REGULATION OF EUROPEAN BANKS AND BUSINESS MODELS:
TOWARDS A NEW PARADIGM?

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The Centre for European Policy Studies (CEPS) is an independent policy research institute based in Brussels. Its mission is to produce sound analytical research leading to constructive solutions to the challenges facing Europe today. CEPS Paperbacks present analysis and views by leading experts on important questions in the arena of European public policy, written in a style geared to an informed but generalist readership.

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CONTENTS

List of Figures

List of Tables

List of Boxes

FOREWORD

As the unfolding banking crisis continues to deepen in Europe, the necessity to restructure the banking sector becomes increasingly blatant. Despite unprecedented levels of state aid and liquidity support provided to them by the European Central Bank, EU banks are still undercapitalised and exposed to potentially large future losses. Furthermore, structural vulnerabilities that were at the core of the 2008 crisis have not gone away: high leverage, excessive reliance on unstable funding and large derivative positions remain intrinsic features of the largest EU banks' business model. Most troubling of all is the ever-more concentration in the banking sector that increases systemic risk and hampers the diversification of banking activities.

Yet, up to now, the EU has failed to deliver a regulatory response in line with the magnitude of the stakes. Four years after the outbreak of the crisis, it is barely in the process of completing the negotiations on the new CRD IV-CRR framework, which aims at transposing the minimum capital and liquidity standards agreed under Basel III into EU law.

This is not only too slow, but also too little. Certainly, higher capital requirements for banks are essential to enhance their loss-absorbency capacity. But such prudential rules necessarily need to be complemented with adequate structural reforms. It is indeed senseless to strengthen EU banks' resilience to economic shocks without, at the same time, introducing structural changes to remove systemic risk from the financial system.

Both the US and UK governments have precisely made this assessment. Besides the implementation of capital rules, they have undertaken structural reforms to limit contagion within and across their financial institutions. While the US – through the so-called 'Volcker rule' – has decided to prohibit commercial banks from trading for their own accounts, the UK has opted for a ring-fencing approach, which requires

banks to insulate their retail operations from their risky investment-banking activities.

Despite the US and UK's decisive moves towards restructuring their banking industry, the EU has failed to come up yet with any concrete proposals in this field. With a view to address this legislative void, Commissioner Michel Barnier set up in November 2011 an expert group – chaired by Erkki Liikanen – to examine possible reforms to the structure of the EU's banking sector. The group is due to present its final report by the end of summer 2012.

While the European Greens look forward to the Liikanen group's recommendations, they haven't waited for the Commission initiative to explore issues related to structural reforms. Already as from 2010 onwards, the Greens had commissioned a study from CEPS on the screening of 26 large European banks, with the aim to provide fact-based and objective inputs into their future legislative work on banking regulation.

Needless to say, the CEPS report – published in September 2011 – represented a major breakthrough in developing a methodology for analysing bank business models and bank risk, performance, governance and transparency on a continuing basis. One of the main findings of the CEPS study was the assignment of each of the sampled banks to one of three distinct business models, namely: retail banks (using customer deposits as primary source of funding and providing predominantly customer loans), investment banks (more engaged in trading and derivatives activities) and wholesale banks (more active in interbank markets).

The present report – commissioned by the Greens - constitutes the second phase of CEPS' pioneering work. Building on a larger sample of banks (74 banks) and a wider set of cluster analysis tools, this new study not only delves further into the categorisation of business models, but provides also guidance on the regulatory framework in European banking.

Regarding the updated screening of European banks, the present report provides four key findings. Firstly, it adds a new category of business models to the three previously identified, namely: 'diversified retail banks' (using diversified sources of funding and providing predominantly customer loans). Secondly, it provides evidence that diversified retail and retail-focused business models are clearly safer than others, as measured by the distance from default (Z-score), amount of loss-absorbing capital and the long-term liquidity risks (NSF ratio). In line with the previous study, it also confirms that investment-oriented banks seem to

engage in regulatory arbitrage to reduce their risk-weights without shedding any risks. Finally, the report highlights a certain discrepancy between declared intentions and practice within the EU banking industry. Although banks such as BNP Paribas, Deutsche Bank or Société Générale define themselves as retail-oriented institutions for marketing purposes, the report provides indeed evidence that their business model is in fact closer to investment banking.

On the regulatory side, the report calls for heavier capital requirements (exceeding the Basel III common equity Tier 1 requirement of 4.5%) on some of the less diversified banks, including the retail-focused, wholesale and investment banks. It also recommends a binding leverage ratio in order to curb excessive leverage in the banking sector. In this respect, the findings highlight that wholesale- and investment-oriented banks, as well as some diversified retail banks tend to be more heavily leveraged than their retail-focused counterparts. In terms of liquidity management, the report proposes several provisions to better calibrate the liquidity coverage requirement (LCR), including the exclusion of bonds issued by any financial institution (bank or non-bank) from qualifying liquid assets. It also calls for the introduction of a binding net stable funding ratio (NSFR) beyond a basic disclosure standard. Finally, the report includes various measures to enhance disclosure requirements, such as the obligation for all banks to make publically available their quarterly balance sheet, income statement and liquidity conditions, or the need to develop – through the European Banking Authority (EBA) – a standardised set of items to be reported.

To conclude, the CEPS banks business model approach provides the legislator with valuable empirical data to devise well-balanced banking reforms at EU level. Contrary to a one-size-fits-all approach that necessarily leads to a regulatory 'race to the bottom', it opens up the possibility of enacting prudential rules differentiated according to the risk profile of banks. In other words, it paves the way for the future establishment of an EU banking legislation that penalises excessive risk-taking activities, while promoting those that focus on serving the real economy.

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FOREWORD

T he timing of this book is ideal. In order to have sound and coherent post-crisis banking regulation, it is imperative to assess the risk implications of strategic choices that banks make. This book performs this task judiciously by empirically examining the performance and risk implications of different bank business models and by confronting various proposals for a new regulatory regime with these empirical insights. The result is a set of coherent and well-founded recommendations to strengthen the new regulatory framework for banks in Europe.

Let there be no doubt. Some banks have made big mistakes in the run-up to the financial crisis. I agree that there is no single smoking gun; it has been a mixture of lax risk standards, wrong incentives and the absence of checks and balances both within banks and in the supervisory framework. In that environment, banks have made strategic choices and have sometimes rapidly shifted between business models which, for some, turned out disastrously. Some were characterised by unchecked growth of complex and hence risky assets. Some even elected to fund opaque investments with an increasing reliance on potentially volatile market funding. And others diversified into untested revenue sources but quite often without having the required skills to manage their risks. These business model choices were sometimes deliberate, but often ad hoc and driven by herd behaviour and demands for outsized returns. Some supervisors attempted to enforce countercyclical tools and some supranational authorities issued warnings. But it has largely been in vain; liquidity and solvency risks combined into a lethal cocktail.

Now the financial system needs rebuilding and the regulatory and supervisory framework needs to be strengthened. The inadequate crisis infrastructure in Europe has resulted in negative feedback loops between banks and sovereigns, provoking an existential crisis of the euro area. Hence, irrespective of the economic environment in the coming years, the

European economy is facing a lengthy process of de-risking and deleveraging, in all sectors of the economy. Restoring the soundness of the banking system is one of the key ingredients for a return to sustainable growth.

It is clear that the riskiness of the financial system will need to be monitored much more closely than in the past and that pro-active remedial action will have to be taken and enforced by competent supervisors. European supervision, strong capital and liquidity buffers and an effective crisis management and resolution framework are key. In order to enforce sound banking rules, supervisors will need to assess the health of the banking systems under their jurisdiction with diligence and adequate knowledge. This book is an important contribution to the advancement of our knowledge in this area by focusing on the performance and risk characteristics of different bank business models. Only a solid knowledge of the return and risk consequences of the key strategic choices that banks are facing ensures that supervisors will be able to detect sources of individual as well as systemic risk in time.

Developing, maintaining and applying a careful and diligent monitoring system of bank business models will therefore be a key strategic task for bank supervisors. The empirical evidence presented in this book provides a useful framework to further create a workable early warning system. This kind of empirical work should be updated regularly in order to capture fundamental changes in bank behaviour and guide policy-makers and supervisors.

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PREFACE

This volume, which follows an earlier study by the same research team at CEPS and which is based on state-of-the-art methodology and statistical techniques, could hardly be more timely. This is because bank business models and the future shape of regulation are inextricably linked with causation working in both directions. The aim of the research is to highlight the key regulatory gaps that emerge from an analysis of banking business models and to provide guidance on the evolving regulatory framework in European banking.

Bank business models are not static and evolve over time and under the influence of a complex mix of exogenous and endogenous pressures and in particular the scope and intensity of regulation. However, as the study indicates, business models have not been homogenous between banks – diversity has remained. The study offers an empirical study of business models and their implications for risk characteristics, business performance, efficiency and the role of regulation. The research specifies four business models: investment banks, focused retail banks, diversified retail banks and wholesale banks, with the risk characteristics being different between the alternative models.

Banking crises inevitably bring forth more and different regulation of banks, and the recent global crisis is no exception. There are many reasons why a comprehensive review of regulatory, supervisory and intervention arrangements are necessary in the wake of one of the most serious banking crises in modern memory. Firstly, given the enormity of the crisis, there were evident fault lines in regulatory and supervisory practice: the rules enshrined in countless pages behind the Basel Capital Accords did not prevent the crisis. Secondly, the crisis imposed substantial costs and risks on taxpayers in several countries, which implies a perverse scenario of privatising bank profits while socialising bank risks. The European Commission indicates that between October 2008 and October 2011, the

Commission approved €4.5 trillion (equivalent to 37% of EU GDP) of state aid to financial institutions. Thirdly, regulatory arbitrage always finds routes around particular regulations, which leaves open the question whether detailed and prescriptive rules are necessarily the right approach. Fourthly, it has become evident that a reform strategy needs to be framed in terms of a risk matrix that considers measures both to lower the probability of bank failures and the cost of those failures that do occur. Furthermore, the need to address the 'too-big-to-fail' problem has become increasingly evident.

As a result, there is likely to evolve one of the biggest-ever reforms in the regulatory regime and, most especially with respect to the EU, also in the basic regulatory architecture. Regulation is at a turning point as the trend towards de-regulation and 'light-touch' supervision has given way to more intensive and extensive regulation and supervision. In effect, faith in markets has given way to faith in regulation.

Since a structure of complex and extensive regulation did not prevent the recent crisis, a key issue is whether the failure was due to fault-lines in the regulatory regime or whether the underlying methodology of regulation has been inappropriate. The research in this study discusses the 'endogeneity' problem whereby, through financial innovation and the incentive structures created, problems such as excessive risk-taking by banks may be partly endogenous to the regulatory regime itself.

It might be tempting to assume that the failures revealed in the banking crisis can in some sense be solved by yet further detailed elaborations of the existing regulatory structure. On the contrary, regulatory reform needs to be strategic rather than incremental. By strategic is meant that the regulatory reform process needs go back to basics and focus on what the ultimate objectives of the regulatory regime are. Two broad objectives of any regime need to be considered: to reduce the probability of bank failures (Objective 1) and to lower the cost of those failures that do occur (Objective 2). It must include the full range of instruments within the regulatory regime to address these two basic objectives. This contrasts with an incremental approach of refining the existing regulatory regime which, in terms of capital requirements, would take us from Basel 1 to Basel 2 and now to Basel 3 and eventually to Basel N. In practice, this alone will not suffice, not least because of the 'endogeneity' problem.

My own view regarding regulatory strategy is that most, if not all, of the objectives of the regulatory regime can be achieved without major structural measures, but through a combination of:

- A significant rise in equity capital requirements applied to banks. With respect to capital, the study suggests that the risk weights in the Basel Accord are at best a poor indicator of underlying risk, and different business models are prone to a different structure of risks which should, perhaps, be reflected in regulatory capital requirements.

- Differential capital requirements applied to banks that are regarded as systemically significant.

- More stringent liquidity requirements on banks related both to asset holding and funding positions.

- More timely and intensive supervision of banks to encompass a greater focus on business models and strategies, the testing and monitoring of risk analysis and management systems of banks, earlier direct intervention by supervisory agencies, governance arrangements of banks, internal incentive structures and a particular focus on high-impact institutions.

- Measures to make Pillar 3 of the Basel Accord more effective including a focus on internal incentive structures within banks, and more use to be made of market metrics in supervisory and intervention processes.

- Tax and insurance impositions on banks to cover the costs of past bail-outs (ex post) and also to fund possible future rescue operations (ex ante).

- A commitment to prompt corrective action and structured early intervention and resolution strategies, implying early and decisive direct intervention by supervisory agencies.

- The requirement for major banks to have 'living wills' incorporating recovery and resolution plans.

- Clearly-defined and credible resolution arrangements. The objective is to allow banks to fail without disturbing business and customer relationships, and to ensure that the costs of default fall on equity and bond holders and other non-secured creditors.

- Resolution arrangements at the international level to be covered in a Pillar 4 of the Basel Capital Accord. In this regard, in June 2012, the European Commission issued a draft Directive focused on bank resolution arrangements in the EU.

This strategy implies greater emphasis and effectiveness of Pillars 2 and 3, and the addition of a Pillar 4. Pillars 1-3 focus predominantly on Objective 1, while the proposed Pillar 4 is relevant for Objective 2.

Bringing together the two strands of the study (bank business models and regulation), the crisis will prove to be transformational in several dimensions and three in particular: the size of the banking industry, bank business models and the cost of bank services. Post-crisis business models are likely to be dominated by three pressures: the unwinding of pre-crisis unsustainable business models and practices, the specific lessons of the crisis and a substantially more demanding regulatory environment.

The European banking industry has reached something of a turning point where major regulatory changes will impact the size, growth, future business models and the structure of the financial system as a whole. The evolution of European banking and its business models over the coming years is likely to be dominated by the legacy of the crisis and the regulatory and supervisory responses to it.

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EXECUTIVE SUMMARY

This study assesses the resilience of different business models of EU banks, based on an analysis of approximately two-thirds of EU-27 banking assets. This executive summary presents our main findings and policy recommendations.

Retail-oriented banks operate with high tangible common equity (TCE), use customer deposits for funding, are less likely to default and are able to better manage their liquidity risks. A deeper analysis reveals that the 'diversified' retail banks are less likely to face losses during downturns, but the same is not true for the 'focused' retail banks. However, these latter smaller institutions may absorb these risks if they continue to closely monitor their leverage and maintain their levels of capitalisation. Wholesale banks, however, carry a range of risks, especially through an apparent shortage of liquidity and their failure to build adequate buffers to absorb shortfalls arising from these risks.

The risk-weighted assets (RWA) measure fails to be a good indicator for default risks for investment banks, which are mainly active in trading and derivatives, even after controlling for capital. Given that these banks typically achieve much lower average risk weights than their peers, it is very likely that the risk-sensitive capital requirements largely underestimate the appropriate amount of capital these banks should hold. Our analysis of stressed earnings, however, fails to point to heavier capital requirements for this class of banks, which is largely due to the smaller sample size for this business model. A longer time-series is needed to draw stronger results for this category of banks.

Some of the risk indicators fail to distinguish between banks business models. This is most striking in the case of the Tier-1 ratio and the CDS (credit default swaps) spreads. While the former is likely to be a result of inadequate binding regulatory requirements that would lead to an instrument-wide convergence, the latter could be a realisation of the moral

hazard risks emanating from the too-big-to-fail (TBTF) phenomenon. If the market participants believe that all troubled large banks will be saved, no matter what their business model or underlying risks may be, the markets will treat them as if they will not fail, leading to an artificial convergence of the pricing of risk.

Although historical evidence suggests that minimum capital requirements could be raised for certain business models, the sample size and data availability issues need to be addressed before we can make a more sound judgement. The relatively limited evidence provided in this study shows that diversified retail banks face the least risk of a capital shortfall during crisis periods, notwithstanding the precision level or the estimation methods. In turn, wholesale and focused retail banks appear to face more downturn risks. These results provide some justification for imposing stricter regulatory requirements both for focused retail and wholesale banks and continued monitoring of all business models, although more data are needed to obtain more reliable estimates. As for investment banks, although it is not possible to make an objective judgement on the need for stricter requirements, the results suggest that drastic capital shortfalls are certainly possible, which make this category of banks vulnerable to external shocks.

It should be noted that our results are based on a relatively small sample and should therefore be interpreted with caution. For these reasons, more policy-oriented analytical research and monitoring are needed to better align the regulatory initiatives with the inherent risks of different banks' business models.

The key regulatory challenges discussed in the study and the conclusions reached are summarised below.

On the minimum capital requirements

Banks with more shock-absorbing capital have clearly resisted the crisis better and have been less likely to receive government support. Thus, increasing the quality and quantity of capital, as foreseen under the Capital Requirements Directive and Regulation (henceforth, CRD IV-CRR) translates into EU law the Basel III standards adopted by the Basel Committee on Banking Supervision (BCBS), should improve bank resilience and contribute to stability, assuming that the minimum requirements are sufficiently strict.

However, our evidence shows that tail risk differ across bank business models. The one-size-fits-all minimum common equity Tier 1 ratio

of 4.5%, as proposed in the CRD IV-CRR rules, is not high enough to account for the more interconnected and riskier business models of banks and hence to prevent widespread failures during downturns.

The minimum capital requirements should take into account the different business models that banks follow. Although a more detailed analysis backed with substantially richer data is needed (especially to obtain more concrete results on investment-oriented banks), the findings call for a tougher stance on some of the less diversified banks, including the focused retail and wholesale banks, and investment banks.

On the design and avenues to improve the risk weighted assets

In addition, there are several serious gaps that the Basel III Accord and EU proposal have overlooked. Perhaps most critically, the new framework continues to rely on poorly designed risk-sensitive regulatory capital ratio requirements, despite growing evidence that these measures fail to reflect the underlying risks, especially in the more sophisticated business models such as investment- or wholesale-oriented banks. Moreover, the assignment of risk-weights to certain asset classes is not always backed by solid reasoning, as is the case for those applicable to sovereign debt in the eurozone, real estate exposures or the low effective risk-weights for certain off-balance sheet exposures. Aside from weakening the effectiveness of the minimum risk-sensitive capital requirements, these practices may be contributing to ballooning of public and private debt while at the same time providing opportunities for banks to game the system.

As a first line of response to these concerns, we recommend regulators to refrain from using the risk-weights as a political tool. Although doing so may put fiscal pressures in some of the periphery countries, such as Greece, Italy, Portugal and Spain, the gradual removal of the 'zero-risk weighting' of sovereign debt and harmonisation with the other asset classes are necessary. Similarly, the unjustified preferential treatment of other exposures, such as real estate and SME exposures, should be aligned with the underlying risks. Last but not least, the evidence of this research shows that a one-size-fits-all risk treatment of financial institutions is not economically sound; therefore the risk treatment of these entities should be differentiated by accounting for their evolving business models and subsequent risk profile.

In addition, the use of the IRB approach and the validity of its components should be subject to deeper regulatory oversight and monitoring. The risk factors, risk distribution and underlying assumptions

must not be left to the discretion of banks. All risk inputs and underlying assumptions must be validated and monitored and when necessary, adjusted in a coordinated fashion. The screening of risk weights can be complementary to existing regulations, and if well-defined and monitored, can prevent the accumulation of risks before they spiral out of control. At an operational level, banks should respond to a series of hypothetical benchmark portfolios of varying underlying risk levels provided by the regulators by reporting their own calculated risk model parameters, including loss-given default, probability of default and the resulting risk-weights.

Provided that the chosen benchmarks are adequately sophisticated, regulators will be able to assess the adequacy and coherence of the internal models used by individual banks, which would feed into the regular supervisory review of the internal risk systems. Moreover, the results from the benchmarking exercise may also help test the validity of the risk-weight assumptions under the standardised approach. Lastly, the disclosure of the results of the benchmarking tests would also supplement market discipline by making banks' risk preferences more transparent.

On leverage and the leverage ratio

Many banks have become increasingly leveraged in recent years, owing to expansionary monetary policy, the pro-cyclical nature of regulations, increasing capital flows and competitive pressures

to generate excessive returns. Although leverage allows banks to grow and increase their profitability, it can also increase risks since even a small perturbation in the valuation of assets because of changing correlation matrix can serve to wipe out their capital base. Thus, a regulatory limit on leverage (e.g. 3%), as envisioned under the Basel III Accord, could address these risks as well as some of the shortcomings of the risk-sensitive capital requirements. The CRD IV proposal envisages no minimum requirements even though some of the compromise texts suggest that the requirements may range from 1.5% to 5%, depending on the risk profiles of the regulated entities.

If implemented, these requirements would also fall short of those that are in effect in the US. Our findings suggest that the Basel III standards could be a serious concern for the wholesale- and investment-oriented banks and possibly some of the diversified retail banks. Naturally, apart from the business models, the appropriateness of the requirements depends crucially on the definition of the leverage ratio in particular with

respect to the treatment of netting. We recommend the European Banking Authority (EBA) to review whether the suggested requirements would be sufficient to constrain the relevant risks in the EU, paying close attention to the different bank business models.

On counter-cyclical requirements

Faced with plummeting asset valuations and losses during the early phases of the crisis, many banks chose to reduce their lending in order to meet the minimum capital requirements. Conversely, the excess capital capacity generated from increasing asset prices have led to bloating balance sheets and an increased taste for risk-taking in the run-up to the crisis. The CRD IV-CRR proposal introduces capital buffers to rein in these pro-cyclical incentives that have contributed to the formation and bursting of financial bubbles. In particular, the counter-cyclical capital requirements require banks to build up their capital base during a boom while allowing them to shrink during a bust. However, it is not certain whether the indicator prescribed in the proposal, the private credit-to-GDP gap, is sufficiently sophisticated for detecting bubbles. The requirements also do not consider risks related to evolving business models of banks, risks from increased interconnectedness, which may need to be addressed beyond the CRD IV-CRR and within a more general macro-prudential regulatory framework that would define the targets, instruments and role of fully-dedicated institutions; in particular the European Systemic Risk Board (ESRB). We argue that more targeted research in this area is essential before venturing into poorly-designed instruments, which add little to regulators' arsenal in detecting macro-prudential risks and the formation of financial bubbles.

On liquidity requirements

Tightening liquidity proved troublesome in various phases of the crisis, particularly for banks that rely primarily on short-term market funding and the interbank markets. Although the new liquidity requirements introduced in the CRD IV-CRR proposal are a step in the right direction, their ultimate effectiveness will depend on technical details, that will only be available after long transition periods. In particular, the proposal provides few details on the measurement of long-term liquidity risks, through the proposed Net Stable Funding (NSF) ratio, which will not be adopted before 2018, if at all. The proposed measures can also be criticised on the same grounds as the risk-sensitive capital requirements, i.e. poor design, complexity, potential for manipulation, and last but not least complacency. For instance, the treatment of sovereign exposures has

been maintained as in the past without a requirement to assess underlying country risks, despite being recognised by many as inappropriate. Lastly, the new rules may prove too shallow to respond to the build-up of systemic (as opposed to individual) liquidity risks, which once again may need to be considered in a more general macro-prudential framework.

