategy was the only way liable from time to time.

In particular, formula (8.4) allows the calculation of the values that the profitability should achieve to produce stabilizing effects in terms of *Tier 1 ratio*.

$$ROA_{stab} = \frac{\%Tier\ 1_t \times \left(\triangle\%RWA \Big/ (1+\triangle\%Rwa) \right) \times + \triangle\%Rwa}{(1-d_t)} \tag{8.4}$$

Formula (8.5) expresses the level of riskiness that enables reaching and keeping the *Tier1 ratio* stable over time at 11 per cent.

$$\%RWA = \frac{ROA_{stab} \times (1-d_t)}{\%Tier\ 1_t \times \left(\triangle\%RWA \Big/ (1+\triangle\%Rwa) \right)} \tag{8.5}$$

By applying formula (8.6) it is possible to obtain the dividends' distribution level that would allow banks to achieve and maintain the *Tier1 ratio* stable over time at 11 per cent.

$$d_t = 1 - \frac{\%Tier\ 1_t \times \left(\Delta\%RWA \Big/ 1+\Delta\%RWA \right) \times 1 + \Delta\%RWA}{ROA_{stab}} \tag{8.6}$$

Finally, formula (8.7) enables the calculation of the risk assets growth rate necessary to reach the target *Tier 1 ratio*.

$$\Delta\%RWA = \frac{ROA_{stab} \times (1-d_t)}{\%Tier\ 1_t \times \%RWA - ROA(1-d_t)} \tag{8.7}$$

8.5 Analysis of the possible strategic solutions

For each of the possible strategies examined, the following tables show: the results achieved by the banking groups included in the sample in 2011; the levels that each of the strategic levers analysed should reach to achieve and keep the target *Tier 1 ratio* stable over time; the necessary changes to reach these levels, in terms of difference between the ex-ante

and the ex-post levels. Each table is divided into two parts (A and B): the same analysis is carried out considering alternatively the '*ordinary ROA*' (ROA_{2011}) (A) and the *'adjusted ROA'* (ROA^*_{2011}), calculated by deducting the effects of the goodwill impairment from the net profit (B).

Before analysing the main results, it is important to underline again that the adopted model allows us to identify the use of each strategic lever that would be necessary, other solutions being equal, as if each strategy was the only way liable from time to time.

Table 8.3 displays for each banking group: the profitability achieved in 2011 (ROA_{2011} and ROA^*_{2011}); the level of profitability that would allow reaching and keeping the *Tier 1 ratio* stable over time at 11 per cent (ROA_{STAB} and ROA^*_{STAB}); and the differences between them (Gap/$Buffer_{ROA}$ and Gap/$Buffer_{ROA^*}$). The *Stabilizing ROA* (ROA_{STAB} and ROA^*_{STAB}) is derived using the (8.4). ROA positive percentage differences (+) suggest how much ROA *should* have grown to achieve stabilizing effects (*Gap*), while negative percentage differences (–) indicate how much ROA *could* have decreased while continuing to produce stabilizing effects (*Buffer*).

Data shows that the average 'ordinary' *Stabilizing ROA* (ROA_{STAB}) should have been about 1.28 per cent, that is 1.40 percentage points more than the average level of –0.12 per cent achieved in 2011. In the same way, the average 'adjusted' *Stabilizing ROA* (ROA^*_{STAB}) should have been 0.98 percentage points higher than the 0.30 per cent achieved in 2011 (ROA^*_{2011}). Therefore, even without goodwill impairments, the average ROA reached in 2011 by the sampled banking groups would not have been enough to 'stabilize' the *Tier 1 ratio* at the target level of 11 per cent.

Most of the analysed banking groups show profitability gaps to be filled. Only Group B and Group H may obtain in the future a lower profitability – other considered solutions being equal – without compromising the target *Tier 1 ratio*. Regarding Group B, for example, data should be read as follows: if Group B maintained unchanged the growth of assets at risk, the distribution of dividends and the riskiness at the levels of December 2011 and did not resort to shareholders' equity increase (i.e., maintaining stable the other levers analysed in this work), it would be able to increase the *Tier 1 ratio* from 6.5 per cent to 11 per cent getting just an ROA of at least 0.06 per cent.