On disclosure and market discipline

Disclosure practices show heterogeneity, both across banks and countries. While banks in certain business model categories report more than others, in other cases, all banks do very poorly. For example, investment-oriented banks report much more information on performance-related indicators than do banks following other business models, most likely in response to calls from their shareholders who tend to be more disclosure-demanding. In turn, the majority of all banks disclose very limited information on their risk and off-balance sheet exposures. In the EU, the supervisory reporting frameworks for financial reporting (FINREP) and common reporting (COREP) have been developed, currently based on non-binding guidelines and reporting, both based on XBRL. The proposed regulation can provide significant benefits if it clarifies the various reporting frameworks, starting with a standardised set of items to be reported, under technical guidance from EBA. In addition, establishing a clear legal basis and binding requirements for all credit institutions to start reporting using the COREP/FINREP frameworks would also be helpful. To that extent, the standardised set of items to report should be seen as a first step for a more harmonious reporting foreseen under the frameworks. Moreover, the quarterly balance sheet, income statement and liquidity conditions on all banks, listed or unlisted, should be made available from a central public website, free of charge.

On the role of the EBA

The European Banking Authority (EBA) should have a more important role than simply being a custodian of definitions and guidelines. It should be armed with enhanced monitoring and enforcement powers to reach its primary aim of safeguarding the stability of the EU's banking system. This is all the more important in light of the growing political pressure to shift to an EU- or euro-wide banking union and a centralised supervisory regime.

Towards a comprehensive framework to regulate EU banks

Many issues remain to be addressed beyond the piecemeal approach of the CRD IV-CRR proposal. These include a more direct regulatory approach to

systemic risks and macro-prudential policy, crisis management, shadow banking, systemically important financial institutions and enhanced international cooperation. Although the Commission's proposal covers (or will be expanded to cover) some of these areas indirectly, there is a need for an integrated approach in the EU, much like the Dodd-Frank Act in the US, that cover some behavioural and structural changes.

Last, but not least, moving forward in regulating the banking sector globally requires a substantial rethink towards a new conceptual framework that considers all the costs and benefits of intervening in financial markets through micro- and macro-prudential regulations, supervision, monetary policy, crisis resolution and other institutional arrangements and structural reforms. The conceptual framework should be designed to fulfil two simultaneous objectives of the reform agenda, necessary for systemic stability: 1) to lower the probability of bank failures and 2) to reduce the costs of those failures that do occur. To some extent there is a trade-off between the two objectives in that the more the costs of failure can be reduced, the less intensive regulation needs to be to lower the probability of failure. The optimal intensity of regulation and structural changes will be indeterminate until the arrangements for the resolution structures are known. Despite the infant understanding of bank business models and practices in Europe, our evidence shows that bank business models matter for soundness, systemic stability and hence for the optimal design of banking regulation.

This leads to a complete rethink of the existing one-size-fits-all regulatory paradigm that acts on banks' behaviour. A new regulatory paradigm would require a better identification of business models and practices of banks and their evolution and would systematically address their risks ex ante at any point in the economic cycle and ultimately their resolution, in case a crisis develops. Until we witness such a change of paradigm, the regulation of EU banks becomes a largely unfinished business.

INTRODUCTION

Adopted by the European Commission in July 2011, the proposed Capital Requirements Directive and Regulation (henceforth, CRD IV-CRR) translates into EU law the Basel III standards adopted by the Basel Committee on Banking Supervision (BCBS).[1] Among other things, the proposed rules increase the quality and quantity of the minimum capital; introduce new rules on liquidity, leverage ratios, counter-cyclical buffers, and systemically important financial institutions; and amend the definitions of counterparty credit risk and rules for the banking book. The rules complement the earlier amendments that strengthened the capital and disclosure requirements for the trading book and re-securitisation instruments as well as the requirements to ensure that remuneration policies do not lead to excessive risk-taking.

Most European banks have shown enormous resistance against the implementation of the new round of reforms, arguing that the stricter requirements would lead to a significant contraction of credit to the private sector and would thus hurt growth. However, these arguments have been called into question by academics and experts who suggest that the hike in minimum capital requirements will have little impact on lending levels. Indeed, recent research shows that large banks will be able to meet the stricter requirements without suffering significant pains, in many cases simply by retaining their earnings.[2]

Despite its ambitious aims, some observers claim that the CRD IV-CRR proposal has been watered down, mainly to appease the private

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[1] The CRD IV-CRR proposal comprises a Directive (COM(2011) 453 final) and a Regulation (COM(2011) 452 final), both published 20 July 2011.

[2] See for example, Ötker-Robe & Pazarbaşıoğlu (2010). BCBS's own impact assessments also confirm that reinforced capital and liquidity requirements would have a very limited impact on growth (BCBS, 2010a and 2010b).

interests of financial institutions and the banking industry within Europe. Although some of these concerns may be exaggerated, the proposal is less far-reaching than the Basel III Accord, effectively stopping short of introducing (or committing to introduce) binding rules for leverage and the long-term liquidity requirements. Many details, both technical and non-technical, have been left out to be resolved in the course of a transition period lasting up until 2018, inviting the possibility of substantial heterogeneity in the regulatory framework within the EU. Moreover, some of the emerging regulatory concerns in the post-crisis era, such as the macro-prudential and systemic issues and resolution, have remained largely vague and have been addressed partially or indirectly at best. Other concerns have been only narrowly addressed such as the possibility that the new regulations would lead to activity being shifted to unregulated conduits, or the 'shadow banking' sector. The proposal leaves a large margin of manoeuvre to the European Parliament and the Council to fine-tune the provisions based on the compromise agreements on the key aspects of the rules.[3]

The aim of this study is to highlight the key regulatory gaps that emerge from an analysis of banks' business models and to provide guidance on the evolving regulatory framework in European banking. Owing to the timing of the study, which coincides with the EU institutions' 'trialogue' discussions involving the Commission, the Council and the Parliament, a considerable part of the analysis focuses on the key strengths and shortcomings of the CRD IV-CRR proposal, which is expected to be adopted by the European Parliament in the summer of 2012 and by the Council in the fall of 2012 after adopting the compromise amendments. The study also draws attention to what remains to be done more broadly beyond CRD IV-CRR and offers a comprehensive analysis of potential future reforms.

The study is organised as follows: chapter 1 provides evidence-based analysis that aims to identify and analyse the performance and resilience of the different business models for EU banks, building on the results and methodology developed in Ayadi et al. (2011). Chapter 2 provides an assessment of the new Basel rules in the EU and proposes potential regulatory adaptations to bank business models with the aim of improving future implementation. The final chapter outlines some general principles

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[3] See Appendix IV summarising the mail points in the 'trialogue' policy discussions between the European Parliament, European Council and the European Commission during 2012.

aimed at guiding the future regulatory reform process and at making a distinction between *incremental* and *strategic* approaches to reform. In addition, the analysis provides a discussion about the 'endogeneity' problem and reviews the alternative means of reducing the probability of bank failures and various options to minimise the costs of bank failures.

1. Evolving Business Models in EU Banking: What soundness?

T he aim of this chapter is to identify and analyse the resilience and performance of the different business models for EU banks, building on the results and methodology developed in Ayadi et al. (2011).[4]

   This factual investigation offers the basis for an informed analysis of the EU banking industry, which is essential to understand the resilience and performance of the business models and their evolution. The results are expected to provide policy-makers and regulators with guidance on specific policy and regulatory actions that should be taken to achieve a more stable and high-performing banking sector capable of withstanding future shocks and contributing to the positive growth of the European economy.

1.1   Data and methodology

Possibly considered as one of the richest and most diversified groups in the world, the European banking industry incorporates a varied array of institutions. Large diversified retail banks provide their domestic and international clients with a range of retail, investment and insurance products. Investment-oriented banks focus more on trading activities, relying on various forms of funding, including most notably issued debt. In turn, retail-oriented commercial, cooperative, savings and others types of banks focus more on traditional services, such as basic deposit accounts, consumer credit, mortgages, and simple payment services. Other banks are more oriented towards institutional clients, including central and local governments, larger firms and financial institutions, and are more active in

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[4] For a review of the literature on the subject, see Ayadi et al. (2011) and Altunbaş et al. (2011).

the debt and wholesale markets. Expanding on our earlier study (Ayadi et al., 2011), the present sample under study comprises a total of 74 banks (up from 26 banks) with end-of-year data for 2006 to 2010, with 352 bank-year observations. The selection overlaps with the selection of banks used by the European Banking Authority (EBA) in its June 2011 stress tests, accounting for approximately two-thirds of the EU-27 banking assets. In addition to data collected from the annual reports and other online financial documents for each bank-year observation, the study uses data made available from the EBA stress tests. As in the previous study, the different business models are identified using state-of-the-art cluster analysis tools.

Cluster analysis is a statistical technique for assigning a set of observations (in our case, bank/year observations) to distinct clusters (i.e. business models) to ensure a certain degree of similarity within each cluster. The basis of this assignment is a set of indicators, or more formally instruments, to measure the distance of each observation from others. For example, if one would want to generate clusters based on the size of financial institutions, a natural candidate would be to rely on a bank's total assets, either in absolute or relative values (e.g. as a % of GDP) as the primary instrument. The clustering procedures would then group together banks that are closest to one another in terms of the selected instrument.

The formation of clusters follows very closely the techniques used in the prior study. To sum up, the clusters are merged sequentially, starting from the maximum number of clusters possible (i.e. the total sample size), until the most distinct formation of clusters is achieved. The distinctness of each clustering solution was evaluated by relying on the Calinski and Harabsz pseudo F-index, based on the within-cluster sum of squared errors divided by the between-clusters sum of squared errors, (Calinski & Harabasz, 1974). More details on the methodological aspects of the clustering analysis used in this study can be found in Ayadi et al. (2011, pp. 23-24).

The selection of instruments is naturally a key factor in the composition of clusters. When the objective of the analysis is broad enough, as is the case here, the number of candidate instruments increases. For example, to distinguish between retail- and investment-oriented banks, a host of variables may be used, ranging from simple balance sheet and income statement information, e.g. customer loans or deposits, corporate debt held and net interest income, to other structural variables, such as the

number of branches or regional coverage.[5] Ideally, the candidate list should span all the relevant dimensions that can matter for the objectives of the analysis. In our case, this would mean that selected instruments should correspond to all the core areas of activity for banks.

To minimise the possibility that certain functions are left uncovered while others are overrepresented, the analysis starts with a large set of candidate instruments and evaluates all the possible permutations to select the most appropriate subset.[6] The selection procedure follows several steps. First, all the possible permutations of the collection of instruments are ranked according to the ratio of between-to-within-cluster standard errors, as measured by the Calinski and Harabsz pseudo F-index, as well as the distinctness of the optimal clustering solution from corner cases.[7] Second, the collections of instruments with the highest ranks are chosen as candidates. Third, among the short-listed candidates, the collection of instruments with the easiest interpretation was chosen.

On the selection of the candidate instruments, it is assumed that the business models are shaped by the selection of inputs and outputs by bank managers. Performance and stability indicators are assumed to be the outcomes of these decisions, determined in conjunction with the other market, macroeconomic and regulatory conditions, and thus are not part of the clustering. For example, banks that rely more on customer deposits will tend to have a more stable source of funding when a deposit insurance system exists. Conversely, those that rely more on (short-term) wholesale funding may face liquidity shortages or abundance, depending on the willingness of other financial institutions to provide such funds. Customer loans could provide substantial earnings when the economic conditions are upbeat and the interest rates are low, implying modest levels of loan losses and high interest margins. Lastly, improving asset prices would tend to improve the expected earnings from securities trading activities.

Using the intermediation approach of Sealey & Lindley (1977), the inputs and outputs are composed of the funding source decisions, e.g.

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[5] See Appendix I for a complete list of variables collected.

[6] More specifically, the iterative analysis used a total of 11 indicators including customer loans and deposits, bank loans and liabilities, debt liabilities, total derivative exposures, trading assets, common equity, liquid assets, domestic assets, and repurchase agreements (repos).

[7] For any given collection of instruments, the optimal solution is the one with the highest Calinski and Harabsz measure. To determine the distinctness of the cluster from the extremes, the corner cases of two- and ten-cluster solutions were used. The relative distinctness were measured by the minimum of the ratio of the Calinski & Harabsz pseudo F-indices between the optimal cluster and the corner cases.

customer deposits, issued debt, wholesale or interbank funding, and the use of funds, e.g. customer loans, wholesale loans, and trading securities. Additional data on repurchase and reverse repurchase transactions as well as derivative exposures are also included in the distinction of the business models, especially identifying more investment-oriented banks. A more granular view of the different funding sources, investment activities, maturity transformation functions or risk exposures was not obtainable due to the unavailability or incomparability data.

In order to ensure that the clustering analysis was based on a full sample, missing observations were supplied using multiple imputation techniques, which complete variables with OLS regression estimates using existing relationships within the sample. Potential errors were accounted for by producing a total of 10 random imputation estimates, effectively multiplying the total sample by a factor of 10. Unlike Ayadi et al. (2011), the estimation exercise was improved by relying on a larger set of indicators that were found to be better covariates of the used instruments.

The set of instruments that form the basis of the analysis is different from Ayadi et al. (2011) due to the more advanced selection procedures explained above. For funding sources and investment activities, the clustering relied on transactions with traditional and less traditional activities, e.g. intra-bank exposures, debt liabilities and derivative transactions. Most likely due to the high correlation with included instruments, customer deposits and trading assets did not appear to improve the distinctiveness of the clusters substantially and were thus not selected as instruments. Moreover, the domestic assets variable was not available for many bank-year observations in the enlarged sample and thus had to be excluded from the clustering analysis, even though some descriptive results are provided below. With the removal of these variables and the addition of two new instruments, debt liabilities and bank loans, the total indicator set was reduced to five (down from six in the previous study).

The instrument selection procedure led to the following collection as the most distinct and easiest to interpret, which was used in the clustering analysis:[8]

1. *Bank liabilities (as a % of assets).* Identifies the share of liabilities of other banks, including deposits and issued debt. Banks with greater

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[8] See Ayadi et al. (2011) for the construction of the variables used in the study.

interbank funding requirements, often due to an excessive reliance on short-term funding, have faced severe problems in the earlier phases of the crisis.

2. *Bank loans (as % of assets).* The instrument shows the share of total assets held as loans to other banks, which is expected to be greater for banks that are more active lenders in the wholesale markets. Much like wholesale funding exposures, wholesale lending exposures could imply risks emanating from interconnectedness. It is important to note that not all banks are active in the wholesale markets as both borrowers and lenders, which is the reason that the instrument was selected.

3. *Debt liabilities (as % of assets).* Calculated by netting customer deposits, bank liabilities, total equity and negative fair values of all derivative transactions from total liabilities. The instrument is strongly (and negatively) correlated with customer deposit funding. While bank liabilities are comprised of short-term interbank debt, the broader debt liabilities indicator provides a general insight into the bank's exposure to market funding.

4. *Total derivative exposures (as % of assets).* This instrument captures all positive and negative (fair value) exposures, incorporating interest, currency, equity, over-the-counter, hedge and trading derivatives, which represent the more volatile parts of the balance sheets of investment-oriented banks.

5. *Tangible common equity (as % of tangible assets).* Tangible common equity focuses on the most loss-absorbing part of a bank's capital, which is expected to remain high in banks that are more risk-averse. The calculation nets out intangible assets and goodwill from common equity, which comprises common stocks, retained earnings and equity reserves. The instrument is a good proxy for the leverage ratio.

Although the arbitrary nature of instrument selection was addressed, the analysis nonetheless remains dependent on the methodological choices, including most notably the distance metric, procedures for forming clusters and the 'stopping rule' used to determine the optimal number of clusters. Alternative configurations were tested to confirm that the results were not excessively dependent on these aspects. However, the multiplicity of the potential clustering procedures and a general lack of theory on the performance of these models imply that the results should be treated with care.

1.2   What business models for EU banking?

The procedures summarised in the prior subsection were used to identify the most distinct business models in European banking. The analysis identified four models as the most distinct form of clustering.[9] Table 1.1 gives the descriptive statistics for the four models resulting from the cluster analysis based on selected balance sheet indicators. Next, we provide an overview of the main structural and financial attributes of the clusters. It is important to highlight once again that the instruments used in the clustering are a subset of the entire set of variables in the sample.

Figure 1.1 Comparison of clusters, standardised scores
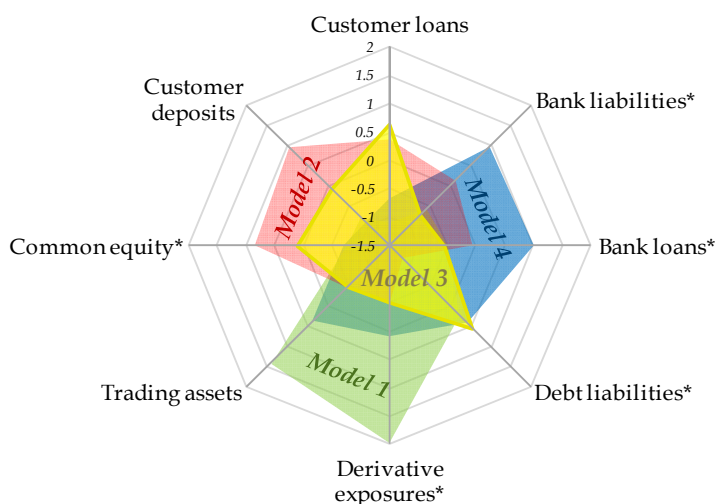
Notes: Indicators marked with an asterisk (*) were used as instruments in the cluster analysis. The figures represent the number of standard deviations from the sample mean. *Customer loans* and *customer deposits* represent balance sheet share of deposits from and loans to non-bank private customers, respectively. *Bank liabilities* and *bank loans* identify the share of liabilities of and loans to other banks, including bank deposits, issued debt, interbank transactions, and use of central bank facilities. *Debt liabilities* are calculated by netting customer deposits, bank liabilities, total equity and negative fair values of all derivative transactions from total liabilities. *Derivative exposures* captures all positive and negative (fair value) exposures. *Trading assets* are defined as total assets minus liquid assets (cash & deposits at central bank) minus total loans minus intangible assets. *(Tangible) common equity* is defined as common equity minus intangible assets and treasury shares as a share of tangible assets (i.e. total assets minus intangible assets).

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[9] The clustering methodology is part of CEPS' ongoing research on monitoring of business models in European banking.

Table 1.1 Descriptive statistics for the four clusters

		Customer deposits (% assets)	Customer loans (% assets)	**Bank liabilities (% assets)**	**Bank loans (% assets)**	**Debt liabilities (% assets)**	**Derivative exposures (% assets)**	Trading assets (% assets)	**Tangible common eq. (% tang. assets)**
Model 1	Mean	29.7%	38.3%	9.3%	6.3%	37.9%	38.3%	52.8%	2.6%
(31 obs.)	St. dev.	0.091***	0.109**	0.041**	0.034**	0.084*	0.191***	0.121***	0.009**
	Min.	16.3%	22.8%	4.5%	2.3%	21.3%	11.5%	28.7%	1.0%
	Max.	50.0%	63.1%	23.3%	17.1%	52.7%	95.1%	72.9%	4.1%
Model 2	Mean	56.5%	60.9%	16.4%	9.2%	17.4%	5.7%	25.7%	5.4%
(96 obs.)	St. dev.	0.142***	0.139**	0.077***	0.055**	0.104***	0.062**	0.124**	0.022***
	Min.	31.2%	10.8%	0.7%	1.3%	1.4%	0.1%	11.0%	1.1%
	Max.	87.1%	80.1%	34.3%	27.0%	43.9%	33.4%	71.3%	13.9%
Model 3	Mean	38.5%	65.0%	8.5%	5.7%	44.3%	6.2%	26.2%	3.8%
(106	St. dev.	0.128***	0.098**	0.04**	0.027**	0.123*	0.049**	0.102**	0.015***
obs.)	Min.	2.3%	35.7%	0.0%	0.4%	19.9%	0.0%	6.6%	-1.1%
	Max.	63.4%	84.6%	17.5%	11.9%	83.1%	23.2%	56.3%	6.8%
Model 4	Mean	24.3%	42.1%	23.2%	16.6%	42.1%	14.2%	39.9%	2.3%
(79 obs.)	St. dev.	0.068***	0.13**	0.084***	0.088***	0.075*	0.095***	0.093***	0.007**
	Min.	12.0%	18.1%	8.7%	4.7%	22.8%	2.3%	23.9%	0.6%
	Max.	40.7%	68.1%	42.4%	44.2%	62.7%	47.9%	61.1%	3.6%
All	Mean	39.5%	55.3%	14.7%	9.6%	34.8%	11.3%	32.1%	3.8%
banks	St. dev.	0.171	0.161	0.088	0.072	0.156	0.131	0.142	0.02
(312	Min.	2.3%	10.8%	0.0%	0.4%	1.4%	0.0%	6.6%	-1.1%
obs.)	Max.	87.1%	84.6%	42.4%	44.2%	83.1%	95.1%	72.9%	13.9%

Notes: The independence of clusters was tested using Wilcoxon-Mann-Whitney non-parametric two-sample tests at 5% significance. According to the results of these tests, the number of asterisks (*,**,or ***) stands for the statistical difference of any given cluster from that number of other clusters for that indicator. For example, two asterisks (**) implies that the cluster is statistically different from two other clusters but not the third (closest) one. Variables in **bold** highlight the instruments used in forming the clusters.

Model 1 groups together large investment-oriented banks, which is by far the largest group by size, both in terms of total and average assets.[10] The average size of a bank in this cluster was approximately €1.5 trillion in 2010, more than the quadruple for an average wholesale or diversified retail bank and representing a substantial proportion of the financial activities in the country they are headquartered in.

In what follows, Model 1 will be referred to the cluster of 'investment banks'. As is clear from the name, these banks have substantial trading activities. The cluster averages for trading assets and derivative exposures—representing 52.8% and 38.3% of total assets, respectively—stand one and a half standard deviations above the relevant sample means. The investment banks are more internationally-oriented, with nearly half of total assets located outside the home country, which is an additional explanation of their relative sizes (see Table 1.2). In funding, the focus is on less stable and less traditional sources, such as debt liabilities and more importantly repurchase agreements, which have come under severe stress during the financial crisis (Gorton & Metrick, forthcoming). The investment banks also tend to be highly leveraged, with an average tangible common equity ratio of 2.6%.

Model 2 is composed of retail-oriented banks, which are heavily concentrated on traditional activities.[11] In particular, customer deposits and loans respectively account for 56.5% and 60.9% of the total balance sheet on average, surpassing the sample averages. The reliance on debt issuance is more than one standard deviation below the sample average, with debt liabilities representing only 17.4% of the balance sheet total. The banks are substantially better capitalised than all other groups, with an average tangible common equity to assets ratio of 5.4%. Similarly, the ratio of cash and cash-like liquid assets remains above the sample average at 3.0% (see Table 1.3).

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[10] All of the banks identified as investment banks in Ayadi et al. (2011) were identified as such in this study, although the inverse is not true. Most notably, two banks originally identified as retail banks and one bank as wholesale bank in the previous study were identified here as investment banks. To some extent, the results are due to the fact that the instruments used here have been selected to pick the most distinct clustering solution, as opposed to the prior study where no alternative evaluations were made.

[11] More than two-thirds of the banks falling under the 'retail' banking model were not included in the sample in Ayadi et al. (2011) due to their smaller sizes.

Table 1.2. Evolution of the sizes of business models

	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
	Sum of total assets (€ billion)					*Total assets of average bank (€ billion)*				
Model 1. 'Investment'	6,628	7,453	10,839	8,693	8,968	1,105	1,242	1,548	1,449	1,495
Model 2. 'Retail – focused'	1,947	3,006	1,900	3,416	3,178	102	150	112	171	159
Model 3. 'Retail – divers.'	4,448	5,185	5,965	6,988	8,195	247	236	271	333	356
Model 4. 'Wholesale'	6,479	6,210	7,535	5,597	4,990	360	414	419	373	384
All banks	19,502	21,854	26,239	24,695	25,331	340	398	426	406	416

Note: All figures correspond to the year-end observations for the relevant sub-sample.

Table 1.3. Other attributes across business models

	Model 1 - Investment	Model 2 – Retail–focus.	Model 3 - Retail–divers.	Model 4 - Wholesale	All banks
Size (% of GDP)	105.0%***	55.3%***	59.2%***	45.7%***	59.1%
Domestic assets (% of assets)	55.2%***	79.4%*	84.8%*	80.5%*	79.1%
Personnel expenditures (% of assets)	7.2**	10.4***	8.2**	4.3***	7.8%
Liquid assets (% of assets)	1.8%**	3.0%***	2.0%**	1.0%***	2.0%
Rev. repurchase (% of assets)	8.4%	6.3%	4.4%	6.1%	6.5%
Repurchase (% of assets)	8.9%**	5.7%**	4.0%**	6.0%**	5.7%

Notes: All figures are the mean values for the year-end observations for the relevant sub-sample. The independence of clusters was tested using Wilcoxon-Mann-Whitney non-parametric two-sample tests at 5% significance. According to the results of these tests, the number of asterisks (*,** or ***) stands for the statistical difference of any given cluster from that number of other clusters for that indicator. For example, two asterisks (**) implies that the cluster is statistically different from two other clusters but not the third (closest) one.

On a more structural note, the average size of a predominantly retail-oriented bank under Model 2, as measured by average total assets, tends to be half of the sample average, by far the smallest banks in our sample. Most of these banks are located in smaller countries, with the total assets of an average bank representing over half of the GDP of the countries in which they are headquartered. Lastly, the staff expenditures remain high, possibly pointing at a larger geographical coverage through a larger number of branches and personnel.

Model 3 shares several similarities with Model 2. First, and foremost, the group is comprised of retail-oriented banks, with traditional customer loans representing on average two-thirds of the balance sheet totals in both groups. These banks also tend to be relatively well-capitalised, implying a relatively high average tangible common equity ratio corresponding to a low leverage multiple. However, the two models do differ on funding sources. While the Model 2 banks rely purely on customer deposits, the Model 3 banks have more reliance on debt markets. The greater diversification of funding sources is most possibly an attempt to maintain a larger size. In line with this description, the Model 3 banks have continued to expand during the crisis, implying that the reliance on multiple sources of financing has reinforced the group's growth prospects.

In order to distinguish between the two retail-oriented groups, the models 2 and 3 will be referred to as the 'retail – focused' and 'retail – diversified' models, respectively.[12]

Model 4 includes banks with a heavy reliance on interbank funding and lending.[13] The liabilities of an average bank under this bank model to other banks, including both deposits and other interbank debt, represent nearly one-quarter of the total balance sheet, towering above the interbank liabilities of other bank models. In turn, traditional customer deposits represent only one-quarter of the total balance sheet—the lowest among the four groups. Other funding sources come from debt liabilities, which exclude traditional deposits and interbank funding.

The Model 4 banks, which will henceforth be referred to as 'wholesale', are also very active in non-traditional uses of these funds,

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[12] In Ayadi et al. (2011), the banks under models 2 and 3 were grouped together as a single retail bank cluster due to the limited coverage of the smaller retail banks in the sample of the prior study.

[13] The group of banks identified as wholesale banks have not changed substantially from Ayadi et al. (2011). In particular, nearly 91% bank/year observations identified as wholesale banks in the earlier study were identically grouped here.

including trading assets (i.e. all assets excluding cash, loans and intangible assets), which account on average for 40% of their balance sheets, and derivative exposures, which represent 14.2% of total assets. They are substantially more leveraged than their peers, with the lowest tangible common equity ratio of 2.3% among the four clusters studied. The total size of the wholesale banking group has declined over time, partly as a result of shrinking average sizes in the midst of the financial crisis in 2008 and 2009,. Lastly, the expenditures on staff is the lowest for the wholesale banking group, with average personnel expenditures remaining at €4.3 per €1,000 of assets, nearly half of the sample average.

Table 1.4. Model transition matrix, share of banks (%)

Prior period (t-1)	Current period (t)			
	Model 1 - Investment	Model 2 - Retail-focus.	Model 3 - Retail-divers.	Model 4 - Wholesale
Model 1	96.0%	4.0%	0.0%	0.0%
Model 2	0.0%	86.3%	12.3%	1.4%
Model 3	0.0%	9.8%	87.8%	2.4%
Model 4	0.0%	1.6%	9.4%	89.1%

Note: The figures show the share of banks that start under a given business model in the prior period and moving to another model in the current period.

Although the composition of banks under the different models remain relatively steady over time, transitions do occur and more so in some models than in others.[14] Table 1.4 provides the transition matrix for the four models through the years 2006 to 2010. The assignment of banks to the investment models shows striking persistence. In particular, approximately all of the investment banks remain within the same model throughout the sampled years. Moreover, no single bank becomes an investment bank over the entire sample. However, the transition probabilities are relatively high for the focused and diversified retail groups, with 10% or more of all banks that start in one group moving to the other model in the subsequent period. In addition, approximately 9.4% of all banks that start as a wholesale bank become a diversified retail bank subsequently although the opposite is true for only 2.4% of the diversified retail banks. The fact that an equally forceful opposing trend does not exist suggests that the wholesale-to-diversified retail transitions are more likely

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[14] See Appendix 5 for a complete list of banks surveyed, grouped by business model.

to be evidence of changing business models, also confirmed by the reduction in the size of the wholesale group over time (see Table 1.2).[15]

The results provided above give an insight into the main areas of activity and inherent characteristics of the four different bank business models: on the one hand are banks that engage in more risky and less stable funding and trading activities; on the other hand are banks, which remain closer to their traditional roots, relying more on retail funding and customer loans. The next two sections will consider whether these basic characteristics are confirmed by a detailed analysis of the financial, economic performance and risk attributes of the four models.

1.3   What performance and contribution to the real economy?

The comparative performances of the four business models are summarised in Table 1.5. As is clear from the figures, wholesale banks appear to do relatively badly among the four models in all of measures depicted, including return-on-assets (RoA), return-on-equity (RoE), and cost-to-income ratios (CIR).

Table 1.5. Performance indicators across business models

	Model 1 - Investment	Model 2 – Retail-focused	Model 3 – Retail-diversified	Model 4 – Wholesale	All
Return on assets (RoA)	0.48%**	0.85%***	0.65%**	0.16%***	0.57%
Return on equity (RoE)	12.10%*	9.24%*	12.07%*	3.51%***	9.03%
Cost-to-income (CIR)	64.41%*	55.82%***	58.97%**	118.11%**	73.57%

Notes: All figures are the mean values for the year-end observations for the relevant sub-sample. The independence of clusters was tested using Wilcoxon-Mann-Whitney non-parametric two-sample tests at 5% significance. According to the results of these tests, the number of asterisks (*,** or ***) stands for the statistical difference of any given cluster from that number of other clusters for that indicator. For example, two asterisks (**) implies that the cluster is statistically different from two (furthest) clusters but not the third (closest) one.

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[15] An analysis of the year-by-year transitions (not provided here) shows that the transitions from the wholesale to diversified retail models were particularly high in 2007 and 2009, both prior to and during the crisis.

In particular, although the statistical tests performed above fail to distinguish among the investment and retail-oriented models, they do set apart the wholesale bank group as the poorest performer. At the same time, the focused retail banks generally do better than their peers in profitability and cost efficiency measures. Diversified retail banks also do relatively well, although their performance in certain measures (e.g. RoE and CIR) is comparable to that of investment banks. Lastly, due to substantial variability in cost efficiency figures, the wholesale and investment banks are not distinguishable statistically, despite substantial differences in their mean values.

The average performances of the four business models given in Table 1.5 hide the evolution of profits over recent years, in particular over the crisis years of 2008 and 2009. As depicted in Figures 1.2 and 1.3, when the time series of the profit indicators are considered, wholesale banks continue to clearly lag behind their peers, with profits turning into negative territory during the crisis. Interestingly, despite the heavy hit that other banks have taken, most groups manage to obtain positive results for all years.[16] Only focused retail banks have suffered substantially negative results in 2010, which are due to the large losses suffered by a single retail bank, Allied Irish Banks.[17] Investments banks did suffer from low profits in 2008, but their profits quickly bounced back in 2009, putting them above their peers in both profitability measures by 2010. A similar but less elastic response of profitability to the crisis is also observed for diversified retail banks, whose profits dropped to a sample minimum in 2009, only to slightly improve in 2010. The rebounding of profits is further evidence that most banks, with the potential exception of smaller, focused retail-driven ones, can increase their capital levels by retaining earnings.

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[16] The relative robustness of the earnings of the investment banks during the crisis contrasts with the more mixed picture presented in Ayadi et al. (2011). However, the improved results for the investment banks in this study are entirely due to a more consistent identification of the investment bank group in this study.

[17] Allied Irish Banks was recapitalised by the Irish government in 2009. In 2010, the Irish government took a majority stake in the bank and has received a total of nearly €20 billion in state funds since the onset of the Irish banking crisis in 2008, mostly in the aftermath of the 2010 year-end losses of €11.9 billion.

A deeper assessment shows that retail banks would achieve lower profits than their peers even if the Allied Irish Banks was excluded from the sample. More specifically, the exclusion of Allied Irish Banks from the sample would increase the RoE for 2010 to 3.3%, which remains below the averages for other groups. In turn, for RoA, the exclusion of the bank from the sample would put the retail banks on top of the earnings table, along with investment banks.

Figure 1.2 Evolution of return on assets (RoA)
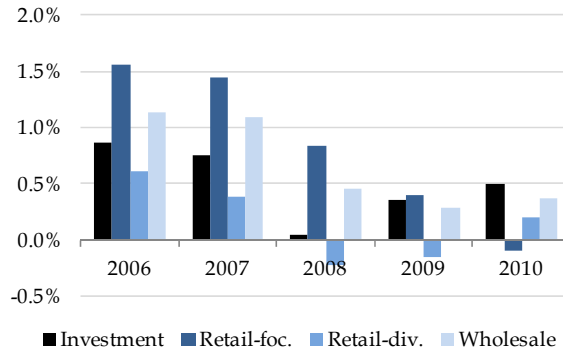
Figure 1.3 Evolution of return on equity (RoE)
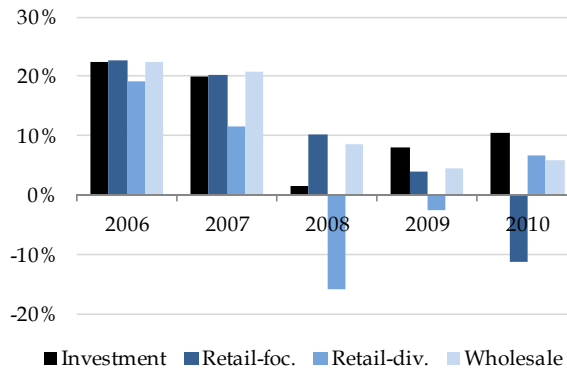
A more detailed analysis of the breakdown of incomes reveals a mixed picture. In particular, Figure 1.4 shows that investment banks clearly have substantial non-interest earnings, most notably from fees, trading and other earnings, which include insurance earnings. Meanwhile, focused retail banks rely substantially more on interest income.

The figures also highlight several less straight-forward results. In particular, all business models on average earn nearly one-quarter of their net incomes in commissions and fees. Similarly, although wholesale banks have been shown to have substantial trading and derivative exposures, they achieve negative returns from those activities, with the trading losses of 0.7% of total incomes. Instead, the net interest incomes are more stable for wholesale banks, which is paradoxical due to the lesser importance of traditional banking activities for this category of banks. Conversely, diversified retail banks, which have low trading and derivative exposures,

appear to earn from these activities a relative amount that is comparable to investment banks.

Figure 1.4 Main income sources across business models, 2006-10
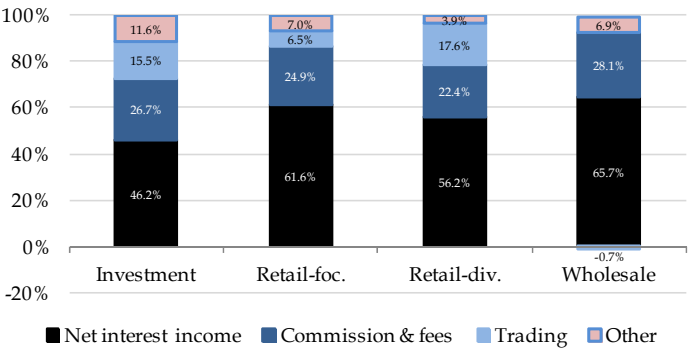
Note: Since annual results are substantially varied, the figures represent the aggregate proportions obtained by summing up the year-end observations for each income item and business model.

Figure 1.5 Evolution of trading income across business models
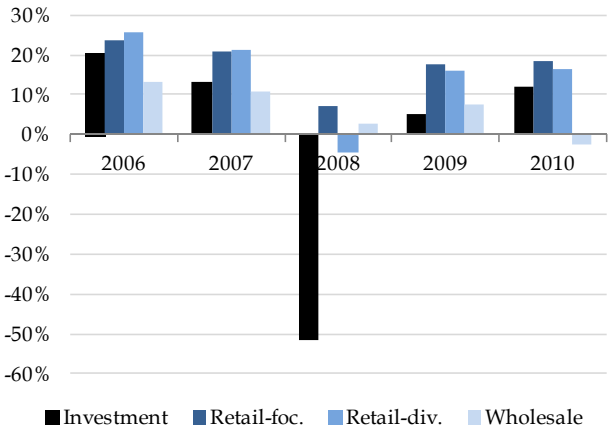
Note: Since annual results are substantially varied, the figures represent the aggregate proportions obtained by summing up the year-end observations for each income item and business model.

Why do the shares of trading earnings fail to identify the underlying models?

An analysis of the evolution of trading incomes depicted in Figure 1.5 provides a simple answer. The pre-crisis figures show that all banks except the focused retail-oriented banks earn more or less 20-25% of their incomes

from trading, with the investment banks clearly coming on top, followed by diversified retail and wholesale-oriented banks, respectively. The ranking changes considerably during the crisis, with wholesale banks posting breathtaking losses of over 50% of net incomes in 2008.[18] Investment banks' trading earnings also took a hit, albeit to a lesser extent. In contrast, diversified retail banks managed to obtain above-average returns in most years, surpassing the performances of all other banking models, including the investment banks, during and after the crisis. In short, the share of trading incomes fails to identify correctly the business models in our sample precisely due to heavy losses suffered by the wholesale and investment banks, which traditionally have greater trading exposures than other models.

To a large extent, the concentrated losses in the wholesale banking sector were due to the write-downs on US subprime exposures in the early phases of the financial crisis in 2008, in some cases well before the fall of Lehman Brothers. The write-downs by the wholesale banking group that were made public by August 2008, including most notably the state-owned German Landesbanken, added up to approximately €29 billion, nearly two-thirds of the year-end trading losses reported by all the wholesale banks.[19]

The previous results show that . income characteristics may serve as a poor indicator for assessing bank business models. For example, the share of commissions and fees, often used to distinguish investment-oriented banks, is similar across the four models on average.[20] In addition, the volatility of earnings renders the assessment of business models using income characteristics less reliable. Indeed, the share of trading income would not be able to identify correctly the set of investment or wholesale-oriented banks, as already noted above. In addition, the results highlight the relative stability of retail-oriented banks, including diversified retail

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[18] The trading losses suffered by the wholesale banking group are not due to the presence of outlier observations, with six banks posting losses of more than 100% of net incomes between the years 2008 and 2010, including DZ Bank, Dexia, Hsh Nordbank, Landesbank Baden-Württemberg, Oesterreichische Volksbank, and Wgz Bank. More strikingly, with the exception of a single entity, Skandinaviska Enskilda Banken, all of the wholesale banks have posted trading losses in 2008, adding up to aggregate losses of €44 billion or nearly 30% of the tangible capital equity for the group as a whole. In contrast, among the investment banks, only two of the seven banks recorded losses for those years, representing less than 5% of aggregate capital.

[19] The data on losses were obtained from Bloomberg, *Banks' Subprime Losses*, 12 August 2008 (http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a8sW0n1Cs1tY).

[20] See Stiroh (2004 and 2006) for the use of income characteristics to distinguish among the different business models.

banks, which appear to outperform their peers in cost efficiency and performance.

An additional question that remains to be answered is the extent to which the different business models continued to contribute to economic activity by providing loans. Faced with eroding capital bases, banks may turn to either raising more capital or de-leveraging. Booked losses and dropping asset prices often make it difficult for banks with low levels of capital to raise further capital, making the reduction of balance sheet size the more optimal choice (Myers, 1977; Myers & Majluf, 1984). Moreover, crisis conditions increase credit costs across the board, leading to higher agency costs of lending, pushing the less-diversified banks to engage in 'flight to quality' in search of more stable securities than loans (Lang & Nakamura, 1995; Bernanke et al., 1996). Thus, due to various difficulties, banks may choose to shrink their balance sheets by rationing loans and other investments.[21]

To what extent the slowing down of loan growth or deleveraging has occurred depends crucially on the risk characteristics and capital levels associated with the different bank business models. Based on the arguments outlined above, there is reason to suspect that banks with less diversified credit risks (such as focused retail-oriented banks) and inadequate capital levels (such as wholesale banks) would slow their supply of credit more than others.

Figure 1.6 shows that the growth of loans has subsided substantially after 2008 across all business models and has failed to take-off in 2010. In particular, the results confirm that outstanding customer loans have shrunk dramatically for wholesale banks, turning negative in 2009. For focused retail banks, the growth of loans have also slowed down substantially, stopped completely in 2009. All groups managed to expand their outstanding loans in 2010, although the gains for wholesale banks remain relatively small. In turn, the larger investment banks have continued to expand their loan books despite the crisis, although generally at a much slower rate than other banks. More strikingly, diversified retail banks have

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[21] It should not be forgotten that a decline in credit growth may not necessarily be a negative outcome, largely the result of a realignment of asset prices with fundamentals. See Borio & Lowe (2002) and Reinhart & Rogoff (2009), who show that rapid credit growth, in conjunction with rising real estate prices, can lead to financial instability and are the primary drivers of crises. Several authors suggest that various macro-prudential and monetary policy tools should be used to respond to these challenges and to the build-up of risk over time. See Allen & Carletti (2011) for an excellent discussion and literature review on these issues.

continued to expand their lending despite the crisis, although at gradually lower rates over the years.

Figure 1.6 Growth in outstanding customer loans (% change from past year)
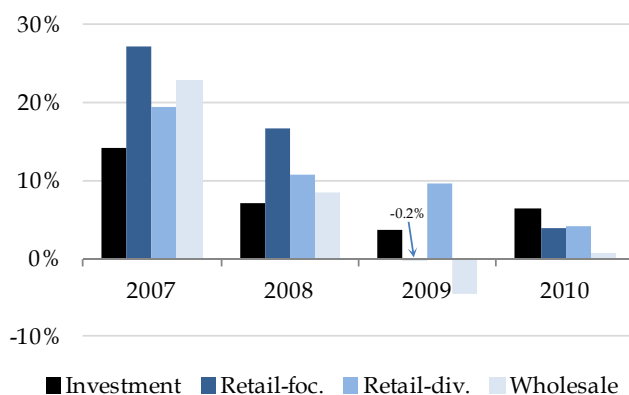
To sum up, the results presented in this section show that retail-oriented banks have generally outperformed their peers in terms of cost efficiency and performance measures. Wholesale banks and to a lesser extent investment banks have suffered substantial trading losses amidst the crisis, which has contributed to their less stable performances. The results also show that credit growth has slowed down for all banks and business models, in some cases leading to deleveraging. This is especially the case for the smaller focused retail banks and the inadequately capitalised wholesale banks. In turn, diversified retail banks have continued to extend credit despite the financial crisis. Lastly, the income characteristics are shown to be poor proxies for identifying the business models, due largely to the variability and responsiveness of earnings to market conditions.

1.4   What risks and how are they mitigated?

The key risk indicators are summarised in Table 1.6. For the most part, the results confirm earlier arguments on the risk attributes of various models. In particular, banks that rely more on non-stable forms of funding and risky investments, such as wholesale and investment banks, tend to face greater estimated default risks and lower liquidity. The focused retail banks face comparable default risks, although these risks appear to be well shielded by relatively strong capital levels and limited liquidity mismatch risks, at least on average. The diversified retail banking model does well under most measures, with low default risks, an average level of capitalisation and moderate liquidity risks.

Table 1.6. Risk indicators across business models

	Model 1 - Investment	Model 2 – Retail-focused	Model 3 – Retail-divers.	Model 4 – Wholesale	All
Z-score (std.dev. from default)	15.1*	16.1*	21.5*	12.2***	16.8
Risk-weighted assets (RWA) (% assets)	34.5%**	57.9%**	54.1%**	37.3%**	49.6%
CDS spread (senior, annual avg., bps.)	69.2	143.5	96.5	109.9	101.7
Tier-1 capital ratio (% of RWA)	9.6%	9.8%	9.0%	9.7%	9.5%
Tang. common eq. (% of tang. assets)	2.6%**	5.4%***	3.8%***	2.3%**	3.8%
NSFR (Avail./req. funding)	60.2%***	93.6%***	84.1%***	72.0%***	81.0%

Notes: All figures are the mean values for the year-end observations for the relevant sub-sample. The independence of clusters was tested using Wilcoxon-Mann-Whitney non-parametric two-sample tests at 5% significance. According to the results of these tests, the number of asterisks (*,** or ***) stands for the statistical difference of any given cluster from that number of other clusters for that indicator. For example, two asterisks (**) implies that the cluster is statistically different from two (furthest) clusters but not the third (closest) one. See Appendix II for the assumptions pertaining to the construction of the net stable funding ratio (NSFR) measure.

The first indicator, Z-score, provides an estimate of a bank's distance to default.[22] In essence, the risk measure uses historical earnings volatility and current capital levels to construct the level of a (one-time) shock beyond the historical average that would lead to default. The greater the Z-score, the less probable is the likelihood of a default. The diversified retail banks appear safer, with a higher distance to default and a high level of net stable funding. However, statistical analysis reveals that the distributions of Z-scores for diversified retail, investment and focused retail banks cannot be distinguished. In turn, wholesale banks have effectively the lower Z-scores, implying the highest risks.