Analysing data relating Group A, the *Tier 1 ratio* looks slightly lower than the one achieved by Group B and the ROA reached in 2011 is higher than for Group B. Nevertheless, the *Stabilizing ROA* of Group A is higher (2.35 per cent). This contradiction is only apparent. In fact, it should be taken into account that the analysis conducted enables highlighting

Table 8.3 Profitability needed to reach and keep the *Tier 1 ratio* stable over time at 11% (stabilizing ROA) (percentage values)

				A			B		
	Tier 1_{2011}	**Tier 1_{target}**	**Gap/ $Buffer_{Tier\ 1}$**	**ROA_{2011} (a)**	**ROA_{STAB} (b)**	**Gap(+) / buffer(–) $_{ROA}$ (b–a)**	**ROA* $_{2011}$ (a*)**	**ROA* $_{STAB}$ (b*)**	**Gap(+)/ buffer(–)$_{ROA}$* (b*–a*)**
GROUP 'A'	5.70%	11%	*5.30%*	0.41%	2.35%	*+1.93%*	0.41%	2.35%	*+1.93%*
GROUP 'B'	6.50%	11%	*4.50%*	0.24%	0.06%	*–0.18%*	0.27%	0.06%	*–0.21%*
GROUP 'C'	7.63%	11%	*3.37%*	0.42%	0.84%	*+0.42%*	0.42%	0.84%	*+0.42%*
GROUP 'D'	7.77%	11%	*3.23%*	0.25%	1.24%	*+0.98%*	0.25%	1.24%	*+0.98%*
GROUP 'E'	8.16%	11%	*2.84%*	0.23%	1.60%	*+1.37%*	0.23%	1.60%	*+1.37%*
GROUP 'F'	8.23%	11%	*2.77%*	–1.69%	0.59%	*+2.28%*	0.85%	0.59%	*–0.26%*
GROUP 'G'	8.60%	11%	*2.40%*	–1.18%	1.86%	*+3.04%*	–0.54%	1.86%	*+2.40%*
GROUP 'H'	8.67%	11%	*2.33%*	0.31%	0.07%	*–0.24%*	0.31%	0.07%	*–0.24%*
GROUP 'I'	9.32%	11%	*1.68%*	–0.99%	0.07%	*+1.06%*	–0.06%	0.07%	*+0.12%*
GROUP 'L'	9.41%	11%	*1.59%*	0.84%	4.16%	*+3.31%*	0.84%	4.16%	*+3.31%*
AVERAGE VALUE	8.00%	11%	*3.00%*	–0.12%	1.28%	*+1.40%*	0.30%	1.28%	*+0.98%*

Source: Authors' elaboration on the basis of the financial consolidated statements of the sampled banks.

the necessary use of the different levers *considered individually*: in this case, we analyse the variation of ROA necessary to reach the *Tier 1 ratio* target, leaving stable the other variables analysed (growth of assets at risk, distribution of dividends and riskiness). The levels reached in 2011 by these last variables, therefore, have inevitably influenced the effort required in terms of profitability to achieve the patrimonial purpose: in Group A, compared to Group B, they have assumed levels that would allow the bank to achieve the target *Tier 1 ratio* only with a deep increase in profitability.

Of course, banking management generally uses the different strategic levers jointly: it does not appear feasible, in order to achieve the target *Tier 1 ratio*, to focus only on profitability, leaving unchanged the volume of assets, the asset's riskiness, the dividend policy. The following exercise, therefore, is just indicative of the bare minimum use of the individual levers. It suggests the need to move them together, combining the effects.

Table 8.4 shows the levels of riskiness – calculated using the (8.5) – which would enable banks to achieve and keep the *Tier 1 ratio* stable over time at 11 per cent ($\%RWA_{STAB}$ and $\%RWA^{*}_{STAB}$), other conditions being equal. For each banking group the differences ($\Delta_{\%RWA}$ and $\Delta_{\%RWA^{*}}$) between the stabilizing levels of riskiness ($\%RWA_{STAB}$ and $\%RWA^{*}_{STAB}$) and the level of riskiness as calculated with regard to 2011 ($\%RWA_{2011}$ and $\%RWA^{*}_{2011}$) are also displayed. Positive differences (+) suggest how much the assets' riskiness *could* have increase without compromising the patrimonial objective; negative differences (–) show the *need* to reduce the riskiness to achieve the target *Tier 1 ratio*.