The second indicator, the ratio of risk-weighted assets (RWA) to total assets, or the average risk-weights, provides a regulatory measure of risk. Banks with higher RWA are expected to be prone to risks and are thus required to hold more regulatory capital to account for their risk-weighted

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[22] See Appendix III for calculation of the Z-score.

balance sheet. According to the statistical analysis, the wholesale and investment models as well as the two retail-oriented models share the same underlying distributions for these variables. In particular, both wholesale and investment banks appear to be less risky, with an average risk weight of approximately 35%, which is substantially smaller than the average risk weights of the retail-oriented banks (approximately 55%). The finding that wholesale banks have less exposure to risks in their assets is intriguing and clearly inconsistent with the Z-score findings, which indicated higher default risks.[23]

The third indicator, the average CDS spreads for senior securities, displays some variation among the four groups, most notably for the wholesale and focused retail banking groups, for which the averages are relatively high. However, the statistical analysis is unable to uncover any statistical significance, implying that the underlying distributions may be identical. Echoing the results in Ayadi et al. (2011), the market participants do not appear to distinguish between the four models in terms of their inherent risks. Provided that other indicators do find substantial differences for the underlying risks, it is likely that the market participants have already factored in the likelihood of bail-outs, resulting in the comparability of the markets' perception of default risks. Once again, these findings give support to the elevation of moral hazard risks due to the dilution of market discipline in the eventuality of bank bail-outs or state guarantees (Calomiris & Kahn, 1991).

The fourth and fifth indicators measure the loss-absorption capacity of banks, under the current Basel II rules. For any given level of risk, holding more capital could imply greater stability. The results show that the Tier-1 ratios are statistically indistinguishable among the four banking groups, implying a more or less identical absorption capacity. Retail banks hold substantially more tangible common equity, which is likely to make them safer at least for the period of observation under investigation. The fact that this added level of safety is not reflected in the Tier-1 ratios is intriguing and invites the possibility that the main regulatory instrument currently in use may not be adequately for capturing (or signalling) the loss-absorption capacity of a bank.

The sixth indicator, net stable funding (NSF) ratio, is an estimate of the proposed long-term liquidity risk measure proposed under the Basel III

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[23] See below for a deeper inquiry into why the regulatory and estimated risk measures may differ so radically.

rules, (BCBS, 2010c). Expressed simply, the measure gives an estimate of the available stable funding sources as a share of required stable funding, which is constructed with available data. Although the measure should be interpreted with caution, a greater value should point to lower liquidity risks.[24] The figures show that the retail oriented banking models face relatively lower liquidity risks, while investment banks may face higher risks. It is important to note that no single bank satisfies the 100% funding requirement on average, as proposed under Basel III. Moreover, Figure 1.7 shows that liquidity conditions have gradually worsened for all models in recent years, particularly for the investment and wholesale banks that took severe liquidity hits in 2008.

Figure 1.7 Evolution of net stable funding ratio (NSFR)
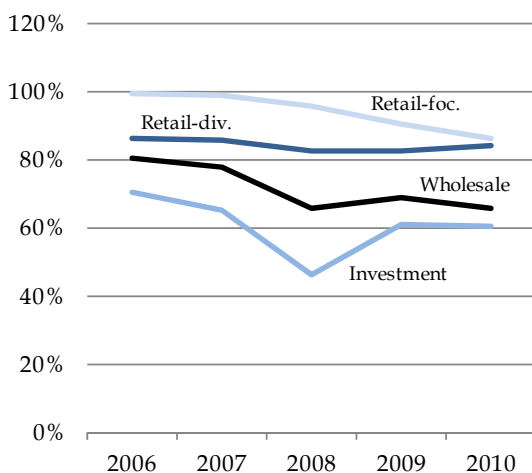
Note: See Appendix II for the assumptions pertaining to the construction of the net stable funding ratio (NSFR).

An alternative assessment of default risks follows the 'top-down' approach to calibrating regulatory minimum capital requirements under stress conditions, as described in BCBS (2010d). More specifically, the quantiles of the return to risk-weighted assets (RoRWA) are used to

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[24] See Appendix II for a detailed description of the measure used in this study. Note that the developed indicator suffers substantially from the unavailability of detailed information. In particular, the disclosure requirements that are currently applicable do not require banks to distinguish between different maturities, secured transactions and many specific asset and liability classes that are relevant for determining liquidity in an institution.

construct expected losses that banks may face under a stress scenario. If the most loss-absorbing parts of equity (i.e. the tangible common capital ratio) remain below or close to such a measure, then the likelihood of a default would be equally higher under those stress conditions.

As an illustrative example, consider a bank that achieves 3% RoRWA in normal years. Let us assume that in a bad year, which occurs randomly once every 20 years, the bank faces a 7% loss. Note that the loss corresponds precisely to the 5th percentile of the distribution function. Although average earnings (2.5% RoRWA) may be considered healthy, the bank will nevertheless default if its risk-adjusted capital level is below 7% in a bad year. Assuming a similar distribution for other banks, the regulators should ensure that the banks have at least this amount of capital at all times to cope with stress when needed.

Figure 1.8 Distribution of risk-weighted returns (RoRWA)
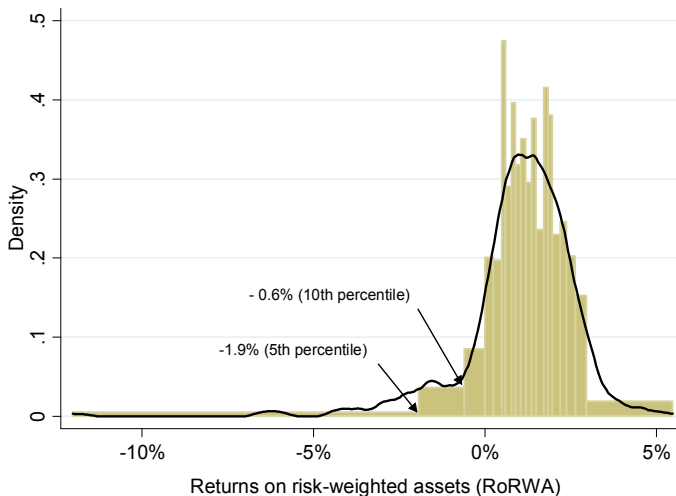
Note: This figure depicts the quantile distribution (in 5-percentile bars) and the estimated kernel density (dark line) for all banks covered in the study for the years 2006 to 2010.

Naturally, the distribution of returns of actual banks is substantially more varied than the example above. In particular, Figure 1.8 provides an illustration of the distribution of the risk-weighted returns for all banks and years in the sample. The mode of the distribution (the highest point of the kernel estimates) is around 1% RoRWA, implying health returns for most

banks in normal years. Assuming that a bad year is defined as a once in a 10-year event, i.e. lower 10th percentile losses, banks face RoRWA losses of 0.6% (see also Table 1.7). If a bad year is defined to be a rarer and thus a more destructive event, i.e. lower 5th percentile, the potential losses increase to 1.9%.[25]

Using such estimates for different business models, one can assess the adequacy of the capital requirements to cope with stress conditions.

For our sample, the number of observations is largely insufficient to produce consistent estimates for the 1st and 5th percentiles, especially for individual business models. The limited sample size thus increases the likelihood of estimation errors. Moreover, the relevant order statistics may be substantially biased if the underlying distribution is not normal. In order to address the latter concern, the distribution-free quantile estimator first proposed by Harrell & Davis (1982) was used to generate alternative estimates for the lower percentiles, in addition to the statistics obtained from the original sample.[26] The estimation results should nevertheless be interpreted with caution due to potential estimation errors.

The lower percentile estimates depicted in Table 1.7 provide an insight into the potential losses that banks have faced in recent years. When the entire sample is considered, the risk-adjusted losses, as measured by RoRWA, are approximately 4.2% at the 1st percentile.[27] Losses are substantially greater during the crisis years, with the pooled sample of banks facing risk-adjusted 1st percentile losses of 6.3%. In turn, if the crisis years were not considered, an average bank in our sample is expected to attain a 0.1% RoRWA.[28]

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[25] Assuming that earnings are randomly and independently distributed, the estimates would imply that a bank with risk-adjusted capital less than 1.9% would face a default likelihood of 5% at any given point in time. However, the earnings distributions of different banks are typically highly correlated, especially when interbank activities and common exposures are substantial. It is also assumed that losses are not correlated over time, which is also not likely to be the case. Based on these shortcomings, the actual default likelihoods are likely to be much higher than the levels implied by the percentile estimates.

[26] Harrell & Davis (1982) provide a kernel quantile estimator in which the order statistics (i.e. smallest observations) used in traditional nonparametric estimators are given the greatest weight.

[27] The pooled sample statistics for 1st percentile are largely in line with the figures provided in BCBS (2010d), which estimate RoRWA losses of 4%.

[28] Although the estimates for different years can clearly not be used to build the scenarios, the substantial differences highlight the need for a balanced data. Whether and the extent to which the crisis years are included in the dataset have a substantial impact on the severity of the stress scenarios and the relevant capital requirements.

The distinction between the sample statistics and the Harrell-Davis estimates hint that concerns over the consistency of estimates could be well-placed. Even for the entire sample (with 328 observations), all of the depicted percentile estimates differ from the original figures. In particular, the estimated RoRWA loss at the 1st percentile is 5.4%, implying that banks with lower capital ratios are likely to default under such a stress event.

Table 1.7. Lower percentile estimates for return on risk-weighted assets (RoRWA)

	Obs.	Sample statistics			Harrell-Davis estimates		
		1st	5th	10th	1st	5th	10th
ALL YEARS (2006-10)							
Model 1 - Investment	31	-6.3%	-0.5%	0.2%	-5.8%	-2.6%	-0.3%
…w/o RBS	28	0.2%	0.6%	0.6%	0.3%	0.4%	0.6%
Model 2 – Retail focus.	92	-12.0%	-2.2%	0.0%	-9.3%	-2.4%	-0.3%
…w/o Allied Irish	88	-4.1%	-1.2%	0.3%	-3.9%	-1.5%	0.1%
Model 3 – Retail divers.	106	-1.5%	-0.5%	0.0%	-2.0%	-0.7%	-0.1%
Model 4 - Wholesale	64	-3.2%	-2.0%	-1.5%	-3.1%	-2.3%	-1.6%
All banks	328	-4.2%	-1.9%	-0.6%	-5.4%	-2.0%	-0.8%
PRE-CRISIS (2006-7)							
Model 1 - Investment	12	0.6%	0.6%	1.8%	0.6%	0.7%	1.2%
Model 2 – Retail focus.	36	0.8%	0.9%	1.4%	0.8%	0.9%	1.3%
Model 3 – Retail divers.	40	0.8%	1.0%	1.2%	0.8%	0.9%	1.2%
Model 4 - Wholesale	28	0.1%	0.2%	0.5%	0.1%	0.2%	0.5%
All banks	129	0.1%	0.6%	0.9%	-0.7%	0.0%	0.8%
CRISIS (2008-9)							
Model 1 - Investment	19	-6.3%	-6.3%	-0.5%	-6.0%	-4.2%	-1.8%
…w/o RBS	16	0.2%	0.6%	0.6%	0.3%	0.4%	0.5%
Model 2 – Retail focus.	56	-12.0%	-3.9%	-1.8%	-10.6%	-4.2%	-1.8%
…w/o Allied Irish	54	-4.1%	-3.2%	-0.2%	-4.0%	-2.7%	-0.1%
Model 3 – Retail divers.	66	-2.5%	-1.2%	-0.5%	-2.3%	-1.1%	-0.5%
Model 4 - Wholesale	36	-3.2%	-2.8%	-2.0%	-3.1%	-2.7%	-2.2%
All banks	199	-6.3%	-2.8%	-1.8%	-7.3%	-2.8%	-1.7%

Note: The figures correspond to the 1st, 5th, and 10th percentile estimates of the distribution of the RoRWA, conditional on the business models and time periods across the sample.

Turning to the comparison of different business models, the figures show that diversified retail banks faced the least losses both before and during the crisis. The estimates of the 1st and 5th percentile losses for the diversified retail banks are relatively precise, ranging between 2.3-2.5% and 1.1-1.2%. The same also applies to wholesale banks, albeit to a lesser extent, where the respective estimates range between 3.1-3.2% and 2.7-2.8%. Based on the 10th percentile results, wholesale banks clearly face the largest risks, scoring below all other business models in all of the estimated provided in Table 1.7. In turn, according to the 1st and 5th percentile estimates, both investment and focused retail banks have been subject to large losses.

The outliers appear to play an important role in some of these results. One investment bank, Royal Bank of Scotland (RBS), has suffered RoRWA losses of 6.3% in 2008, with continued loss-making through 2010. Although dropping this observation substantially improves the results substantially, the relative small size of the investment bank cluster makes the comparisons less credible. The negative result for the focused retail banks is also partly driven by a single bank, the Allied Irish Banks, with a RoRWA loss of 12% in 2010. However, focused retail banks remain more risky than their diversified peers (and wholesale banks for 1st percentile losses in crisis years) even when the outlier observation is removed from the sample.

Comparison of the mean loss values for RoRWA (Table 1.8) shows that the distinctions between clusters is far from clear when tested using Wilcoxon-Mann-Whitney non-parametric two-sample tests. Indeed, the results for all years (49 observations) show that the wholesale and diversified retail models are distinct from the focused retail model. However, the same result does not hold in crisis years; indeed, the available data do not allow us to distinguish the losses across business models when crisis years are considered, most likely due to the smaller qualifying sample. In particular, although the investment model appears to experience the largest losses, these occurred in only three observations in the entire sample. As a consequence, the non-parametric test is unable to identify the sample as statistically distinct from others.

The findings show clear distinctions across business models in terms of riskiness. In particular, the average risk weights (as measured by RWA as a % of total assets) do not seem to be a good indicator of the underlying risks. In particular, wholesale banks face severe default risks (as measured by a low Z-score, or proximity to default) but appear to also enjoy low average risk weights (see Table 1.6).

Table 1.8 Mean RoRWA losses across business models

	Model 1 - Investment	Model 2 – Retail-focused	Model 3 – Retail-diversified	Model 4 – Wholesale
All years (2006-10)	-2.3%	-3.6%*	-0.8%*	-1.4%*
Crisis years (2008-09)	-3.4%	-2.4%	-0.7%	-1.5%

Notes: All figures are the mean values for loss-making banks. The independence of clusters was tested using Wilcoxon-Mann-Whitney non-parametric two-sample tests at 5% significance. The number of asterisks (*,**, or ***) stands for the statistical difference of any given cluster from that number of other clusters for that indicator. For example, a single asterisk (*) implies that the cluster is statistically different from the furthest cluster but not the other two.

One explanation for the finding that regulatory measures appear to be misaligned with underlying risks is the possibility that greater risk-weights are associated with more capital. If banks with greater RWA also hold more capital, partly due to binding regulatory requirements, they may face lower default risks, possibly explaining the perverse relationship.[29]

An alternative explanation is that banks may be engaging in 'risk optimisation' to reduce their risk-weights (and the implied capital charges) without shedding any risks. Indeed, despite sound arguments for making capital requirements risk-sensitive, the complexity and flexibility of these rules have led to concerns over the potential for regulatory arbitrage.[30] Since raising capital is not always possible during the crisis periods, banks often choose to respond to regulatory shortfalls by decreasing their risk-weighted assets. There is growing concern that such transactions need not always imply lower levels of risk and involve 'cosmetic' arrangements (i.e. regulatory arbitrage) that are motivated solely to optimise capital requirements.[31]

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[29] A closer examination reveals that for the relationship between RWA and distance to default to be positive, banks should respond to higher risk weights by holding substantially more capital than before, surpassing the adjustments implied by binding capital requirements. In other words, banks with higher RWA should hold substantially more capital than the minimum required amounts, and vice versa.

[30] The theoretical literature provides a simple argument for making capital requirements risk-sensitive. Faced with purely linear (i.e. risk-insensitive) capital requirements, banks may shift their portfolios towards riskier assets, offsetting their losses from higher capital levels by increasing their portfolio risks (Kahane, 1977; Koehn & Santomero, 1980; Kim & Santomero, 1988; Rochet, 1992). Empirical studies have confirmed that fixed capital requirements may increase risks, conditional on the size and the adequate capitalisation of the bank (Furlong & Keeley, 1989; Gennotte & Pyle, 1991; Calem & Rob, 1999).

[31] Jones (2000) discusses several forms of 'cosmetic' adjustments that banks can undertake to reduce

The empirical evidence on the potential misalignment of risk-sensitive capital requirements remains relatively limited. In Ayadi et al. (2011), we provided evidence of a negative relationship between average risk weights and a number of risk factors for the EU's top banks in recent years, including estimates of default likelihood, tier-1 ratio and earnings volatility. Supplemental evidence from the study also shows that investment-oriented banks may have found ways to take on more risk than their regulatory risk measures would reflect. More recently, Das & Sy (2012) have shown that banks with lower average risk-weights (measured by the risk-weighted-assets to asset ratio) do a poor job in predicting market measures of risk, especially during the crisis.

Table 1.9 provides the results of censored regression regressions to assess whether the average risk weights explain distance from default (Z-Score). In addition to univariate regressions across the different business models, additional regressions that control for the tangible capital equity are also included (even-numbered columns). If the regulatory risk measures are good indicators of underlying risk, the relationship should be negative, implying that banks with a higher RWA are closer to default, controlling for capital levels.

The estimation results given in columns III, V and VII show the presence of a persistent but insignificant negative relationship for most models. However, for the investment bank model (column I) and the pooled sample (column IX), the relationship is significant and positive, which implies that RWA are perversely related to underlying risks. The relationship becomes stronger and more negative when capital is controlled in the wholesale (column VIII) and diversified retail banking (column IV) models as well as the pooled sample (column X). Nevertheless, the proportionality of capital to RWA does not appear to be a good explanatory factor for investment banks, for which the relationship remains in the positive territory, even after losing its significance, once capital is controlled for (column VI).

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risk weights, including the concentration of assets in highest risk classes for a given risk weight, various forms of credit enhancements, remote-origination, and structured transactions. More recently, some observers note that the introduction of the IRB approach under Basel II has effectively enlarged the opportunities of the more sophisticated banks to engage in regulatory arbitrage, (Blundell-Wignall & Atkinson, 2010; Dewatripont et al., 2010; ICB, 2011). More specifically, there is substantial evidence from the financial crisis of 2007-09 that losses from off-balance sheet asset-backed commercial paper (ABCP) conduits have remained with the originating banks (Acharya et al., 2010).

Table 1.9 Relationship between Z-score and RWA across business models, 2006-10

	Model 1 - Investment		Model 2 – Retail – focused		Model 3 – Retail - diversified		Model 4 – Wholesale		All banks	
	I	II	III	IV	V	VI	VII	VIII	IX	X
RWA	24.3**	14.2	-4.6	-8.8	-0.6	-8.2**	-5.9	-7.3*	5.5***	-5.1***
	-10.5	-12.5	-5.9	-5.3	-3.9	-3.3	-4.1	-3.8	(1.7)	(1.9)
TCE		202.3		124.3***		226.6***		225.1***		175.6***
		-134.4		-28.7		-30		-76.6		(16.2)
Cons.	2.1	0.3	13.6***	9.7**	11.8***	7.1***	9.8***	5.3***	7.2***	5.8***
	-3.5	-3.2	-3.8	-3.8	-2.4	-2	-1.4	-1.9	(0.9)	(0.7)
Obs.	31	31	88	88	101	101	63	63	318	317
Log L.	-93.77	-92.24	-285.5	-280.2	-337	-325.1	-179	-174.8	-1028	-990.5
F-stat.	5.381	5.297	0.61	10.42	0.0254	28.45	2.086	5.1	10.68	82.61
p-value	0.027	0.011	0.437	0	0.874	0	0.154	0.009	0.001	0.000

Notes: Regressions present results for Tobit univariate regressions with the Z-score as the dependent variable and left-censored at zero. Robust standard errors are in parentheses. ***, **, and * signify significance at 1%, 5%, and 10% p-values. RWA: risk-weighted-assets as % of total assets; TCE: tangible common equity as % of tangible assets; Log L.: log likelihood ratio.

The findings give support to the idea that the responsiveness of capital levels to increased RWA may be partly offsetting the impact on increased default risks. In other words, banks with greater RWA may be holding more capital, which may make them equally sound as banks with a lower risk profile. Moreover, the regulatory risk measure (RWA relative to total assets) appears to capture the underlying risks for the wholesale, diversified retail and the focused retail banking models. In turn, the relationship between the two measures of risk is at best ambiguous for investment banks, even after controlling for capital, strengthening the case for the alternative explanation of regulatory arbitrage. Due to the complex and often cross-border nature of the transactions involved, the investment banks also have more opportunities than their peers to engage in such cosmetic transactions to optimise their capital charges. Although the results cannot be used as strong evidence of regulatory arbitrage, further research with a larger sample and over a longer period should be used to confirm whether regulatory arbitrage may indeed be in play, at least for the more investment-oriented banks.

1.5 Summary of main findings

The results outlined in this section highlight several risks associated with the different business models of EU banks, which are relevant to the discussion of regulatory conditions that will be presented in the next chapter.

First, the two retail-oriented models appear to be safer than others, as measured by the distance from default (Z-score) and the long-term liquidity risks (NSFR ratio). A deeper analysis reveals that although the diversified retail banks are less likely to face losses during downturns, the same is not true for the focused retail banks. However, these smaller institutions may absorb these risks if they continue controlling their leverage and being well-capitalised. Wholesale banks, instead, carry a range of risks, especially through an apparent shortage of liquidity and failure to build adequate buffers to absorb shortfalls arising from these risks.

Second, some of the risk indicators fail to distinguish between business models. This is most strikingly the case for Tier-1 ratio and the CDS spreads. While the former is likely to be the result of inadequate binding regulatory requirements that lead to an instrument-wide convergence, the latter could be a realisation of the moral hazard risks emanating from the too-big-to-fail (TBFF) phenomenon. If the market

participants believe that all troubled large banks will be saved, no matter what their business model or underlying risks may be, the markets will treat them as if they will not fail, leading to an artificial convergence of the pricing of risk. It is entirely possible that the same explanation could also be behind the relatively superior performance and the low loss-making potential of the larger investment banks.

Third, although historical evidence suggests that minimum capital requirements could be raised for certain business models, the sample size and data availability issues need to be addressed before making a more sound judgement. The relatively limited evidence provided in this study shows that diversified retail banks face the least risk of a capital shortfall during crisis periods, notwithstanding the precision level or the estimation methods. In turn, wholesale and focused retail banks appear to face more risks during downturns, even after removing outliers. These results provide some justification for imposing stricter regulatory requirements for both focused retail and wholesale banks, although more data are needed for more reliable estimates, and continued monitoring of all business models. As for investment banks, although it is not possible to make an objective judgement on the need for stricter requirements, the results suggest that drastic capital shortfalls are certainly possible, which make this category of banks vulnerable to external shocks.

Lastly, the RWA ratio fails to be a good indicator for default risks for investment banks, even after controlling for capital. Given that these banks typically achieve much lower average risk weights than their peers, it is very likely that the risk-sensitive capital requirements fail to direct these banks to hold an appropriate amount of capital. However, our analysis of stressed earnings fails to point to heavier capital requirements for this class of banks, which is largely due to the smaller sample size for the business model. A longer time-series is needed to draw stronger results for this group.[32]

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[32] Part of this ongoing monitoring exercise will be undertaken by CEPS, starting in the second half of 2012 and reported in forthcoming Business Model Monitor reports.

2. THE NEW BASEL RULES IN THE EU: DO BANK BUSINESS MODELS MATTER?

Aimed at addressing the regulatory deficiencies enshrined in the previous Basel Accords and ultimately at reducing the probability of future bank failures, the new European version of the future banking rules introduced once again a number of 'incremental' changes. These changes impose specific regulatory requirements that are supposed to create incentives for more prudent bank behaviour.

In a nutshell, the proposed rules increase the quality and quantity of the minimum capital; introduce new rules on liquidity, leverage ratios, counter-cyclical buffers, and systemically important financial institutions; and amend the definitions of counterparty credit risk and rules for the banking book. The rules complement the earlier amendments that strengthened the capital and disclosure requirements for the trading book and re-securitisation instruments as well as requirements to ensure that remuneration policies do not lead to excessive risk-taking.

This chapter provides a preliminary diagnosis and an assessment of these Basel rules in the EU and proposes potential regulatory adaptations to bank business models with the aim of improving future implementation.

2.1   Minimum capital requirements

The recent financial crisis has amply demonstrated that existing capital cushions are far from adequate to absorb losses or prevent widespread panic, inducing governments and monetary authorities to step in to support the financial institutions. Indeed, many of the rescued banks were seemingly in compliance with the minimum capital requirements before the troubles emerged. The core of the criticism has been the increased reliance on lower-quality capital, especially on non-tangible equity and hybrid forms of Tier-2 capital, which may fail to absorb losses as a bank

continues to operate (Blundell-Wignall & Atkinson, 2010; Viñals et al., 2010).

The loss-absorption capacity of regulatory capital has been one of the central innovations of the Basel III framework and the CRD IV-CRR proposal. The proposed changes aim to ensure that the strictest definition of regulatory capital (i.e. the Tier-1 capital) is truly loss-absorbing and can support a bank to operate as a going-concern. In the case of some of the hybrid convertible instruments that have been accepted as Tier 1 capital under Basel II and its European variant, conversion to equity required a failure event to occur. However, rescues by national authorities meant that such an event never took place, calling into question the effective loss-absorption of such instruments.

The Basel Committee on Banking Supervision (BCBS) proposed a number measures to strengthen the definition of capital. In implementing these agreements, the CRD IV-CRR proposal aims at harmonising the definition of capital within the EU while opting for some divergences from the original Basel framework.

In a nutshell, the common equity Tier 1 capital is introduced as the most junior and restrictive form of regulatory capital.[33] Additional Tier 1 instruments comprised equity-like instruments that can absorb losses when the entity is solvent (e.g. going-concern capital), leaving some of the less loss-absorbing convertible instruments to Tier 2 (i.e. gone-concern capital). The new rules eliminate the use of Tier 3 capital instruments, which were introduced in the Basel II framework to cover market risks.

Although the Regulation goes to great length to characterise criteria for qualifying instruments, there may be inconsistencies among member states, due to a number of reasons ranging from legal to political ones. One specific example is the convertible instruments (e.g. 'silent participations') that were used by public authorities in Germany to inject capital into troubled banks. These instruments have been the subject of some controversy after the European Banking Authority (EBA) initially decided

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[33] The common equity Tier 1 is composed of equity that is paid-up, perpetual, not repayable with the exception of liquidation, excluding preferential shares, with distributions that are payable once all obligations are met, taking the first and largest share of losses, entitling owners to residual assets, and with the paid-in amount not secured by any arrangement to enhance the seniority of the claim (Art. 26(1)). In addition, a number of deductions are made, including current losses, intangible assets and goodwill, deferred tax assets on future tax-related earnings, expected loss amounts for institutions that use the internal-risk basis (IRB) approach, minority interests, and own- or cross-holdings of own common equity Tier 1 instruments (to avoid double counting) (Arts 33-43).

not to treat them as core Tier 1 equity under its July 2011 stress tests. The main reason behind the EBA's decision was that the instruments do not qualify as paid-in equity or first-loss absorbing equity, as they do not convert to equity in normal times (i.e. for going-concern banks).[34]

For the moment, the CRD IV proposal leaves some areas regarding the definition of qualifying instruments grey. For example, it is not entirely clear whether the EBA will have the mandate to develop definitions for all or only a subset of the qualifying instruments. The European Parliament's compromise of May 2012 requires the EBA to have a say on a series of broad concepts, including most notably what 'first-loss absorbing equity' may mean. However, the Council's compromise appears to do the opposite, leaving the definition and monitoring of qualifying instruments to national authorities. With no clear responsibility to be the ultimate standard bearer on qualifying capital, it is questionable whether the EBA can challenge the use of certain instruments by certain member states. To avoid increasing discretion between competent authorities, the EBA should be given the ultimate responsibility to devise the technical standards on the nature and definitions of all qualifying instruments and monitor whether the national practices comply with these EU-wide definitions.

In addition, the proposed EU rules continue to allow competent authorities to give consent to an alternative method of consolidation for insurance and re-insurance entities, as provisioned under Directive 2002/87/EC. However, under the Basel III proposal, significant investments outside the scope of regulatory consolidation (i.e. with more than 10% but less than 50% ownership stakes) in banking, insurance and financial entities will be deducted from the common equity Tier 1 capital base. The deduction is motivated by the principle that any equity held in banking, insurance or financial entities that are not wholly-owned (and thus not fully controlled) should correspond only to the risks that are particular to those activities. The divergence from the internationally-agreed Basel III standard may fail to address the inherent interconnectivity risks, especially in the bank-assurance groups.

In terms of the minimum regulatory requirements, the EU rules envisaged for the common equity Tier 1 would start at 3.5% of risk-

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[34] Accordingly, the CRD IV proposal allows grandfathering of all state-aid instruments (CRR, Art. 462), effectively allowing silent participations to be counted as common equity Tier-1 (CET1) as long as the instruments were issued before July 2011, a date that was extended to April 2012 under the April 2012 Council compromise.

weighted assets in 2013, to be gradually raised to 4% in 2014 and to 4.5% in 2015 onwards. Likewise, minimum Tier 1 capital requirements would commence at 4.5% in 2013, 5.5% in 2014 and 6% in 2015 and onwards. Total minimum capital requirements will remain at 8% for the entire period.[35]

A central issue behind the increase of the quality and quantity of capital is the extent to which (if at all) the imposed capital requirements are a real cost either to banks or to the society generally. It is often claimed (mainly by bankers) that to impose higher capital requirements (in quantity and quality) would lead to a rise in the costs of banking and financial intermediation services, lower bank lending and lower rates of return on equity and hence returns to shareholders. We argue the case for a substantial rise in bank (equity) capital as a major contribution to lowering the probability of bank failures and enhancing systemic stability, which in the long-run benefit both banks and society. This is based in part on the proposition that many concerns about raising equity capital requirements are unfounded when the systemic and long-term perspectives (rather than the short-term interests of banks and shareholders) are adopted.

Various models (e.g. Admati et al., 2010) suggest that a rise in equity capital ratios should produce at least some offsetting fall in risk premia (both in equity and debt) as the bank becomes less risky. This in turn lowers the required rate of return on equity to satisfy shareholders. Overall, whilst the impact of higher equity ratios on the overall cost of capital might be modest, the offset is unlikely to be total (Llewellyn, 2011). Nevertheless, empirical research shows that large banks will be able to meet the stricter requirements without significant pain, in many cases simply by retaining their earnings (Ötker-Robe & Pazarbaşıoğlu, 2010).[36]

Even if higher capital requirements increase regulatory costs, the social benefits of a potentially more stable banking system need to be considered as part of the equation of balancing costs and benefits over time. Such benefits include the avoidance of the costs of bank crises, lower costs to taxpayers associated with bank failures and a greater confidence in the banking system, which should also contribute to lowering the cost of capital.[37] In addition, higher equity ratios are likely to create more powerful

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[35] The competent authorities are allowed to set limits that are closer to the ultimate minimum restrictions within the transition period (CRR, Art. 488).

[36] BCBS's own impact assessments also confirm that the impact of the reinforced capital and liquidity requirements would have a very limited impact on growth (BCBS, 2010a and b).

[37] Admati et al. (2010) argue that higher capital requirements are likely to produce more stable returns

incentives for private monitoring and reduce moral hazard risks as equity holders have more to lose, which compensates the cost of monitoring and assuming no implicit guarantees.

Higher capital requirements can also counteract the preferential tax treatment of debt, which could be contributing to increased use of debt instruments (as opposed to equity) among banks.

One question that emerges from this discussion *is what the appropriate level of capital should be*. The evidence provided in the calibration of regulatory minimum capital requirements in BCBS (2010d) show that the minimum common equity Tier 1 ratio of 4.5% is a reasonable starting point but not necessarily high enough to prevent widespread failures during downturns and in the more interconnected business models.

Figure 2.1 Return on risk-weighted assets (lower percentile estimates)
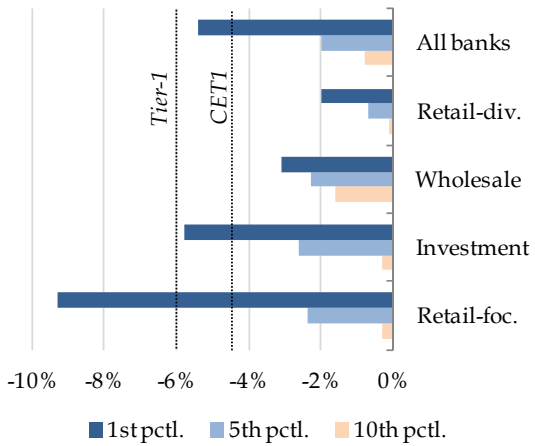
Notes: The graph shows the Harrell-Davis lower percentile estimates for the distribution of returns on risk-weighted assets (RoRWA), representing the worst losses that banks would face in rare events. The estimates are drawn from the entire sample years and banks. Loss estimates for the 10th percentile correspond to losses that would materialise in a once-in-a-decade bad event, as opposed to losses in a once-in-20 years (5th percentile) and once-in-a-century events.

Based on the results discussed in section 1.4 of chapter 1, Figure 2.1 shows that many banks in our sample would suffer greater risk-adjusted losses than 4.5%. For example, a once-in-a-century stress event

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to bank shareholders albeit lower in buoyant times but higher in distressed times because of a lower appetite for risk.

(corresponding to lower 1st percentile) would lead to risk-adjusted losses of 5.4% on average, exceeding the minimum common equity Tier 1 (CET1) requirement of 4.5% and getting close to the minimum Tier 1 requirement of 6%.

Across different business models, the tail risks are particularly acute for the focused retail banks and investment-oriented banks, although the limited sample size (as noted in chapter 1) does not allow us to make a more general and forceful conclusion. Although the 1st percentile losses of wholesale banks are not substantially greater than other models, the losses remain relatively high under less-rare stress conditions, reflecting the inherent risks and the potential for sequential losses associated (as opposed to 'one-time' losses assumed here) with the wholesale banking model.[38] In particular, even a once-in-a-decade event (corresponding to the 10th percentile loss) is likely to wipe out nearly 1.6% of the capital of an average wholesale bank, which is substantially more than all other models. The diversified retail banks face the least losses under alternative stress assumptions, possibly reflecting the diversification benefits. In short, although the usual data limitations apply, the evidence provided above suggests that the proposed capital requirements might be too lenient, both on average and for specific business models.

The minimum capital requirements should take into account the different business models that banks follow. Although a more detailed analysis backed with substantially richer data is needed (especially to obtain more concrete results on investment-oriented banks), the findings call for a tougher stance on some of the less diversified banks, including the focused retail and wholesale banks and investment banks. Provided that the focused retail banks appear to be adequately capitalised, these requirements are likely to be binding mostly for the larger wholesale and investment banks.

To some extent, the additional buffers that are likely to be applicable to systemically important financial institutions (SIFIs) could be seen as a means to distinguish between different business models, at least for the sizeable institutions.[39] Although these requirements are mostly macro-

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[38] Although a longer time-series is needed for a complete assessment, the returns of wholesale banks appear to be highly auto-correlated, with an auto-correlation coefficient of approximately 0.50.

[39] According to the compromise adopted by the European Parliament's Committee on Economic and Monetary Affairs (ECON) on 14 May 2012, SIFIs will be identified by a number of factors, including their cross-border activity, size, interconnectedness and complexity, identified either by national authorities or the ESRB. Assuming that the final legislation also carries a similar provision, the SIFIs

prudential in nature, they can equally be seen as a buffer against micro-prudential risks. However, a simple empirical assessment based on our sample shows that the selected factors are likely to be poor determinants of risk-adjusted losses. In particular, both bank size (relative to country GDP) and international activities (share of international assets in total assets) fail to be significant determinants of risk-adjusted returns for loss-making banks.[40] Thus, although SIFI charges may serve an important macro-prudential purpose, they are unlikely to respond to the need for distinct capital requirements for different business models. Moreover, the charges are unlikely to have an impact on smaller banks, such as some of the focused retail banks in our sample.

The previous arguments highlight that a distinction should be made between private and social costs when adjusting regulatory capital requirements. The cost of capital is likely to rise if the perception is that risks are shifted from taxpayers to shareholders. In turn, social costs would not increase if banks are required to pay a fair price for the subsidies and implicit guarantees they receive. Our results are based in part on the proposition that many of the concerns about raising equity capital requirements are unfounded when the banks' business models as well as systemic and long-term prospects are considered.

2.2 Risk-weighted assets

Starting with Basel I, the minimum capital requirements have been risk-sensitive, implying that a bank would have to hold more capital the greater its risk exposures.[41] Provided that they are measured correctly, the average risk weight, i.e. the ratio of RWA-to-total-assets, should ideally be a good

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will be classified into five different risk groups, corresponding to five incremental common equity Tier-1 buffers ranging from 1 to 3% of risk-weighted assets, with the possibility of heavier charges for the highest risk group.

[40] In particular, censored regressions of risk-adjusted losses on total assets-to-GDP ratio and the share of international assets (in total assets) result in coefficient estimates of -0.002 (0.005) and -0.014 (0.018), respectively, with robust standard errors in parentheses.

[41] In contrast to recent calls, there is good reason to make capital requirements risk-sensitive. Indeed, faced with purely linear (i.e. risk-insensitive) capital requirements, banks may shift their portfolios towards riskier assets, offsetting their losses from higher capital levels by increasing their portfolio risks (Kahane, 1977; Koehn & Santomero, 1980; Kim & Santomero, 1988; Rochet, 1992). Empirical studies have confirmed that fixed capital requirements may increase risks, although the findings are far from unanimous, conditional on the size and the adequate capitalisation of the bank (Furlong & Keeley, 1989; Gennotte & Pyle, 1991; Calem & Rob, 1999).

indicator of portfolio risk on its own if it reflects the true risk profile of the bank's balance and off-balance sheet. However, there is concern that regulatory arbitrage and politically driven policies have put the appropriateness of risk-sensitive regulations in question.

The evidence provided in section 1.4 in chapter 1 suggests that regulatory arbitrage may be real and utilised extensively, especially by investment banks that are more disposed and inclined to use sophisticated derivatives instruments to divert the risks away from their balance sheets. In particular, the evidence shows that the average risk weights are positively correlated with distance from default, as measured by Z-score. Earlier findings from Ayadi et al. (2011) show that the same perverse relationship may hold for tier-1 capital ratio and earnings volatility as well. Other recent studies also suggest that regulatory arbitrage through RWA-optimisation in the banking sector may be a serious threat (Acharya et al., 2010; Das & Sy, 2012). These findings alone imply that the risk-sensitive approach may be seriously biased, possibly underestimating the appropriate level of capital to be held.

Other studies also suggest that regulatory arbitrage through RWA-optimisation in the banking sector may be a serious threat (Acharya et al., 2010; Das & Sy, 2012; Le Leslé & Avramova, 2012). Many observers have also noted that the simplistic 'single risk factor model' underlining the IRB approach allows banks substantial freedom in minimising their RWA to reduce the required capital charges (Calem & LaCour-Little, 2004; Blundell-Wignall & Atkinson, 2010). More generally, banks may use the risk-sensitive requirements for their own benefit to 'optimise capital' in a number of ways. [42]

Larger banks and in particular investment banks tend to have more specialisation in the proven methods to reduce their RWA without truly mitigating risks. There is thus the possibility that the internal assessment of the required capital charges for those banks is biased downwards. This imprudent behaviour is a consequence of the banks' widely-held interpretation of what is risk management, which is more understood as risk transfer with no risk retention on-balance sheet.

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[42] In his seminal article, Jones (2000) discussed several forms of 'cosmetic' adjustments that banks can undertake to reduce risk weights, including the concentration of assets in the highest risk classes for a given risk weight, various forms of credit enhancements, remote-origination and structured transactions.

The ability of larger banks to calculate their own risk charges through the internal rating based (IRB) approach is most likely the principal reason behind the misalignment of the regulatory risk measures. Undoubtedly, providing flexibility in measuring regulatory capital, which represents a true cost for banks, is a highly accommodative approach introduced under the Basel II framework. Banks have incentives to operate with minimum capital to satisfy the shareholder value creation constraint, which overlooks any micro-prudential or long-term stability considerations (Ayadi, 2012). Moreover, supervisors often lack the necessary resources to adequately verify the models.

Regulators have also contributed to the ill-designed policies for political reasons. The risk weights used under the standardised approach, the alternative to the internal ratings (IRB) approach, have also been challenged on this account. In particular, the risk weights show a highly preferential treatment of real estate and sovereign exposures.[43] They have also not paid sufficient attention to off-balance sheet risk exposures, most notably through securitisation transactions.[44] Last but not least, they have not accounted for the underlying risk of banks' business models. Much like the potential loopholes in the IRB approach, these practices guide banks to allocate financial resources without paying due attention to the real risk profile.

Most of these concerns remain unaddressed. In particular, the CRD IV-CRR proposal continues to assign a zero-weight to exposures to EU member states' central governments and central banks that are denominated and funded in the domestic currencies, notwithstanding the

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[43] There remains a fundamental misalignment of the risk weights in the treatment of sovereign debt and other exposures such as real estate. The CRD IV proposal continues to assign a zero-weight to all exposures to EU member states' central governments and central banks that are denominated and funded in the domestic currencies, notwithstanding the credit ratings for the relevant securities. More crucially, the standardised zero-weight is available as a default option even for institutions using the IRB approach (i.e. 'permanent partial use'), effectively providing a flexibility that is otherwise not generally available in other exposure classes.

[44] Under the CRD IV proposal, only the risk-weights for exposures to securitised assets are increased. Rules on exposures to securitisation transactions were tightened under an earlier amendment (CRD II), requiring originating banks to retain a 'net economic interest' by holding on to at least 5% of the nominal value of the securitised tranches sold or transferred. Although some suggest a further tightening of the 'skin in the game' rules, it should not be forgotten that issuers may hedge the corresponding risks from retained parts and may thus offload the own risks from a higher retention rate (Dewatripont et al., 2010).

credit ratings for the relevant securities. The standardised zero-weight is available as a default option even for institutions using the IRB approach (through the 'permanent partial use'), effectively providing a flexibility that is not available in other exposure classes. Earlier amendments put forward by the European Parliament's Committee on Economic and Monetary Affairs (ECON) has sought to address these concerns by instigating a potential re-adjustment of the risk-weights. [45] Nevertheless, it is uncertain whether the review process will be adopted in the final legislation. Moreover, it is even more questionable whether such a process will lead to more realistic charges for the lower-rated sovereigns, given the on-going sovereign debt crisis or to the risks underlined in the banks' business models in Europe or elsewhere.

The CRD IV-CRR proposal also continues to treat retail and real estate exposures in a preferential manner. In particular, exposures to natural persons or small- and medium-sized enterprises (SMEs) continue to receive lower risk-weights than unrated corporate exposures.[46] In addition, secured mortgage exposures on real estate are awarded a lower rating than higher-rated corporate exposures.[47] It is likely that the risk-weights will even be further reduced in the ultimate legislation, leading to a greater divergence between the risk-weights and the actual underlying risks.[48]

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[45] The amendment requires the Commission to "submit a to the European Parliament and the Council proposing options to adjust that risk weight accordingly as soon as possible, while taking into account potentially destabilising effects of tabling such proposals during periods of market stress" (Amendment for a draft report, 16 April 2012, Recital 69b). The Council under the Danish presidency has not put forward comparable elements as of the writing of this report.

[46] The CRD IV proposal assigns a risk-weight of 75% for all retail exposures to natural persons or SMEs, provided that the total amount owed does not exceed €1 million (CRR, Art. 118). Meanwhile, unrated corporate exposures continue to receive a risk-weight of 100%. One argument for lower risk-weights on retail loans would be the ability of banks to mitigate their risks. Although the proposal requires the retail exposures to be adequately diversified (CRR, Art. 218(b)), there is no attempt to define what that desired level might be. This omission is unfortunate as one of the key lessons learnt from the subprime crisis (and earlier crises) was the need for heightened monitoring of diversification and the resulting systemic risks posed on the entire financial system (Hellwig, 2009).

[47] Under the CRD IV proposal, residential property exposures that are "fully and completely secured by mortgages on residential property which is or shall be occupied" are assigned a risk-weight of 35% (CRR, Art. 120). The secured exposures to commercial real estate are assigned a higher, 50% risk weight (CRR, Art. 121). In comparison, A-rated corporate exposures (corresponding to credit quality step 2, or A+/A/A- under Standard & Poor's terminology) are assigned a risk-weight of 50% (CRR, Art. 117).

[48] Under the compromise adopted by the European Parliament's Committee on Economic and Monetary Affairs (ECON) on 14 May 2012, the risk-weights for SME exposures were further dropped from the original proposed amount of 75% to 50%, while the total allowed exposure was

The CRD IV-CRR proposal continues to rely heavily on the IRB approaches ('foundation' and 'advanced'), which allow banks to compute their risk factors and lead to potential misalignment of the risk-weights with the underlying risks. As noted above, the IRB approaches give banks a substantial freedom to engage in various forms of regulatory arbitrage to satisfy the shareholder value creation constraint, which remains above any long-term stability consideration. Furthermore, the distinctions among methods, with several means to estimate risk distributions and factors, make comparability a challenging if not largely an improbable task. The IRB approaches might have also suffered from overly optimistic assumptions, limited treatment of other risks such as liquidity and systemic risks. Lastly, bank supervisors may lack the resources or the capabilities to verify the models, thus calling into question whether the capital ratios published by banks are sufficiently robust to cover all the risks.

Various aspects of the standardised approach could also be problematic. The discussion above has already highlighted instances where the standardised risk-weights may fail to reflect the underlying risk profiles. However, an excessive reliance on credit ratings may also lead to partial risk sensitivity, since not all exposures are rated. More importantly, under the current proposal, highly risky corporate exposures would be better off in terms of capital charges if they simply were left unrated, leading to a clear 'lemons problem' for such exposures. This adverse selection problem can be overcome by enhancing the incentives to broaden external ratings. However, the performance of external ratings by credit rating agencies has been widely criticised in the context of the financial crisis, which puts in question the reliability of the external ratings for regulatory purposes.