Looking at 'ordinary' results, data show that banking groups would not be able to achieve the target *Tier 1 ratio* even if totally eliminating the riskiness of their assets. Effectively, the average stabilizing riskiness is even negative (–41.08 per cent). Data suffer for the negative ROA achieved by three banking groups in 2011 (Group F, Group G and Group I – as shown in Table 5.1). Indeed, excluding these groups, the stabilizing riskiness for the other seven groups is about 54 per cent. On the contrary, considering data without goodwill impairments, the average stabilizing riskiness is even higher than the one recorded by the banking groups in 2011, about 5 percentage points (70.15 per cent against 64.81 per cent). The higher ROA have greatly reduced the negative gaps necessary to achieve the patrimonial target. It is clear, however, that these results should be interpreted and considered as just indicative of the effects of different management policies and strategic choices: no bank could actually reach levels of riskiness so low or so high, as indicated

Table 8.4 Level of risk-weighted assets needed to reach and keep the *Tier 1 ratio* stable over time at 11% (percentage values)

					A		B	
	Tier 1_{2011}	**Tier 1_{target}**	**Gap/ $Buffer_{Tier\ 1}$**	**$\%RWA_{2011}$ (a)**	**$\%RWA_{STAB}$ (b)**	**$\Delta_{\%RWA}$ (b–a)**	**$\%RWA^*_{STAB}$ (b*)**	**$\Delta_{\%RWA^*}$ (b*–a)**
GROUP 'A'	5.70%	11%	*5.30%*	51.56%	9.10%	*–42.46%*	9.10%	*–42.46%*
GROUP 'B'	6.50%	11%	*4.50%*	78.54%	299.89%	*+221.34%*	332.02%	*+253.48%*
GROUP 'C'	7.63%	11%	*3.37%*	68.42%	34.43%	*–33.99%*	34.43%	*–33.99%*
GROUP 'D'	7.77%	11%	*3.23%*	80.47%	16.45%	*–64.01%*	16.45%	*–64.01%*
GROUP 'E'	8.16%	11%	*2.84%*	67.77%	9.62%	*–58.15%*	9.62%	*–58.15%*
GROUP 'F'	8.23%	11%	*2.77%*	79.68%	–228.49%	*–308.17%*	114.25%	*+34.57%*
GROUP 'G'	8.60%	11%	*2.40%*	88.23%	–56.07%	*–144.30%*	–25.39%	*–113.61%*
GROUP 'H'	8.67%	11%	*2.33%*	54.03%	248.06%	*+194.03%*	248.06%	*+194.03%*
GROUP 'I'	9.32%	11%	*1.68%*	49.68%	–749.78%	*–799.46%*	–43.08%	*–92.76%*
GROUP 'L'	9.41%	11%	*1.59%*	29.70%	6.03%	*–23.67%*	6.03%	*–23.67%*
AVERAGE VALUE	8.00%	11%	*3.00%*	64.81%	–41.08%	*–105.88%*	70.15%	*+5.34%*

Source: Authors' elaboration on the basis of the financial consolidated statements of the sampled banks.

by data of Groups B, F, and H (Table 5.2). In the first case, because the banking activity itself consists in the assumption and management of risks; in the second one, because reaching excessively high levels of riskiness would affect the bank's ability to manage the excessive risks taken.

Table 8.5 displays the levels of dividend payout ratios that would allow the banking groups to reach and keep the *Tier 1 ratio* stable over time at 11 per cent (d_{STAB} and d^*_{STAB}), calculated using the (8.6). Differences between the stabilizing levels of dividends and the distributed profits during 2011 (Δ_d and Δ_{d^*}) are also shown: positive differences (+) suggest how much the dividend payout ratio *could* have increased without compromising the patrimonial objective; negative differences (–) show the *need* to restrain the dividends' distribution to achieve the target *Tier 1 ratio*.