To sum up, the proposed rules fall well short of adequately addressing the fundamental flaws underlying the use of the RWA and the calculation of minimum capital requirements, considered as the cornerstone of banking regulation.

As a first line of response to these concerns, the use of the IRB approaches and the validity of their components should be subject to deeper and regular monitoring by the supervisors. The risk distribution and risk factors calculation must not be left to the discretion of banks.[49] All risk inputs and underlying assumptions must be validated and monitored

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expanded to €2 million.

[49] Nearly 80% of the 74 banks in our sample were using the IRB approach at the end of 2010.

and if necessary adjusted in a coordinated fashion. The screening of risk weights can be complementary to existing regulations, and if well defined and monitored, can prevent the accumulation of risks.

At an operational level, banks should respond to a series of hypothetical benchmark portfolios of varying underlying risk levels provided by the regulators by reporting their own calculated risk model parameters, including loss-given default, probability of default and the resulting risk-weights. The reporting would be accomplished both for individual exposure classes and at the aggregate level for the entire portfolio.[50]

Provided that the chosen benchmarks are adequately sophisticated, regulators will be able to assess the adequacy and coherence of the internal models used by individual banks, which would feed into the regular supervisory review of the internal risk systems. Moreover, the results from the benchmarking exercise may also help test the validity of the risk weights and assumptions under the standardised approach. Lastly, the disclosure of the results of the benchmarking tests would also supplement market discipline by making banks' risk preferences more transparent.

Several principles may need to be considered in the design of the proposed benchmarking exercise:

- The procedures should be developed and regularly updated through deep analysis of the exposures of banks, which rely on comprehensive data on individual and portfolio banks' risk exposures.
- The benchmark portfolios should be made public, allowing independent experts to scrutinise their appropriateness in an ongoing fashion.
- If data allows it, benchmarks should distinguish between banks' business models and account for likely business model transitions. For example, investment banks should be asked to report the risk-weights for exposures or portfolios that are more in line with their activities. At the same time, the focused and diversified retail banks

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[50] A similar approach has been proposed by Vikram Pundit, the CEO of Citibank, and by Jaime Caurana, General Manager of the Bank for International Settlements (BIS). For more details, see "Apples vs apples: A new way to measure risk", by Vikram Pundit, *Financial Times*, 10 January 2012; and "The need for effective international collaboration in times of financial stress", speech by Jaime Caruana, General Manager of the BIS, Berlin, 20 January 2012.

among which transition likelihoods are relatively high, should report on alternative formulations that address the potential model changes.

- The timing and the nature of the benchmarking exercise is also of crucial importance. In order to reduce the regulatory arbitrage potential, the benchmarking exercises should take place unexpectedly or without allowing a long preparatory time for banks, possibly as part of the regular supervisory assessment process under Pillar 2.

- When benchmarked portfolios are known, banks may be able game the system by 'cosmetically' concentrating their risks to lower their capital charges. To prevent such strategic responses, the banks should be provided with a number of instantly generated hypothetical portfolios, randomly drawn from a pre-defined distribution around the desired portfolio, which should then be fed through their internal risk systems that form the backbone of the IRB approaches. Compliance should be defined by a comprehensive assessment of the performance of the risk assessment framework of each bank.

- This procedure must also be linked to the capital add-ons under the supervisory review process. If for example the internal models do not assess adequately the risks in the balance sheet and off-balance sheet of a bank, then capital add-ons are imposed by the national supervisors.

- At the EU level, the benchmarking exercise could be led and coordinated by the EBA in close collaboration with the ESRB (who should have a clear view on the macro-risk indicators). It would also form an integral part of stress testing conducted by EBA.

One of the key challenges standing in the way of introducing the proposed benchmark, however, is the potential administrative costs that it would impose on both the regulators and the banks. Leaving aside the intricacies of constructing appropriate benchmarks for different business models, the exercise may prove demanding and time-consuming, especially if regular on-site visits are required for verification. A cost-benefit analysis of the benchmarking exercise is worth pursuing. In Europe, the EBA can start with a pilot sample of banks to which the stress tests have been applied.

An alternative and less costly proposal would be to require all banks to report the implied risk-weighted assets and capital charges for their existing portfolios under a strengthened standardised approach. Although this practice may suffer from the same arbitrage opportunities under the

standardised approach, the distinction between the actual and benchmark results provide a proxy for the amount of capital 'saved' for the banks.

Going further, the regulators should refrain from using the risk-weights as a political tool. Although doing so may put fiscal pressures in some of the periphery countries, such as Greece, Italy, Portugal, and Spain, the gradual removal of the 'zero-risk weighting' of sovereign debt and harmonization with the other asset classes is necessary.[51] Similarly, the unjustified preferential treatment of other exposures, such as real estate loans and SME credit, should be aligned with the underlying risks. These practices effectively weaken the ability of capital regulations to respond to underlying risks and may effectively contribute to the build-up of asset bubbles and excessive growth of debt in the preferred exposure classes.

In addition to these requirements, an unweighted capital requirement, as in the form of a minimum leverage ratio as envisioned under the Basel III framework, should also be implemented as a backstop for the existing requirements. The next subsection turns to a deeper discussion of this valuable tool.

2.3   Leverage ratio

One of the key features leading to the crisis has been the excessive build-up of leverage in the banking sectors in many developed countries, especially among the larger and more investment-oriented institutions (Adrian & Shin, 2010; Kalemli-Ozcan et al., 2011). As is the case for non-financial firms, leverage is used to expand a firm's assets through debt in an attempt to make the most of existing capital or to minimise their excess capital.

Excessive leverage is threatening from a micro-prudential point of view because even a small downward perturbation in asset prices can wipe off existing capital and lead to insolvency. As a macro-prudential concern, heavily leveraged banks tend to rely on or provide less stable forms of short-term debt to match the volatility of the valuation of assets. When economic conditions worsen, these institutions may fail to roll-over their

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[51] At the moment, there is little motivation to introduce an amendment of the 'zero-risk weighting' of the EU sovereign debt, in particular in the absence of a credible EU plan to back ailing eurozone countries. The draft report of the European Parliament's Economics and Monetary Affairs Committee of 16 December 2011 included an amendment to introduce a review of the rule by the European Commission, "taking into account potentially destabilising effects of tabling such proposals during periods of stress". The Danish Presidency compromise did not include such a revision or amend the rule.

debt (or raise capital) or may hoard liquidity. When the share of leveraged firms is relatively high, these conditions could lead to a sudden drying up of market liquidity, asset price busts, fire sales and further drops in asset prices (Geanakoplos, 2010; Acharya & Viswanathan, 2011; Farhi & Tirole, forthcoming).

Figure 2.2 Leverage ratios across banking models
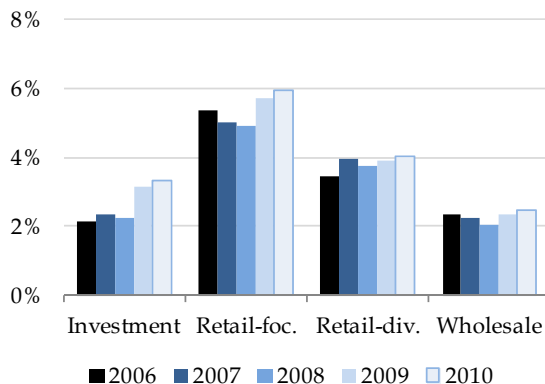
Notes: Leverage ratios as depicted are defined as Tangible Common Equity/(Total assets - Intangible Assets). Note that the depicted ratio considers a simple approximation to total exposures and a narrower definition of capital than the CRD IV or Basel III framework, which is based on Tier 1 capital.

Figure 2.2 shows that there are substantial differences in leverage ratios (defined as tangible equity-to-asset ratio) across different business models. The smaller and focused retail banks, for which customer loans and customer are clearly the main activities, have also the highest leverage ratio (implying the lowest gearing ratio). In turn, wholesale banks, for which inter-bank liabilities account for approximately a quarter of total activities, have the lowest leverage ratio. This finding most likely reflects the fact that the liquidity risks are not adequately factored in the current regulations. Albeit improving figures in recent years, the investment-oriented banks also have relatively low leverage ratios, possibly due to their characteristically high derivative activities, which can be used to reduce risk-weights. Lastly, the diversified retail banks maintain moderate levels of leverage, probably since their underlying model of extending customer loans does not allow them to grow as extensively as other bank.

Faced with risk-sensitive regulatory requirements, many banks have found ways to become increasingly leveraged, leading to increased micro- and macro-prudential risks. The banks have been able to achieve these

outcomes by engaging in transactions to lower their risk-weighted assets to remain compliant with the risk-sensitive capital requirements. To the extent that these transactions are cosmetic, a leverage ratio may above all put a strict limit on the total amount of risks. The requirement could also reinforce the regulators' hand to sanction the banks by ensuring that the banks bear a larger proportion of the systemic risks themselves and put a price on banks' contribution to the boom-bust cycles (Blum, 2008).

The Basel III framework introduced a leverage ratio in an attempt to constrain the build-up and to reinforce the existing risk-based capital requirements. The proposed measure is defined as an institution's Tier 1 capital divided by total exposures reported as an arithmetic mean of monthly averages over a quarter. Put simply, the total exposures are defined as the sum of all on- and off-balance sheet assets that are not deducted from the calculation of the capital measures. The proposed Regulation allows the netting arrangements for derivative transactions, repurchase agreements, as well as securities and commodities transactions.

A principal issue relating to the suggested leverage ratio is the potential impact of netting, especially through derivatives exposures. Derivative transactions represent a significant proportion of the balance sheet totals of investment banks. For example, in the past few years, the derivative exposures have fluctuated between one-third and one-half of Deutsche Bank's total activities. However, in many cases, derivative transactions enter both as assets and liabilities, subject to various forms of netting. In Deutsche Bank's case, the netting arrangements that are applicable under the US GAAP rules effectively reduce the total assets of Deutsche Bank by one-quarter to one-third.[52] Similar netting arrangements may give rise to heterogeneity in the measurement of leverage ratio and undermine its effectiveness. A deeper look into such divergences may be warranted, at least in the form of technical guidance from the EBA.

As a second issue, and perhaps more crucially, the CRD IV-CRR proposal sets out a very long transition period for introducing a leverage ratio. Under the Commission's CRD IV-CRR proposal of July 2011, the tool was originally introduced as an additional feature for disclosure "that can be applied on individual institutions at the discretion of supervisory

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[52] Depending on whether the derivatives are netted-out (as under US GAAP) or not (as under IFRS), Deutsche Bank's leverage ratios for the year 2008 would range between 3.6% and 1.0%, respectively. In later years, the distinction became smaller due to Deutsche Bank's takeover of the more retail-oriented Postbank.

authorities," and "with a view to migrating to a binding requirement" (CRR, Recital 68). At the time of writing this report, there is hope that the amendments to the proposal will instead introduce a binding commitment by 2018, after a lengthy revision and monitoring process.

Lastly, an important question is the level of leverage ratio requirements. Basel III suggests a 3% minimum requirement. The CRD IV-CRR proposal envisages no minimum requirements, even though some of the compromise texts suggest that the requirements may range from 1.5% to 5%, depending on the risk profiles of the regulated entities.[53] If implemented, these requirements also fall short of those that are in effect in the US (see Box 1).

Box 1.The US-Dodd Frank Act

The Wall Street Reform and Consumer Protection Act, better known as the Dodd-Frank Act or DFA, was signed into law by President Barack Obama on 21 July 2010. The rules are aimed to respond to the micro- and macro-prudential concerns that emerged in the aftermath of the 2007-09 financial crisis, addressing a vast array of issues, including the capital requirements, consolidated supervision, too-big-to-fail institutions, proprietary trading, consumer protection, external credit ratings, executive compensation, and so on. Unlike the CRD IV proposal, the Dodd Frank Act did not contain a fully formed set of legislative proposals but rather loosely defined principles and a path for the construction of a new regulatory architecture within the US.

Among other things, DFA creates new institutions and reinforces the powers of the existing ones. The supervision and regulation of SIFIs are transferred to the Federal Reserve (Fed), including any qualifying bank holding company, savings and loan holding company as well as affiliates and subsidiaries of a foreign bank. Meanwhile, non-SIFIs continue to be subject to the regulation of the Federal Deposit Insurance Corporation (FDIC), the Office of the Comptroller of the Currency (OCC) and the Office of Thrift Supervision (OTS). DFA allows the Fed to impose stricter-than-usual capital, leverage and liquidity standards for SIFIs, including a requirement for larger bank holding companies to have convertible contingent equity as part of their capital.

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[53] The leverage ratio bands were adopted under the compromise adopted by the European Parliament's Committee on Economic and Monetary Affairs (ECON) on 14 May 2012.

A newly established Financial Stability Oversight Council (FSOC) is accountable for identifying, monitoring and addressing threats to financial stability as well as promoting market discipline. The FSOC is armed with policy instruments to subject non-bank financial companies to supervision by the Fed and make recommendations regarding the regulation and operation of SIFIs. Under the authority of FSOC, SIFIs may also be required to establish living wills to provide plans for orderly resolution in the event of illiquidity or insolvency.

An Orderly Liquidation Authority (OLA) is formed for resolving and liquidating insolvent institutions, with the management and enforcement powers assigned to the FDIC. The provisions give OLA various tool to resolve and eventually liquid a troubled institution through receivership, suspending debt payments and creating a bridge-bank, procedures that have already been available for FDIC-insured banks.

Comparison of Dodd-Frank and Basel III requirements

	Dodd-Frank		Basel III
	Well-capitalised	Adequately capitalised	Minimum requirements
Common equity Tier 1 (% of RWA)	n.a.	n.a.	4.5%
Tier 1 ratio (% of RWA)	6.0%	4.0%	6.0%
Total capital ratio (% of RWA)	10.0%	8.0%	8.0%
Leverage ratio (% of total exposures)	5.0%	4.0%	3.0%

Like the Basel III framework, the Act provides for minimum capital and leverage ratios, which compare well with the Basel III standards. However, a side-by-side comparison of the requirements should be treated with caution since the definitions of the capital instruments do not always overlap. In particular, while the Basel III framework and the CRD IV-CRR proposal involve requirements applicable to the most loss-absorbing form of capital, i.e. common equity Tier 1 capital, the DFA has no such requirements. In turn, the leverage requirements in the US are stricter than the ones proposed by the Basel III (and most likely the ultimate CRD IV-CRR requirements). In spite of these differences, the DFA, much like the Basel III standards, has chosen to exclude certain forms of hybrid equity instruments, most notably trust preferred securities, from Tier 1 capital.

The 'Volcker rule' is arguably the most controversial component of the Dodd-Frank Act, which is structural by nature. The relevant provisions prohibit regulated banking entities from engaging in proprietary trading, effectively disallowing banks to engage in trading activity for the purpose of profiting from short-term price movements. Similarly, the rule limits the ability of banks to invest or sponsor private fund (i.e. private equity or hedge fund) and investment activities.

> Certain activities are exempt from the restrictions, including transactions in public securities and entities, investments in entities that serve in the public interest, market-making and risk-mitigation hedging activities, as well as transactions on behalf of customers. The restrictions are likely to have an impact on more investment-oriented banks (Ötker-Robe & Pazarbaşıoğlu, 2010). Additional provisions relating to mandatory margin, clearing and trading requirements for derivatives are also likely to have an impact on investment banks.

Our findings suggest that the Basel III standards could be a serious concern for the wholesale- and investment-oriented banks and possibly some of the diversified retail banks (see Figure 2.2). Naturally, apart from the business models, the appropriateness of the requirements depends crucially on the definition of the leverage ratio. Thus, the EBA should review whether the suggested requirements would be sufficient to constrain the relevant risks in the EU, paying close attention to the different business models.

2.4 Counter-cyclical capital buffers

Many banks faced substantial losses during the financial crisis. As is clear from the protracted nature of the current crisis, these losses can lead to extensive retrenchment of credit in an attempt to comply with the capital requirements, leading to a downturn in the real economy, with future feedbacks into the banking sector. In essence, the time invariant nature of capital requirements is sufficient to introduce a form of pro-cyclicality by subjecting the banks to the same minimum requirements.

Several studies highlight the business-cycle amplification effects of capital requirements and the subsequent 'capital crunches' (Bernanke & Lown, 1991; Peek & Rosengren, 1995; Kashyap & Stein, 2004; Repullo et al., 2009). In addition, Repullo & Salas (2011) warn that the pro-cyclicality was further reinforced by the entry into force of Basel II through the calculation of risk-weights and, in particular, the probability of default estimations. Counter-cyclical buffers would offset these effects, requiring banks to hold more capital in good times and allowing them to shrink their capital base in bad times. The capital buffers could also serve a more macro-prudential function in helping prevent the excessive build-up of risks through explosive growth of credit.

Counter-cyclical capital buffers have been introduced under the Basel III framework to ensure that banks build buffers that are above the

regulatory minimum. The proposed Directive introduces two capital buffers beyond the minimum capital requirements to minimise the risk of violating the minimum capital requirements. First, a capital conservation buffer of 2.5% of the risk-weighted assets (RWA) is introduced. Institutions that fall below the buffer face constraints on distributing earnings; the restrictions are applied in an increasing manner so that the closer the capital ratio is to the minimum requirement the greater are the earnings conservation requirements. Second, a countercyclical capital buffer is used to expand the capital conservation range (up to 2.5% of RWA) in good times to build up an added form of absorption capacity. As is the case for the conservation buffer, the restrictions on earnings distributions become more apparent as the capital ratios approach the minimum required amounts.

The main concern regarding the capital buffers relates to the method for setting the countercyclical buffer rate and the identification method to detect financial bubbles. Because of the macro-prudential nature of the task, this role must be granted to a macro-prudential authority, which has a broad system view on the accumulation of risk at national and regional levels. According to the proposed Directive, each member state will designate an authority for setting a reference guide based on the deviation of credit-to-GDP ratio from its long-term trend. The buffer rate is to be revised quarterly from the reference guide and other variables, including possibly structural variables. The potential for the selection of distinct structural variables is one issue, which can lead to undue heterogeneity in the application of the buffers among the member states. In addition, it is not entirely clear why structural variables, such as GDP growth, would be related to banking sector risk factors.[54] The counter-cyclical buffer should target the build-up of financial risks, in the form of asset bubbles and busts and not necessarily other macroeconomic variables. Lastly, there is little empirical backing on the selected methods and instruments for identifying financial bubbles. In particular, a detailed analysis by the IMF (2011b) reveals that the proposed capital-to-GDP gap is more likely than other measures to pick the wrong cycles (Type II error) while failing to pick the right ones (Type I error). We argue that more targeted research is this area

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[54] Although GDP growth may not be the part of the indicator to identify the build-up or bursting of bubbles, it may nevertheless have an indirect impact through other variables, most notably the selected indicator. Maintaining this possibility, Repullo & Salas (2011) show that the proposed measures may fail to remove the pro-cyclicality due to a statistically significant and negative correlation between credit-to-GDP gap and GDP growth.

is essential before venturing into poorly-designed instruments which would produce no value in detecting the accumulation of financial risks in the system and hence the future formation of financial bubbles. Monitoring the banks' business models may provide a view on the accumulation of financial risks in the system.

2.5   Liquidity requirements

In various phases of the financial crisis in 2007-09, banks that relied extensively on short-term funding faced severe stress during the early phases of the financial crisis, due to the rapid reversal in the availability of global liquidity. In Europe, the risks were particularly acute, especially for the 'wholesale' banks with substantial exposure to short-term liabilities, often raised in the interbank markets. For example, Dexia and Hypo Real Estate, both identified as wholesale banks in our study due to their large exposures to short-term funding, suffered tremendously following the collapse of the interbank markets in aftermath of the failure of Lehman Brothers in September 2008. In all the cases, the banks had to eventually be backed with central bank liquidity and government support in order to remain viable.

The risks arising from excessive reliance on short-term funding and the resulting maturity mismatches, roll-over risks, fire sales and the drying up of liquidity have long been established in the literature. The ability of depositors to withdraw their money exposes the banks to self-fulfilling panic, which may drive the bank into fire sales (Diamond & Dybvig, 1983). The resulting response by regulators over the past decades was to introduce deposit insurance to mitigate such risks, effectively leading to a rebranding of customer deposits as a safer form of funding. In the interbank and money markets, it has long been noticed that the uninsured and often uncollateralised mutual exposures can lead to an amplification of contagion risks (Rochet & Tirole, 1996). More recently, the reinforcing nature of funding liquidity (i.e. the ability to obtain funding) and market liquidity (i.e. ability to sell assets) have been shown as the principal sources of illiquidity spirals in the early phases of the crisis, leading to a sudden drying up of liquidity and a flight to quality (Brunnermeier, 2009; Brunnermeier & Pedersen, 2009).

An interesting question is why short-term funding has become so dominant in recent years. The simple answer is that more stable funding sources, such as customer deposits, can help a bank grow, but only up until a point. For many banks, expanding the balance sheets is only possible by

relying more on short-term funding, implying greater liquidity risks. In addition, this type of funding also allows banks to manage their balance sheet sizes actively in a highly pro-cyclical manner (Adrian & Shin, 2008 and 2010b). Although short-term funding allows banks to grow, it may also generate self-reinforcing liquidity shortages, as materialised during the crisis.

Liquidity standards are among the key concepts introduced in the Basel III framework. BCBS proposed two measures to reinforce the resilience of banks to liquidity risks (BCBS, 2010c).

The first measure, the so-called liquidity coverage requirement (LCR), specifies that the value of qualifying liquid assets should be at least sufficient to cover anticipated net outflows during 30 days under stress conditions. Banks should meet these standards continuously and hold unencumbered (i.e. non-pledged)[55] liquid assets to serve as a buffer against severe liquidity outflows. In Basel III parlance, high-quality liquid unencumbered assets should "be easily and immediately converted into cash at little or no loss of value" even in times of stress (BCBS, 2010c, p. 5). Net total outflows, on the other hand, comprise total outflows, which include less stable funding sources such as potential draw-downs on committed credit or liquidity facilities, minus potential inflows, such as planned inflows from performing loans.

The second measure, the net stable funding ratio (NSFR), considers a one-year horizon to ensure that the (on- and off-balance sheet) maturity mismatches between an institution's assets and liabilities are not too excessive. Although the CRD IV-CRR proposal contains few details, the standard developed by BCBS requires that the amount of available stable funding sources must be at least as much as the required stable funding (BCBS, 2010, p. 25).[56] As noted in section 1.4, no single model as a whole satisfies the 100% stable funding requirements on average, even though the focused and diversified retail banks did get much closer than others. In

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[55] A review by the UK Financial Services Authority revealed that RBS had a LCR of between 18% and 32% at the end of August 2008. The shortage of high-quality unencumbered liquid assets at the same date was estimated to be between £125 billion and £166 billion. For more details, see FSA (2011).

[56] More specifically, available stable funding sources include capital and reserves, customer deposits and other liabilities with more than one-year maturities. Required stable funding includes assets that cannot be quickly sold off without substantial costs during adverse market conditions lasting up to one year.

addition, the results show a clear worsening of the liquidity conditions during the crisis, which reflects the funding problems faced by most banks.

A common weakness is that the introduced liquidity measures continue to treat EU sovereign exposures as highly liquid. Under the CRD IV-CRR proposal, exposures to transferable claims issued or explicitly backed by member states are deemed highly liquid, without looking at the quality and the actual liquidity conditions for those assets.[57] Under the general criterion proposed under CRD IV-CRR, the lower trading volumes, credit ratings, as well as higher bid/ask spreads applicable to certain sovereign bonds would qualify them as being illiquid. As in the case of zero risk-weighting of EU sovereign debt, the preferential treatment afforded sovereign debt could be troublesome and undermine the timely identification of liquidity risks, especially for banks with high public sector exposures.[58] Moreover, the treatment could undermine the liquidity risks in banks that have more public sector exposures (see Box 2).

Box 2. Liquidity problems in Dexia

The case of Dexia (rebranded Belfus since 2012) exemplifies the extent of liquidity problems that more wholesale-oriented banks may face and accordingly deserves a deeper look. Prior to the crisis, Dexia was specialised in providing financial services to (local) governments in Belgium and France, which accounted for 30-40% of its balance sheet total. To bolster its margin on these low-interest loans, the bank relied heavily short-term wholesale funding, mainly from the interbank markets and debt securities.

The drying-up of liquidity that followed the fall of Lehman Brothers in September 2008 led Dexia to seek substantial sums of central bank liquidity (including through its US arm) and more than €100 billion in member state government guarantees to fulfil its funding needs. Throughout 2009-10, the bank reduced its reliance on short-term funding.

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[57] For third countries, the exposures can also be treated as being liquid to the extent that they are held to cover currency risks.

[58] Indeed, the proposed measures would have failed to pick the growing liquidity problems in Dexia. Prior to 2011, the bank's exposures to marketable public debt instruments, mostly issued or backed by the Belgian, French, Greek and Italian governments, accounted for approximately 20-25% of the bank's balance sheet. Due to a severe drop in the market prices of EU sovereign debt in 2011, these exposures heralded the market liquidity problems and necessitated an ultimate bail-out by Belgium, France and Luxembourg. Neither the LCR nor the NSFR (detailed under Basel III) would reveal the liquidity troubles early on since the exposures would be deemed as highly liquid, at least up until the point that they were pledged as collateral for obtaining central bank liquidity, which occurred in the second half of 2011.

However, the legacy operations and outstanding public loans continued to exert a physical restraint on how quickly the bank could change its business model. The resurfacing liquidity shortage in the second half of 2011 due to increasing sovereign risks pushed the bank to once again resort to the ECB's marginal lending facility for its daily needs. However, sometime during the fall of 2011, the bank depleted all its eligible (unencumbered) assets that could be posted as collateral at the ECB and had to turn to the emergency liquidity assistance (ELA) facility of the National Bank of Belgium. Following continued stress, the Belgium government acquired the domestic activities and together with France and Luxembourg provided up to €90 billion of government guarantees in December 2011.

The proposed measures would have probably failed to anticipate Dexia's liquidity problems. Most of Dexia's public-sector exposures are public-finance term loans to local and municipal governments in France. Although these loans are backed by implicit central government guarantees, they cannot be treated as being liquid since they are not marketable. However, Dexia did hold part of its public exposures as debt instruments, which are marketable and account for a substantial proportion of the bank's balance sheet. Accordingly, the LCR ratio (and in particular the NFS ratio as detailed under Basel III but using CRD IV-CRR liquidity definitions) would fail to point to troubles, at least not before the exposures were used as collateral for obtaining central bank liquidity.

Second, the proposed liquidity measures could interact with the conduct of monetary policy. In particular, LCR gives preferential treatment to central bank excess reserves and liquidity.[59] These provisions are likely to enhance the role of the central banks as an intermediary even in normal times, crowding out the interbank and wholesale funding markets, undermining the incentives of market participants to monitor the borrowing banks and making the exit from current liquidity support measures more difficult. Moreover, if the definition of liquid assets under the LCR fails to overlap with the criteria for central bank liquidity eligibility, banks may engage in a regulatory arbitrage by pledging more risky assets as collateral at the central bank and keeping the more liquid ones unencumbered.[60] Therefore, the design of the liquidity measures

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[59] In particular, cash and deposits held at the central bank will be reported as being liquid assets under the CRD IV proposal (CRR, Art. 404(1)a). These exposures are also likely to qualify for the highest quality liquidity once the EBA issues its review on the detailed definitions. In addition, under Basel III, funding from the central bank in the form of secured repurchase agreement operations collateralised by less liquid assets also receive a more preferential treatment.

[60] Similar points are raised by Lorenzo Bini Smaghi, then a member of the Executive Board of the ECB, at the International Banking Conference on Matching Stability and Performance: The Impact of

should consider their impact on monetary policy, especially through the 'risk-taking' channel (Borio & Zhu, 2008; Adrian & Shin, 2010a).

Third, LCR fails to capture the broader liquidity risks due to a wealth of reasons. To a large extent, the assessment of the liquidity of various asset classes, which will be subject to a review by EBA to be conducted by end-2013, rely extensively on historical trade-based proxies, such as minimum traded volume and maximum bid/ask spread. Moreover, liquidity is by definition an endogenous concept. When markets tumble, assets once deemed liquid can quickly become illiquid due to concentration of risks. Since the short-term liquidity concept has to distinguish between different asset classes ex-ante, the ensuing endogeneity creates the possibility that the LCR can become inadequate in highlighting the illiquidity risks ex-post.

Fourth, as noted in the Basel III framework document for managing liquidity risks, the cross-border availability of liquidity between the parent and its subsidiaries may be difficult "when there is a reasonable doubt about the availability of such liquidity" (BCBS, 2010c, p. 40). The CRD IV-CRR proposal disallows the consolidation of liquid assets only when currency restrictions exist and a third-country subsidiary is involved. However, although currency exchange restrictions are not applicable within the EU, another form of restriction, the separation of retail and investment banking activities, could nevertheless lead to transfer limitations even within the EU. Most notably, if the UK ring-fencing rules proposed by the Independent Commission on Banking (ICB, 2011) become applicable, non-UK based EU banks with substantial investment arms may be prohibited (by the Bank of England) to call on the liquid assets in their UK retail subsidiaries.[61] The issue can be addressed by engaging in coordination between the regulators.

Lastly, the CRD IV-CRR proposal fails to commit to table a binding NSFR requirement beyond a basic disclosure standard. At the time of the writing of this report, some of the compromise solutions do include such a

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New Regulations on Financial Intermediary Management, Milan, 29 September 2010 (see http://www.ecb.int/press/key/date/2010/html/sp100929.en.html).

[61] In a related manner, the intra-group funding gaps that involve cross-border transactions with differing currencies may also invite challenges that are not addressed by the Regulation. For example, many Austrian and German banks have opened subsidiaries in Eastern European countries over the past few years. In keeping up with quick credit growth and limited expansion capacity of deposits, the parent entities have used their excess intra-group liquidity prior to the crisis to provide funds to their subsidiaries. These operations have reduced the group-wide availability of liquidity during the crisis. An amendment in view of addressing intra-group liquidity shortages would be welcome.

requirement, including provisions to distinguish between different banks' business models.[62] However, there appears to be some divergence of opinion within the Council against making NFSR a binding requirement beyond a disclosure requirement, at least at the moment. NSFR is a broader concept and is less reliant on measures based on narrow asset classes. For that reason, it is less likely to be responsive to the inherent endogeneity of liquidity and many other problems associated with the LCR. We thus argue that the long-term liquidity measure should be a part of the regulatory framework, precisely as foreseen under the Basel III framework. A more ambitious commitment for its adoption by 2018 (or earlier) is therefore essential.

2.6 Reporting and disclosure requirements

One of the key lessons from the 2011 CEPS study was that the transparency and public disclosure practices of different business models were by and large incomplete and incomparable. Although some banks appear to report more information than others, there appear to be discrepancies, even for a given bank over time. Apart from a handful of general terms, such as total assets, a comparison across banks is rendered extremely hard due to a general lack of standards on the reported items. Comparable information on some of the most basic items, such as risk exposures and liquidity conditions, are not available in many cases (see Box 3). These incongruities are likely to grow as the reporting and regulatory requirements become more numbered over time, as foreseen in the CRD IV-CRR proposal after the observation phases of various elements.

An additional issue is the public availability of quarterly reports. While in the US, quarterly individual disclosures of all licensed commercial banks (listed or unlisted) obtained from the Reports of Condition and Income ("Call Report") are made public in bulk,[63] in the EU no such practice exists. These micro-data sets are extremely useful for researchers and investors who are attempting to assess and compare key variables relating to banks' structures, performances, stability and profitability and

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[62] A commitment to implement a binding NFSR requirement distinguishing among business models was undertaken under the compromise adopted by the European Parliament's Committee on Economic and Monetary Affairs (ECON) on 14 May 2012.

[63] See http://www.chicagofed.org/webpages/banking/financial_institution_reports/commercial_bank_data.cfm. A timelier updated site also exists at FFIEC Central Data Repository's Public Data Distribution (PDD) site (https://cdr.ffiec.gov/public/.

most importantly to examine changing business models. These reports are required to be submitted by all regulated financial institutions and collected by the Federal Deposit Insurance Corporation (FDIC). Since 2005, the reporting has been done in the extensible business reporting language (XBRL), which is an open-source global standard for exchanging business information. In the EU, the supervisory reporting frameworks for financial reporting (FINREP) and common reporting (COREP) have been developed, currently based on non-binding guidelines and reporting, both based on XBRL.

Box 3.Weaknesses in homogeneity of disclosed data

The data collection exercise conducted for the study revealed substantial differences in the definition of the simplest items even though all the banks in the sample applied the same International Financial Reporting Standards (IFRS). The differences are large between countries; however, the analysis revealed significant divergences even within the same country. Some of the supposedly straightforward items show substantial inconsistencies and lack of sufficiently detailed information.

   Cash, for instance, is often used to calculate the liquidity position of a bank. For many banks, cash is presented as 'cash and balances with central banks', 'cash and cash equivalents' or 'cash reserves' on the balance sheets. All of these items include cash in hand and balances with central banks. However, in some cases some of the 'cash and cash equivalents' are also included, covering money market loans. Meanwhile, cash reserves include debt issued by public-sector borrowers and bills of exchange re-discountable at the central banks. The 'balances with central banks' consist of mandatory reserve requirement, which cannot always be freely used as well as the other cash components when serving as collateral. These add-ons could inflate the reported cash items substantially while at the same time not being equally liquid as simple cash or cash reserves.

   A second example of the lack of disclosure harmonisation involves the various items reported under the heading of 'customer deposits'. For one thing, the amount of customer deposits cannot always be retrieved from some banks' financial statements. An investment bank in the sample, for instance, only reported 'total deposits', including bank deposits, which tend to have a much shorter maturity, higher turnover and, more importantly, outside the scope of the deposit guarantee scheme. Another bank in the sample included 'central bank funds' as an add-on for the customer deposits figures. Some banks only report customer liabilities, which tend to include debt issued by corporations.

> In addition, a group of banks also report 'repurchase agreements' as customer deposits, which do not share even the most basic attributes of deposits. Moreover, only a handful of banks disclose the division of deposits between difference counter-parties, i.e. non bank financial customers, individual customers and corporations. Cross-border exposures and currency risks are also reported generally, which render monitoring of risks extremely difficult. In the context of CRD IV-CRR, harmonisation is of the utmost importance since reliable and comparable information on customer deposits is needed to make a good assessment of the stable funding.

2.7 Concluding remarks

Implementing the international Basel III standards into EU law, the CRD IV-CRR proposal is certainly a game changer for many banks, regulators and market participants. However, the assessment provided in this chapter reveals that the proposed rules are not as ambitious as they claim to be.

In particular, the proposal and the ongoing compromises fail to make a clear commitment to introduce binding requirements on leverage ratio or the closely linked concept of net stable funding ratio (NSFR). The literature and recent evidence show that such a tool can play a key role in mitigating systemic risks and restraining excessive growth and more generally the self-reinforcing dynamics of boom-bust cycles. Without a clear commitment to the NSFR, the regulators and legislators will miss an opportunity to address liquidity problems as seen during early phases of the crisis.

Second, much like the Basel III framework, the CRD IV-CRR continues to rely excessively on the risk-sensitive approach with no verification or validation. The present evidence and the literature show that the risk-weighted asset measure is at best a poor indicator of underlying risks. To the extent that the misalignment is due to regulatory arbitrage, a more coordinated validation and monitoring of the internal risk models in particular through benchmarking is needed. Furthermore, a leverage ratio could also reduce the reliance on risk-sensitive capital requirements, provided that it is binding.

Third, the politically-oriented provisions in CRD IV-CRR should be gradually removed. The criticism is particularly applicable for the zero-risk weighting of EU sovereign debt risks, which induces an overly optimistic view of credit and liquidity risks. Similarly, the highly preferential treatment of real estate exposures (or SME loans as suggested under some amending versions) can lead to asset bubbles, paving the way for the next

crisis. Also, the one-size-fits-all risk treatment of EU financial institutions should be revisited by accounting for the underlying risks related to different business models. The regulators should refrain from using financial regulations to meet political ends.

Fourth, the European Banking Authority should have a more important role than simply being a bookkeeper of definitions and guidelines. It should be armed with enhanced monitoring and enforcement powers to reach its primary aim of safeguarding the stability of the EU's banking system. This is all the more important as there is increasing political pressure to shift to an EU- or euro-wide banking union and a centralised supervisory regime.

Fifth, the proposal makes no attempt to substantially improve disclosure standards. The study clearly shows that reliable and consistent information on even the most basic items, such as risk exposures and liquidity conditions, are lacking. With most of the attention on Pillars 1 and 2, the CRD IV-CRR and Basel III have overlooked the prospect of substantially improving disclosure standards and reinforcing private monitoring of banks.

Lastly, and perhaps most importantly, the study shows that different business models are prone to different sorts of risks. More concretely, the wholesale- and investment-oriented banks in the EU appear to have the lowest leverage ratios among their peers, well below the 3% leverage ratio suggested under Basel III. As for the appropriate minimum capital requirements, our results show that both the focused retail and wholesale-oriented models suffer from substantial tail shocks and should therefore be subject to heavier requirements. However, our results are based on a relatively small sample and should therefore be interpreted with caution. For these reasons, more policy-oriented analytical research and monitoring is needed to better align the regulatory initiatives with the inherent risks of different banks' business models.

3. TOWARDS A COMPREHENSIVE FRAMEWORK TO REGULATE EU BANKS

Given that the present structure of complex and extensive regulation (most especially enshrined in the Basel Capital Accords) failed to prevent the recent crisis, one must ask whether the failure was due to fault-lines in the regulatory regime or whether the underlying methodology of regulation has been inappropriate. This chapter outlines some general principles aimed at guiding the regulatory reform process and at distinguishing between *incremental* and *strategic* approaches to reform. A Regulation Matrix is presented based on the two central objectives of any regulatory regime that need to be addressed in parallel: 1) lowering the probability of bank failures and 2) minimising the costs (to society) of those failures that do occur. The nature of a possible trade-off between the two objectives is reviewed. In addition the analysis provides a discussion about the 'endogeneity' problem[64] and about the alternative means of reducing the probability of bank failures and various options to minimise the costs of bank failures.

To some extent there is a trade-off between these two objectives of the reform agenda in that the more the costs of failure can be reduced, the less intensive regulation needs to be in order to lower the probability of failure. The optimal intensity of regulation is indeterminate until the arrangements for the resolution structures are known. The danger is that the two are addressed separately with a resultant potential for over-regulation to achieve objective 2. Because of this, regulatory reform needs to be strategic (addressing both objectives simultaneously) rather than incremental

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[64] Whereby, through financial innovations and the incentive structures created in recent decades of deregulation, problems such as excessive risk-taking by banks may be partly endogenous to the regulatory regime itself (Llewellyn, 2011).

(refining the existing regulatory regime), which is what has been pursued so far.

Within this strategic approach, more emphasis than in the past needs to be given to minimising the social costs of bank failures making use of resolution of failing (failed) banks. Undoubtedly, for resolution to succeed, it is essential that business models of banks are understood, adequately regulated and monitored over time.

3.1   Driving principles

Several structural features of the pre-crisis environment have proved to be unsustainable and themselves contributory causes of the crisis. A basic perversity was that in good times the profits were treated as private; however, in bad times, the losses were socialised, with the taxpayer effectively acting as an 'insurer-of-last-resort' on the basis of an inefficient contract, as no ex-ante premia were extracted. Overall, as there was a reluctance to require creditors to absorb a proportionate share of the costs of bank distress and failures, burden-sharing was disproportionate with an excessive share borne by taxpayers, although it is yet to be determined what the final cost will prove to be.

The perception of banks being too big to fail (TBTF) because of the absence of resolution arrangements weakened the incentives for private monitoring of banks. Given the increased cross-border inter-connectedness that developed over the decade or so before the onset of the crisis, the absence of agreed cross-border resolution arrangements surfaced as a particular issue that needed to be addressed. The low level of equity capital (and high gearing) of many banks, in particular the investment and wholesale banks, depicted in the previous sections was in part a product of an artificially low cost of debt compared with equity induced by favourable tax treatment of the former.

In the absence of credible and predictable resolution arrangements for failing banks, in many cases there was little choice about whether bail-outs and official support operations for TBTF banks should be undertaken. Given the potential costs of bank failures (largely due to the absence of credible resolution arrangements), rescue operations or bail-outs may be the least-cost option in the short-run. However, given the time-consistency issue, such bail-outs create serious moral hazard for the future. There is, therefore, a distinction between short-run and long-run optimality with respect to rescue operations. Only if the costs of bank failures can be

minimised will a no-bail-out policy be credible or even desirable. It is argued below that this is a major unsustainable feature that needs to be corrected. In effect, arrangements need to be in place that allow banks to fail without imposing substantial systemic and social costs and taxpayer liability.

3.2 Strategic versus incremental regulatory reforms

A central issue is that regulatory reform needs to be *strategic* rather than *incremental*, which implies that regulatory reform goes back to basics including considering what the ultimate objectives of regulation are. This requires a different paradigm than with *incremental* reform, which restricts itself to refining existing regulatory requirements (capital ratios, RWA, liquidity, etc.). Abstracting from issues of consumer protection, the two broad objectives of any regulatory regime are:

1) to reduce the *probability* of bank failures, and

2) to lower the social *cost* when failures do occur.

In a regulation matrix (Figure 3.1), the probability of a bank failing is measured on the horizontal axis, and the costs of failure are identified on the vertical axis. The social costs of bank failures relate to those incurred directly or indirectly by inter alia the system as a whole (the systemic stability dimension), taxpayers who might be called upon to finance rescue operations, depositors, deposit insurance and customers in general if banking services are disrupted and uncertainty is created.

Figure 3.1 Regulatory matrix

		Probability of Failure	
		Low	*High*
Cost of failure	*Low*	√	
	High	Crisis potential	X

The matrix illustrates the possibility of a trade-off between the two: if the social *costs* of failure can be lowered, there need be less concern about the *probability* of failures. In the extreme (totally unrealistic) case, if the costs of bank failures could be reduced to zero, the probability of failures would

be of no concern, there would be no potential taxpayer liability, no need for bail-outs and no moral hazard attached to bail-outs. Furthermore, there would be no need for regulation to reduce the probability of bank failures. Of course, such a utopia is just that! Nevertheless, it serves to illustrate the nature of the trade-off implicit in the regulation matrix.

The objective of regulatory reform strategy is to optimise the risk matrix by considering both objectives simultaneously. The danger is that each of the two objectives are treated independently which, because the optimal level of regulatory intensity for objective 1 is indeterminate until the arrangements for objective 2 are determined, means that a degree of over-regulation is likely to emerge. As already argued, the greater the extent to which the costs of failures can be reduced, the less intensive need be regulation for Objective 1.

There may, therefore, be less need for measures to lower the cost of failures if their probability were to be reduced to a low level. Conversely, if this were to be either impossible (or achievable only with draconian and high-cost regulation), the greater will be the need to have in place measures to minimise the social costs of those bank failures that do occur.

The central strategic issue in any comprehensive regulatory and institutional reform programme is the positioning to be made on the regulation matrix.

Historically, the focus of the regulatory regime has been on reducing the probability of failures rather than minimising their costs. Indeed, in many countries the second issue has only been addressed in a serious way since the current crisis.[65]

Given that all regulatory measures to reduce the probability of bank failures have costs, the trade-off between the two dimensions is central to decisions about the optimal intensity of regulation. Greater emphasis needs to be given to Objective 2 (lowering social costs of failures) under the following circumstances: 1) when lowering the probability of failures entails excessively onerous regulation, or 2) when the costs of regulating

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[65] In June 2012, the European Commission released its proposal for a Directive establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directives 77/91/EEC and 82/891/EC, Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC and 2011/35/EC and Regulation (EU) No 1093/2010. In 2009, the UK adopted a Special Resolution Regime in the context of the absence of any special insolvency arrangements for banks, and weak and ill-defined institutional arrangements for dealing with failing institutions.

are too high. The central strategic issue in any holistic regulatory and institutional reform is the positioning to be made on the regulation matrix. The less confidence there is that the probability of bank failures can be reduced, the greater the need for institutional arrangements designed to reduce the costs of failures. In practice, a combined strategy is likely to be optimal.

3.3 A fundamental endogeneity problem in regulation

Regulatory strategy conventionally assumes that the problems to be addressed, e.g. excessive risk-taking by banks, are *exogenous* to the regulatory process. In this case, a problem is observed and a regulatory response is made to deal with it: i.e. to reduce the probability of it happening. Exogeneity is a bold assumption because problems may be at least partly endogenous to regulation, i.e. caused by the very regulation designed to reduce the probability of problems emerging. This arises as banks seek to circumvent regulation through financial innovation and by changing the way that business is conducted. This in turn calls for more regulation: Kane's Regulatory Dialectic (Kane, 1987).

As regulation responds to the endogeneity problem by successive adjustments, the cost of regulation rises. As the costs of regulation designed to lower the probability of bank failure rise, the trade-off between the two objectives in the risk matrix changes in favour of minimising the cost of bank failures rather than their probability. The endogeneity problem is likely to raise the cost of effective regulation because it engenders a rules-escalation strategy. However, in a complex cost-benefit analysis, the costs of measures for Objective 2 also need to be considered.

As the process of regulatory arbitrage diverts the nature of the problem, regulation is often shooting at a moving target, and the target moves partly because of regulation itself. For instance, the Basel II capital regime (hailed at the time as a decisive breakthrough) created incentives to offload assets from banks' balance sheets, using securitisation, the creation of structured investment vehicles (SIVs) and other off-balance sheet vehicles. These practices have led to the development of shadow banking, excess gearing and the use of credit risk-shifting derivatives. All of these featured as central aspects of the banking crisis (Llewellyn, 2010). It is evidently the case that detailed rules at the time did not prevent the crisis.