Seven out of ten groups have distributed dividends in 2011, some of them equal to or more than half of the profits earned. Looking at 'ordinary' stabilizing dividends, the average value is strongly negative (–48.55 per cent): therefore, on average, even if no dividends were distributed, the ten banking groups would not be able to achieve the target using only this lever. In particular, only four out of ten banking groups (Group A, Group B, Group H and Group L) would be able to comply with the regulation's requirements just reducing the dividend payout ratio. For the other, this solution would not be enough even if they did not distribute any dividend. The data continue to be negative also considering the 'adjusted' values (–21.69 per cent).

Table 8.6 shows the risk-weighted assets' growth ($\Delta\%RWA_{STAB}$ and $\Delta\%RWA^*_{STAB}$) – calculated using the (8.6) – which, other conditions being equal, would enable banks to achieve and keep the *Tier 1 ratio* stable over time at 11 per cent. The differences ($\Delta_{\Delta\%RWA}$ and $\Delta_{\Delta\%RWA^*}$) between the stabilizing assets' growth and RWAs' growth obtained in 2011 ($\Delta\%RWA_{2011}$ and $\Delta\%RWA^*_{2011}$) are also displayed: positive differences (+) suggest how much the assets' growth *could* have increased while continuing to produce stabilizing effects; negative differences (–) show the *need* to reduce the growth to achieve the target *Tier 1 ratio*.

Data show that, on average, the banking groups included in the sample should reduce by about 9.70 percentage points the RWAs' growth, starting from an assets' growth of about 7 per cent between 2010 and 2011. The difference greatly decreases if we consider data without goodwill impairments (5.20 percentage points). Even in this case, some banking groups (B, F and H), starting from a low assets' growth and a good profitability in 2011 (Table 5.4), would be able to reach and keep the *Tier 1 ratio* stable over time at 11 per cent also accelerating, albeit slightly, the risk-weighted assets' growth.

Table 8.5 The value of dividend payout ratio needed to reach and keep the *Tier 1* ratio stable over time at 11% (percentage values)

					A		B	
	Tier 1_{2011}	**Tier 1_{target}**	**Gap/ Buffer $_{Tier\ 1}$**	**d_{2011} (a)**	**d_{STAB} (b)**	**Δ_d (b–a)**	**d^*_{STAB} (b*)**	**Δ^*_d (b*–a)**
GROUP 'A'	5.70%	11%	*5.50%*	87.00%	26.37%	*–60.63%*	26.37%	*–60.63%*
GROUP 'B'	6.50%	11%	*4.50%*	10.00%	76.43%	*+66.43%*	78.71%	*+68.71%*
GROUP 'C'	7.63%	11%	*3.37%*	48.00%	–3.33%	*–51.33%*	–3.33%	*–51.33%*
GROUP 'D'	7.77%	11%	*3.23%*	48.00%	–154.34%	*–202.34%*	–154.34%	*–202.34%*
GROUP 'E'	8.16%	11%	*2.84%*	74.00%	–83.18%	*–157.18%*	–83.18%	*–157.18%*
GROUP 'F'	8.23%	11%	*2.77%*	0.00%	–134.87%	*–134.87%*	30.26%	*+30.26%*
GROUP 'G'	8.60%	11%	*2.40%*	0.00%	–257.35%	*–257.35%*	–247.53%	*–247.53%*
GROUP 'H'	8.67%	11%	*2.33%*	34.40%	85.71%	*+51.31%*	85.71%	*+51.31%*
GROUP 'I'	9.32%	11%	*1.68%*	0.00%	–106.63%	*–106.63%*	–15.30%	*–15.30%*
GROUP 'L'	9.41%	11%	*1.59%*	93.03%	65.69%	*–27.34%*	65.69%	*–27.34%*
AVERAGE VALUE	8.00%	11%	*3.00%*	39.44%	–48.55%	*–87.99%*	–21.69%	*–61.14%*

Source: Authors' elaboration on the basis of the financial consolidated statements of the sampled banks.

Table 8.6 The assets' growth needed to reach and keep the *Tier 1 ratio* stable over time at 11% (percentage values)

					A		B	
	Tier 1_{2011}	**Tier 1_{target}**	**Gap/ $Buffer_{Tier\ 1}$**	**Δ%RWA $_{2011}$ (a)**	**Δ%RWA_{STAB} (b)**	**$\Delta_{\Delta\%RWA}$ (b–a)**	**Δ%RWA^*_{STAB} (b*)**	**$\Delta_{\Delta\%RWA^*}$ (b*–a)**
GROUP 'A'	5.70%	11%	*5.30%*	+5.69%	+0.96%	*–4.73%*	+0.96%	*–4.73%*
GROUP 'B'	6.50%	11%	*4.50%*	+0.67%	+2.59%	*+1.93%*	+2.87%	*+2.21%*
GROUP 'C'	7.63%	11%	*3.37%*	+6.14%	+3.00%	*–3.14%*	+3.00%	*–3.14%*
GROUP 'D'	7.77%	11%	*3.23%*	+7.83%	+1.51%	*–6.32%*	+1.51%	*–6.32%*
GROUP 'E'	8.16%	11%	*2.84%*	+5.90%	+0.80%	*–5.11%*	+0.80%	*–5.11%*
GROUP 'F'	8.23%	11%	*2.77%*	+7.21%	–16.17%	*–23.38%*	+8.08%	*+0.87%*
GROUP 'G'	8.60%	11%	*2.40%*	+23.72%	–10.86%	*–34.58%*	–4.92%	*–28.63%*
GROUP 'H'	8.67%	11%	*2.33%*	+0.76%	+3.57%	*+2.81%*	+3.57%	*+2.81%*
GROUP 'I'	9.32%	11%	*1.68%*	+1.22%	–15.38%	*–16.60%*	–0.88%	*–2.10%*
GROUP 'L'	9.41%	11%	*1.59%*	+9.74%	+1.84%	*–7.90%*	+1.84%	*–7.90%*
AVERAGE VALUE	8.00%	11%	*3.00%*	+6.89%	–2.82%	*–9.70%*	+1.68%	*–5.20%*

Source: Author's elaboration on the basis of the financial consolidated statements of the sampled banks.

In synthesis, the analysis conducted has shown the levels that each of the strategic levers analysed should reach in order to achieve and keep stable higher capital requirements over time: a 1 percentage point increase in profitability from the average level achieved in 2011, or, alternatively, a deep reduction in riskiness, in assets' growth or in dividend payout ratios. Moreover, it suggests that the differences in the starting profitability (ROA_{2011} or ROA^{*}_{2011}) among the banking groups included in the sample affect the feasibility of the different available strategies and that the use of just a single management lever may not generally be enough.

8.6 Considerations on the actual intervention margins

In the previous section we looked at what banks should have done to achieve the target *Tier 1 ratio*. In this section we look at banks' performance between 2011 and 2013 in terms of profitability, risk and capitalization (Section 8.6.1), and at what they are going to do – or should do – in the upcoming years, considering their business plans and keeping in mind the national and international economic context (Section 8.6.2). This in order to draw indications on the actual feasibility of the different strategic solutions analysed in Section 8.5.

8.6.1 Banking performance between 2011 and 2013

Table 8.7 shows a comparison between the stabilizing levels in profitability, assets' growth, riskiness and dividends distribution to reach the target *Tier 1 ratio,* as calculated in Section 8.5, and the results obtained in 2011, 2012 and 2013, considering both the values of '*Ordinary ROA*' and those of the '*Adjusted ROA*'.

Data on 2012 and 2013 clearly show a relevant weakness of the profitability of the banking groups included in the sample: the 'ordinary ROA' is about 0.03 per cent in 2012 and even negative in 2013 (–0.68 per cent); the 'adjusted ROA' looks no better (0.15 per cent in 2012, –0.41 per cent in 2013). Moreover:

- the *Tier 1 ratio* is higher in 2012 (8.80 per cent) than in 2011 (8.00 per cent), while reduced in 2013 (8.66 per cent);
- the assets' growth registered a relevant slowdown during the last three years, from +6.89 per cent in 2011 to –4.02 per cent in 2013;
- the riskiness has been reduced over time, as well as the dividend payout ratio.

Table 8.7 Stabilizing values and results obtained in 2011, 2012 and 2013 (percentage values)

	Ordinary ROA				Adjusted ROA			
	Stabilizing values	**2011 results**	**2012 results**	**2013 results**	**Stabilizing values**	**2011 results**	**2012 results**	**2013 results**
Tier1 ratio	11.00%	8.00%	8.80%	8.66%	11.00%	8.00%	8.80%	8.66%
ROA	1.28%	–0.12%	0.03%	–0.68%	1.28%	0.30%	0.15%	–0.41%
Dividend payout ratio	–48.55%	40.00%	27.80%	20.00%	–21.69%	40.00%	27.80%	20.00%
Δ%RWA	–2.82%	+6.89%	+0.16%	–4.02%	+1.68%	+6.89%	+0.16%	–4.02%
%RWA	–41.08%	64.81%	59.06%	57.34%	70.15%	64.81%	59.06%	57.34%

Source: Authors' elaboration on the basis of the financial consolidated statements of the sampled banks.

To understand the reasons behind the results shown in Table 6.1, the main events that have affected the Italian banks' activity and the economic background in recent years need to be considered.

First of all, the low profitability, in addition to decreasing income, was strongly affected, on one hand, by the goodwill impairments (six out of ten groups have depreciated goodwill between 2011 and 2013, two of which in all three years) and by increasing loans loss provisions.

This condition both reflects the adoption by banks of unwise credit policies in the past and the accentuation of the negative effects arising from the worsening economic outlook. Moreover, the intervention of the Bank of Italy, aimed to make the evaluation criteria of collateral more linked to their actual market value, has led to significant impairment of collateral instruments used in support of loans.[5] As a result, an increased focus on the risks taken has led to a contraction in loans to costumers, with obvious impacts on net interest margin. The profitability condition was further aggravated by the increased cost of funding, linked to the sovereign debt crisis, as well as the negative impact on net interest resulting from a reduction in the bank spread and the decline in other revenues also due to the adverse conditions in financial markets, besides other factors.

In this already weak context, banks should also be able to increase their capital positions, not just to be compliant with the new Basel 3 requirements, but also in accordance with the EBA's regulation and in response to the results of the Asset Quality Review and the stress tests published by the ECB in October 2014.[6]

In terms of profitability it is understandable not to expect a positive contribution to the capital strengthening, even in case of economic recovery, given the continuing decline in profitability began well before the financial turmoil. In fact, the study conducted by Lusignani and Onado (2013) – as reported in the literature review (Section 8.2) – based on the analysis of the systemic data from 1965 to 2011, shows the continuous decline of the interest margins of Italian banks in the last 20 years and of the other revenues in the last 10 years. The Italian banking system's ROA recorded a fluctuating trend but, in general, it decreased from 1.7 per cent in 2000 to 0.4 per cent in 2011 (excluding goodwill impairments).

What is seen at the banking system level is also partly confirmed for our sampled banking groups. We have expanded our analysis by considering, in particular, the trend of ROA in the three years preceding the financial crisis (2004–06), and in the three years at the turn of the crisis – in 2008, 2009 and 2010 – in order to highlight the trend both over a

period of 'strong' expansion, and in the recessive one that characterized the years from 2008 onwards. Data are reported in Table 6.2.

The average ROA of the sample was 0.62 per cent in 2004 and grew until 2006 when it registered an average value equal to 0.71 per cent. Since then it experienced a gradual reduction to touch 0.30 per cent in 2010.

Keeping in mind that:

- in 2011, 2012 and 2013 the recorded values of ROA for the sampled banking groups were respectively 0.30 per cent, 0.15 per cent and –0.41 per cent, excluding goodwill impairments;
- the results obtained by applying the accounting model outlined the need to increase profitability – other considered solutions being equal – at least by 1 percentage point compared to the 0.30 per cent registered in 2011.

These results lead us to reflect on a relevant aspect. In a positive scenario, the profitability of the banking groups included in the sample increased less than 0.10 percentage points between 2004 and 2006. This increase corresponds to about 10 per cent of the one required by applying the accounting model in order to achieve the higher capital requirements (1 percentage point of increase in profitability). Therefore, in a period of economic weakness as the present one, it is evident how difficult

Table 8.8 ROA's banking groups between 2004 and 2006 and between 2008 and 2010 (percentage values)

	ROA_{2004}	ROA_{2005}	ROA_{2006}	ROA_{2008}	ROA_{2009}	ROA_{2010}
GROUP 'A'	0.55%	0.57%	0.55%	0.64%	0.56%	0.44%
GROUP 'B'	n.d.	0.44%	0.57%	0.21%	0.11%	0.05%
GROUP 'C'	0.82%	0.76%	0.72%	0.55%	0.53%	0.34%
GROUP 'D'	0.62%	0.67%	0.76%	0.20%	0.86%	0.51%
GROUP 'E'	0.39%	0.60%	0.61%	0.38%	0.32%	0.26%
GROUP 'F'	0.41%	–0.02%	0.32%	–0.87%	–0.18%	0.05%
GROUP 'G'	0.37%	0.68%	0.99%	0.17%	0.23%	0.20%
GROUP 'H'	0.74%	1.18%	0.96%	0.52%	0.34%	0.26%
GROUP 'I'	0.80%	0.31%	0.66%	0.38%	0.18%	0.14%
GROUP 'L'	0.86%	1.11%	0.96%	0.27%	0.49%	0.72%
AVERAGE VALUE	0.62%	0.63%	0.71%	0.25%	0.34%	0.30%

Source: Authors' elaboration on the basis of the financial consolidated statements of the sampled banks.

it could be to reach the profitability recovery necessary to support the required capital growth and how long the adjustment process may be.

8.6.2 The banking groups orientation: planned and adopted strategies, future solutions

To complete the analysis, we wonder whether and how the orientations of Italian banks have changed from 2011 up to now and which strategies could be considered actually feasible, taking into account the conditions on which they are based.

Regarding the first question, useful information also came from the results of the survey conducted in Tutino, Birindelli and Ferretti (2012) – already mentioned in the literature review (Section 8.2) – about the strategies hypothesised to respect the new prudential requirements. In January 2012, among the surveyed banks, the most shared solution was represented by capital increase (chosen by around 65 per cent of banks), followed by self-financing (58 per cent) and the reduction in RWAs (52 per cent). Only about 20 per cent of the surveyed banks would have opted for the reduction of dividends and the 16 per cent for the disposal of non-core assets. The majority felt negligibly the impact of the necessary recapitalization on loans to customers.

Despite that this reference cannot be considered as a proper comparison with the results observed on our specific sample, it could be useful anyway to derive general indications.

In particular, looking at data resulting from the 2012 and 2013 financial statements of our sample, the scenario highlighted in Tutino, Birindelli and Ferretti (2012) seems to be just partly confirmed.

Between 2011 and 2013, nine out of ten banking groups have issued new shares or endorsed capital increases for 2014 (in five cases). Nevertheless, 60 per cent of the sample does not reach a *Tier 1 ratio* of 9 per cent, despite the significant capital increases, maybe because more than half of the sampled banking groups carried out goodwill impairments over the last three years 2011, 2012 and 2013 and due to the substantial write-downs of loans which have involved all groups analysed and partially worn out the capital.

Moreover, if in 2012 in all cases the percentage of RWAs to total assets has decreased, in 2013 the trend is upward for 50 per cent of the selected groups. Expectations about the possibility of self-financing and its impact on loans and on the distribution of dividends are not confirmed by the results obtained in 2012 and even less than those of 2013: profitability is on average close to zero in 2012 and negative in 2013;

80 per cent of the sample banks have reduced lending to customers in the last two years. Regarding dividends: in 2012 there was a sharp decline in dividends paid out in 80 per cent of cases (in particular, five out of ten banking groups have not distributed any dividends); while in 2013, three out of ten groups have paid dividends on average for 50 per cent of net income, six groups have not distributed any dividends and the remaining one, despite having recorded a loss, paid dividends through the use of retained earnings.

The differences that emerged between the early banks' expectations on the likely impact of the recapitalization required and the choices imposed later by events, are also related to lack of full awareness, at the end of 2011, about the seriousness of profitability problems and the impacts on margins resulting from the increase in cost of funding due to the sovereign debt crisis.

This is also confirmed by information arising from the banking groups' business plans, published between 2011 and 2013 and, therefore, in some cases, before the sovereign debt crisis. The first element to point out is that five out of the eight groups that published business plans had to revise or update their plans in 2013 to replace those previously published (depending on the case) between 2011 and 2012. This is a sign of a clear difficulty or inability to understand the speed of changes in context, and a sign of how much the economic and financial conditions may affect the feasibility and the effectiveness of the banking strategies.

Summarizing, some points clearly emerged:

- most of the banking groups that excluded capital increases and disposal of non-core assets instead found themselves having to intervene in this direction, maybe partly linked to the Comprehensive Assessment conducted for the transition to the new European Banking Union. However, as mentioned in Section 8.2, when considering the capital increases conducted in 2014, all banks subjected to the Comprehensive Assessment succeeded in the baseline scenario of the stress test, while in the adverse scenario just two intermediaries did not emerge as conform;
- a deep structural reorganization also through the rethinking of the branch network, the overhaul or the closure of non-performing branches in order to enhance rationalization and efficiency;
- still little attention paid to reducing risk, at least in the business plans published between 2011 and 2012.

Referring to the last point, it should be highlighted the difficulty of reducing risk: on one hand, due to the inability to operate with too-low riskiness levels as the banking activity is based on the assumption and management of risk; on the other, because economic events and perspectives would not have made it easier and because it would translate into a further contraction in loans.

8.7 Conclusions

In this chapter we investigated each of the possible strategies aimed to reach the tighter required standards imposed by Basel 3, making a comparison between what should have been done to achieve higher capital requirements, what the analysed Italian banking groups actually did between 2011 and 2013 and what they are going to do – or should do – in the upcoming years, as pledged in their business plans. The analysis enabled us to reflect on the feasibility of the different strategic solutions – higher profitability, restrained assets' growth, lower risk-weighted assets, limitations to dividends distribution – and on the future directions that could be identified.

In synthesis, the research showed that in order to achieve the patrimonial purpose, it would be necessary to increase the profitability at least by 1 percentage point, on average, or, alternatively, to deeply reduce the riskiness, the assets' growth or the dividend payout ratios. Moreover, the analysis has shown that, in some cases, the capital target could have been achieved, theoretically, even using only one of the levers considered, all the others being unchanged, and that differences in the starting levels of profitability, asset composition, as well as heterogeneous dividend policies among the banking groups have strongly influenced the results. The research has also shown that the profitability levels necessary to support a *Tier 1 ratio* of 11 per cent appear difficult to reach, at least in the short term, as confirmed by the decline in profitability registered in 2012. It is a sign that internal conditions of the bank and the economic background do not always actually allow using specific operating levers. For the same reason, banks might *have to* make inconvenient choices for themselves or/and for the whole economy. Just think of how an increase in cost of funding and capital or the substantial write-downs of loans have affected the decision to reduce the loans to costumers.

Furthermore, it is evident as other adopted solutions have proven to be unsuitable later, like having distributed dividends – sometimes substantially – even though knowing that the capital level and its quality should

grow over time, or even having taken inappropriate and unacceptable levels of risks.

The analysis conducted suggests directions for further developments. A more extended study could take into account some of the aspects that are not directly included in the current one, like the need to move simultaneously the different levers available, the effects deriving also from other regulatory constraints – in addition to capital requirements – and the possibility of turning to shareholders' equity increase, although the latter should be considered – at least in the long term – as a solution conditional on the market's ability to absorb massive capital issues and on ROE's results actually able to encourage and attract capital investments.

Notes

1. Bank of Italy (2012), Annexes, Glossary, Banks.
2. The introduction of the *Counter-cyclical Buffer* is left to national authorities' discretion in case they might evaluate that an extreme credit growth may lead to an excessive systemic risk (BCBS, 2010).
3. Bank of Italy (2011); EBA (2011).
4. Bank of Italy (2013), Annual Report, Appendix, Glossary.
5. Bank of Italy (2013), Supervisory Bulletin No. 3, March.
6. ECB (2014), Aggregate Report on the Comprehensive Assessment, October.

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