The limits of regulation for Objective 1 can be seen in the Basel capital regime and hence in any of its applications in particular in the EU. Many of the banks that got into serious trouble entered the crisis with Basel

compliant ratios. These ratios are seemingly risk-sensitive in theory, but failed to depict the risk profile of the bank business models because of their flawed design. Experience suggests that capital can disappear very quickly in particular when capital ratios are poorly designed. An IMF study compared successful and unsuccessful banks during the crisis and found no significant difference in capital ratios immediately prior to the onset of the crisis (IMF, 2009). The lesson is that capital ratios are either not reliable indicators and/or the minimum capital can be destroyed very quickly which calls into question the reliance on capital regulation to reduce the probability of bank failures. Indeed, and apart from the potential for regulatory arbitrage, it is possible that, under some circumstances, capital requirements may induce banks into more risky business.

Blundell-Wignall et al. (2008) show a positive correlation between losses and banks' Tier 1 risk-weighted capital ratio, but a negative correlation between losses and the leverage ratio. This suggests that the risk-weight approach to capital adequacy may induce banks to incur more risk through increased leverage. The reliability of the RWA has been questioned in the previous chapters of this study in particular for the investments and wholesale-type banks.[66] Regulatory arbitrage will always be a major feature of bank business models. As noted in Haldane et al. (2010), "risks migrate to where regulation is weakest, so there are natural limits to what regulatory strategies can reasonably achieve."

The *endogeneity problem* can be considered in the context of the history of the Basel Capital Accord. The original Basel regime established in 1988 was revised in Basel II and again in 2010 in Basel III. One interpretation is that subsequent adjustments imply moving towards the perfect model (Basel N) by correcting for past errors and making the regulation more complex and hence more costly to implement. This will lead to a regulatory cost that could even outweigh the cost of failure on a long time span. An alternative interpretation is that there are fault-lines in the regulatory process itself and that the methodology is flawed because banks will always engage in regulatory arbitrage. As was shown in Ayadi (2012), banks have strong business incentives to game the regulatory rules, which to some extent they contribute to design. In this sense, the view that regulators are always 'behind the curve' is not a critique of regulators but is endemic within the regulatory design and process. Successive adjustments over time have not solved the problem of periodic crises. They instead

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[66] Confirming the conclusions of Ayadi et al. (2011).

provide quick fixes to past problems; may not prevent future problems from occurring and are more likely to increase the costs of regulation.

This casts serious doubt on whether the traditional incremental approach is appropriate to regulate the financial industry in the post-2007 financial crisis. An alternative approach and paradigm shift might be more fruitful: more targeted and quality focus on incremental measures designed to reduce the probability of bank failures, and in parallel more emphasis should be given to designing features of the regulatory regime aimed at reducing the social costs of those bank failures that do occur. Given the weaknesses and limitations of regulation, whilst rules may be a necessary part of the regulatory regime, they are not sufficient. A complementary approach is to lower the cost of bank failures by keeping risks private rather than, as has massively been the case in the recent crisis, socialised by shifting risks to taxpayers.

In practice, both approaches are needed: lowering the probability of bank failure and limiting the social costs of failures. The debate about the role of regulation and supervision for financial stability should be about the appropriate weight to be given to the two dimensions over time. Whilst both approaches are needed, more emphasis than in the past needs to be given to Objective 2 given that, however carefully constructed, regulation will never prevent bank failures and neither should it attempt to do so.

3.4   Instruments for a comprehensive regulatory strategy

To lower the probability of bank failure, regulation, supervision, intervention and market discipline can be used. Regulation can in turn be categorised as either *structural* or *behavioural*.

Structural measures are of two types: 1) prescriptive structural measures that prescribe the nature, structure and allowable business of banks and other financial firms and 2) ring-fencing regulation that allows a wide range of business to be undertaken but in separate subsidiaries.

The evidence of the crisis indicates that a wide range of different types of banks were under distress and/or required government intervention: large, small, highly diversified, concentrated, retail banks and investment banks. This raises three general questions about prescriptive structural measures: whether, in practice, a clear distinction can be made between different types of institutions and businesses; whether it is possible to define institutions that are systemically important over time, and whether issues of size, business lines and models are key in the analysis. Prohibiting retail banks from conducting some forms of

speculative activity would not reduce it in total if it shifts that activity elsewhere in the system, where it is not regulated.

Several issues should be addressed when imposing prescriptive structural measures: it is not always clear what an optimal structure is (e.g. the allowable business mix of banks, different business models in the system and their interaction), and arbitrage will often be able to circumvent them. There are also practical difficulties of making a formal separation simply because the distinction between different lines of businesses is fuzzy. In fluid markets, and with constant financial re-engineering, it is difficult in practice to isolate different types of risks.

Some of the proposed structural measures, such as narrow banks (Kay, 2009a and 2009b), equity banks (Kotlikoff, 2010; Kotlikoff & Leamer, 2009) and measures to drastically reduce maturity transformation by banks could almost amount to solving the problem of bank failures by abolishing banks. Maturity transformation, for example, is an integral part of the functioning of banks in the financial system. The question arises as to whether it is appropriate for regulatory and structural reform to undermine the basic functionality of banks.

Another alternative is the Volcker rule in the US which prohibits proprietary trading, effectively disallowing banks to engage in trading activity for the purpose of profiting from short-term price movements. However, certain activities, including most notably hedging activities and principal trading (i.e. transactions on behalf of customers), are exempted. Although the distinctions between these activities may be clear in theory, in practice it is very difficult to determine whether a transaction is motivated by speculative, hedging or principal trading purposes. In the context of the huge trading losses faced by JP Morgan Chase, which became public in May 2012, the transactions were identified by the bank as a hedging strategy against increased volatility in the markets. To that extent, the transactions would be exempt from the Volcker rule even though they were clearly designed to benefit from price movements. Thus, the concern that "the potential for proprietary trading and permitted activities to be commingled" appears to be well-founded, leading to questions about the ultimate effectiveness of the Volcker rule (FSOC, 2011, p. 15).

Another approach is to allow the two activities to be conducted within the same bank but to have an internal separation between the two.

The central idea of ring fencing[67] is that those bank services that are critical to the economy are to be ring fenced into legally, economically and operationally separate subsidiaries: in effect, creating an internal retail bank. This would imply, for instance, having dedicated capital assigned to the two parts of the business. Under the ICB approach, any excess capital within either business can be transferred to the other business providing the required minima are kept in each. The principle is that, in the event of distress, the investment banking part of the business would not be rescued although the core retail banking arm (however that is defined) could be rescued if necessary. The central idea is two-fold: retail banking operations should not be contaminated by the risks in investment banking, and the ring-fenced retail banking operation would be rescued.

There are, however, practical difficulties with ring fencing that need to be recognised. Firstly, it is necessary to define precisely which services are 'crucial to the economy' and hence to be ring-fenced. Secondly, the failure of the wholesale part of the bank may create systemic problems, which implies that it is not always clear which parts of a bank need to be supported when in distress. Thirdly, in practice there may be links between the different subsidiaries of a bank such as, for instance, when a retail bank holds securitised assets on its balance sheet. Furthermore, in a crisis, while there may be formal separations between different types of banks and different subsidiaries within the same bank, all banks can be affected which means that ring-fencing can never in practice be complete.

As was detailed in the previous section, there are behavioural regulatory alternatives (e.g. differential capital requirements, constraints on leverage, macro-prudential rules, liquidity requirements and transparency) that could be imposed on riskier business models such as the wholesale and the investment types.[68] If they are well designed (in particular in terms

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[67] Final Report of the UK's Independent Commission on Banking (ICB, 2011) and endorsed by the Chancellor of the Exchequer.

[68] A higher degree of regulatory intensity could be applied to such banks such as calibrating regulatory requirements on the basis of institutions' contribution to systemic risk (Acharya & Richardson, 2009; Brunnermeier et al., 2009; Bernanke, 2009). The Financial Services Board has also proposed a global capital charge on systemically important banks. The BIS has argued that the rationale of a systemic capital charge would be to create a distribution of capital that reflects the systemic risk posed by individual firms (BIS, 2010). Chan-Lau (2010) suggests a practical methodology for levying capital charges based on degrees of interconnectedness. These would be based on a bank's incremental contribution to systemic risk and its contribution to increased risk of other institutions. The approach is designed as a way of internalising negative externalities associated with too-connected-to-fail institutions.

of the riskiness of bank business models) and well enforced, these regulatory measures may provide the right incentives for a more prudent bank-behaviour.

A key component of any strategy to reduce the probability of failures is the nature, timing and form of intervention in the event of a failing bank. Intervention strategies can be based on prompt corrective action (PCA) programmes (i.e. early intervention), and structured early intervention and resolution (SEIR) regimes, as in the US.

Intervention arrangements have incentive and moral hazard effects which potentially influence future behaviour of banks and their customers. These arrangements may also have significant implications for the total cost of intervention (e.g. initial forbearance often has the effect of raising the eventual cost of subsequent intervention) and the distribution of those costs between taxpayers and other agents. The issue focuses on when intervention is to be made. The experience of banking crises in both developed and developing countries indicates that well-defined strategies for responding to the possible insolvency of financial institutions are needed.

A key issue relates to rules *versus* discretion in the event of bank distress: the extent to which intervention should be circumscribed by clearly-defined rules (so that intervention agencies have no discretion about whether, how and when to act), or whether there should always be discretion simply because relevant circumstances cannot be set out in advance. The obvious *prima facie* advantage for allowing discretion is that it is impossible to foresee all future circumstances and conditions for when a bank might become distressed and close to insolvency.

However, there are strong arguments against allowing discretion and in favour of a rules approach to intervention. Firstly, a rules approach enhances the credibility of the intervention agency in that market participants have a high degree of certainty that action will be taken. Secondly, allowing discretion is likely to increase the probability of forbearance which usually eventually leads to higher costs when intervention is finally made. It guards against hazards associated with risk-averse regulators who themselves might be disinclined to take action for fear that it will be interpreted as a regulatory failure, and the temptation to allow a firm to trade-out of its difficulty: a policy that amounts to the regulator 'gambling for resurrection'. Thirdly, a rules-based approach removes the danger of undue political interference in the disciplining of banks. Fourthly, a rules approach guards against supervisors focusing on

the short-term costs of intervention compared with the longer-term costs of delaying intervention as supervisors with discretion may be tempted to 'gamble for resurrection'. Fifthly, it guards against a 'collective euphoria' syndrome whereby all agents (including supervisors) are swept along by a common euphoria (Llewellyn, 2010). Finally, and related to the first, a rules approach to intervention is likely to have a beneficial impact on ex-ante behaviour of financial firms and create incentives for management to manage banks prudently so as to reduce the probability of insolvency.

Above all, a rules approach is designed to address the time-consistency problem and add credibility to a no-bail-out strategy and thereby create appropriate incentives within banks. SEIR strategies can, therefore, act as a powerful incentive for prudent behaviour. The PCA rules in the US specify graduated intervention by the regulators with pre-determined responses triggered by, inter alia, capital thresholds.

The role of market discipline needs to be addressed and enhanced (as was proposed in the previous chapter) not only via the elements already within Pillar 3 of the Basel Accord. Market discipline has to be viewed as an important mechanism to induce banks to assess and manage effectively their risks and to maintain sufficient levels of capital accordingly. Effective market discipline requires not only that relevant information is available to investors and to the public as a whole but also that it is possible to use this information to discipline institutions. Disclosing harmonised complete financial and governance reports and specific aspects of the supervisory review process, such as stress tests results, capital add-ons and countercyclical requirements, are necessary to achieve this purpose.

To minimise the cost of failure, the main elements are:1) structural measures, 2) ring-fencing, 3) taxation, 4) explicit and predictable resolution arrangements and 5) living wills.

Haldane (2009) suggests that a key issue is how to break out of a 'doom loop': expectations of some banks being TBTF create a moral hazard and excess risk, which may lead to failures and the rescue of those banks. The resurrected banks are then free to repeat the process. In this vicious circle, the apparent solution to one problem sows the seeds of the next. One option to deal with banks regarded as potentially systemically important is to impose higher capital charges on such institutions as advocated, for instance, by Acharya & Richardson (2009), Brunnermeier et al. (2009) and Bernanke (2009). Chan-Lau (2010) suggests a practical methodology for levying capital charges based on degrees of interconnectedness. These would be based on a bank's incremental contribution to systemic risk and

its contribution to increased risk of other institutions. The approach is designed as a way of internalising negative externalities associated with too-connected-to-fail institutions. The BIS has argued that the rationale of a systemic capital charge would be to create a distribution of capital that reflects the systemic risk posed by individual firms (BIS, 2010).

The central advantage to ring-fencing is that retail banking operations of a financial group would be rescued if necessary whilst the investment bank would not be, but while maintaining any economies of scale and scope advantages that might exist within a group. Specifically, resolution would be made easier because of a simplified business structure, and there would be no implicit subsidy to investment banking activity by virtue of a bank being judged to be TBTF. In principle, the overall cost of a bank failure is reduced as one part of the bank can be allowed to fail without undermining core retail banking activity.

The wide range of intervention measures applied by governments and central banks in the wake of the crisis involved a substantial taxpayer commitment. Taxpayers became what amounted to an 'insurer of last resort' but with an inefficient insurance contract in that no ex-ante premiums were paid by the insured entities. The contract was implicit. In effect, taxpayers became exposed to bank credit risks that they themselves had no part in creating and for which no ex-ante premiums were received. In order to minimise the cost to taxpayers, banks could be required to pay ex-ante premiums and/or ex post for the costs of rescue operations. The distribution implications of such a move would be difficult to unravel although each bank's liability to pay could in principle be related to a measure of its systemic significance.

The rationale for imposing special taxation on banks is three-fold: 1) to recoup the costs of past bail-outs and intervention, 2) to compensate for the effective subsidy received by banks by virtue of possible future bail-outs and being TBTF and 3) creating incentives to alter funding structures and perhaps against becoming 'too big'. The IMF has made two proposals: a financial stability contribution (FSC) and a financial activity tax (FAT).

Under an FSC, banks would be required to make payments ex ante through a levy on their balance sheets to the extent of their contribution to financial instability, effectively putting a price on systemic externalities arising from excessive reliance on short-term funding, which constitutes

the most volatile portion of banks' balance sheets.[69] The FSC systems in place (or under consideration) in many countries are also often designed to contribute to the maintenance of credible resolution schemes, addressing one of the key sources of moral hazard risks.[70]

The FAT would instead tax 'supra-normal' profits and remuneration in an attempt to correct the incentives for increased risk-taking by limiting excessive earnings. In this manner, the tax could serve as a substitute for the value-added tax (VAT), which is not applicable to financial services due to inherent difficulties in charging taxes to margin-based intermediation services.[71]

Prior to the onset of the recent crisis, many countries did not have clearly-defined resolution arrangements in place, or a legal structure giving powers of intervention before insolvency is reached. This meant that uncertainty was created about how governments would respond to serious bank distress. Exceptions were the US, Canada, Italy and Norway with the latter having put in place special resolution arrangements following the banking crisis in the 1990s. In the EU, it was only in June 2012, more than five years since the eruption of the financial crisis, that the European Commission released the resolution framework, which was obviously too late to act on the successive banking crises in the EU. To avoid this uncertainty, the regulatory regime needs to encompass credible, predictable, and timely resolution arrangements for failed institutions which limit the potential liability imposed on tax-payers, maintains systemic stability, and protects depositors.

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[69] Many variants of the FSC exist. Among these, Perotti & Suarez (2009) propose a liquidity risk charge, which put a tax on a financial institution's use of short-term liabilities.

[70] The European Commission has shown its preference for the construction of a resolution fund, without clearly a funding method. Charging a levy to uninsured liabilities, effectively acting as a simple FSC, is identified as one of the many possible ways to build an ex-ante resolution fund, but has been met with criticism, especially from the banking industry. For more details, see the European Commission's Communication on bank resolution funds (COM(2010) 254 final) of October 2010 and the Commission's consultation on crisis management (http://ec.europa.eu/internal_market/consultations/docs/2011/crisis_management/consultation_overview_en.pdf).

[71] Financial institutions provide a number of intermediation services to their clients, which make it hard to determine the value-added for a specific service. For example, what is cost of extending loans to a client? Would the deposit rate reflect the true cost of funds, given the fact that banks typically charge a variety of additional fees to depositors? Even if it did, what proportion of the interest margin – the difference between the interest rates for loans and deposits – would be due to the risk premium, not subject to taxation? These complicating issues are particularly crucial when the client is a business, looking to obtain a credit for VAT paid on these services. For more on the difficulties in and arguments for the application of VAT to the financial institutions, see Huizinga (2002).

The objective is to allow banks to fail without disturbing business and customer relationships, and to ensure that the costs of failure fall on private stakeholders (equity and bond holders and other unsecured creditors) rather than taxpayers. Bail-outs are to be avoided as they impose costs on taxpayers, create serious moral hazard, may support inefficient banks and weaken market discipline. A key objective is to minimise the moral hazard created by bank rescues.

The ultimate objective is for resolution arrangements to be in place to deal with distressed banks with a minimum of costs and disruption. This implies allowing banks to fail without disturbing customer business or compromising systemic stability. A basic principle in reducing the cost of bank failures is for problems of a failed bank to be addressed quickly. This means that insolvency and bankruptcy procedures need to be clear and appropriate for the special position of banks.

Problems emerge when resolution arrangements are not clear. Firstly, uncertainty is created for all stakeholders, including depositors and other banks in the system. Secondly, it creates time-consistency problems (and hence credibility issues) as governments may be induced to behave differently over time. Thirdly, stakeholders are inclined to bargain for economic rents often (if not usually) at the expense of the taxpayer. Fourthly, as argued above, it can lead to political pressures for forbearance and the moral hazard attached to it, and can lead to costly and unnecessary delays in resolution. Two further considerations in the case of cross-border banks is the extent to which countries have different resolution regimes, and how burden-sharing is to be distributed. Overall, without predictable rules for allocating losses, resolution will almost inevitably be delayed. The living wills can serve to enhance credibility if well-designed and approved by the regulators.

Prior to the recent crisis, most countries did not have in place the necessary tools to wind down their domestic financial institutions. Huertas (2010) argues that living wills can in theory create a financial system that is "resilient to shocks and one that assures that banks are not 'too big' or 'too interconnected' to fail." Living wills can be a superior and more realistic alternative to structural measures to address the TBTF issue. Living wills seek to prevent the failure of one bank having broad systemic consequences leading to the failure of other innocent banks. As put by Huertas (2010): "Living wills offer the prospect that society can create a lower impact/lower cost solution to the problem posed by large, systemically important banks."

The two key components of living wills are *recovery* and *resolution* arrangements with the resolution component kicking in when the recovery component has failed. In principle, clearly-defined and credible recovery plans should lower the probability that resolution will be needed because such plans outline how a bank is to respond to distress situations. They are designed to maintain banks as going concerns. Living wills dictate that a bank has in place a clear recovery plan by requiring it to outline in advance what is to be done in the event that it falls into extreme stress. As put by Huertas (2010): "The bank is forced to think through in advance what it would do if the bank were to fall under extreme stress." In particular, banks are required to have plans in place to ensure that, in such circumstances, they can maintain adequate capital and liquidity. The requirement to have convertible bonds as part of a bank's capital base could be part of living will arrangements with the circumstances under which the conversion takes place being specified in advance. Other possible routes to recovery include selling parts of the business, exiting from some business lines, running down the scale of the bank, selling the entire business, etc.

The essence of living wills is that there are clearly-defined and credible recovery plans in advance, resolution arrangements are made explicit, and arrangements are in place to enable a bank to be broken up when in distress so as to protect core depositors' business. They amount to a form of SEIR. There are further advantages to living wills in the case of complex and potentially systemically important institutions. Firstly, to the extent that they induce simplified structures in complex banks, interconnectedness might be lowered. Secondly, they are designed to lower the probability of failure through the recovery component. Thirdly, systemic costs of any failures that occur should be lowered because clear and credible resolution plans are put in place in advance. Fourthly, the resolution process should be made easier and less complex. Fifthly, they would give more information to supervisors in the process of resolution operations. Finally, there could be general advantages through reducing the need for rescues or bail-outs because credible and explicit alternative resolution mechanisms would be in place. This should enhance the credibility of a no-bail-out policy. The ultimate rationale is that the 'recovery' component should lower the probability that a bank would require intervention by the regulatory authorities, and the resolution part should lower the costs to society of a bank failure.

The structural complexity of large financial groups creates particular problems for the resolution regime most especially when the objective is to

separate the essential parts of a bank (which are to be sustained) from its other activities. Living wills need to be designed to give information about how any wind down would be executed in practice. They are also designed to include mechanisms to separate the components of a financial firm that are critical from those that are not (Hupkes, 2009). In particular, deposits, some lending business and payments services are to be ring-fenced in the event of a resolution. This suggests having simple structures so that parts of the bank can easily be sold (Tucker, 2010). The main purpose is to lower the cost, and speed up the process, of resolution by making it easier to sell different parts of the bank and to protect the taxpayer by giving an alternative to bail-outs. It needs to be clear which parts of a bank's business are to be supported and kept solvent. A key feature is that core business should be effectively ring-fenced in the event of bank distress.

To address these issues comprehensively at the EU level, we argue for the need to address the prevention and resolution simultaneously and in a coordinated fashion to determine the intensity of regulation and its costs, relative to the credibility of resolution and its costs.

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APPENDIX I. LIST OF VARIABLES

No.	Variable	Coverage	No.	Variable	Coverage
1	Country (headquarter location)	100%	32	Income (interest - expenses)	97%
2	Reporting currency	100%	33	Income (non-interest)	99%
3	Accounting date (end of year)	100%	34	Income (commissions - net)	99%
4	Listed (YES/NO)	99%	35	Income (commissions - income)	92%
5	Block holder ownership (>5%)	94%	36	Income (commissions - expenses)	92%
6	Ownership (cooperative, savings..)	100%	37	Income (insurance - net)	56%
7	Public ownership (%)	30%	38	Income (insurance - income)	50%
8	Assets (total)	99%	39	Income (insurance - expenses)	50%
9	Assets (domestic)	98%	40	Income (trading - net)	99%
10	Assets (% of GDP)	99%	41	Income (dividend)	46%
11	Cash (& balances with central banks)	99%	42	Income (other)	98%
12	Intangible assets	98%	43	Expenses (operating - total)	99%
13	Goodwill	78%	44	Expenses (operating - administrative)	99%
14	Other intangible assets	78%	45	Expenses (operating - personal)	97%
15	Loans to banks (total)	99%	46	Expenses (operating - depreciations)	97%
16	Loans to customers (total)	99%	47	Expenses (operating - other)	97%
17	Liabilities (banks incl. central banks)	98%	48	Expenses (risk costs)	99%
18	Liabilities (customers)	92%	49	Expenses (restructuring costs)	12%
19	Repurchase agreements	77%	50	Expenses (bank levy)	34%
20	Capital (equity-total)	99%	51	Profit (before tax)	99%
21	Capital (equity-minority)	99%	52	Income tax	99%
22	Capital (regulatory capital)	48%	53	Profit (after tax)	99%
23	Capital (tier I - core)	40%	54	Risk-weighted assets (total)	93%
24	Capital (tier I - total)	88%	55	Applicable Basel standards (I/II)	99%
25	Capital (common equity)	99%	56	Basel approach (SA/IRB)	99%
26	Capital (tangible common equity)	99%	57	CDS spread (senior, average)	52%
27	Derivatives (total - fair value - negative)	96%	58	CDS spread (senior, year end)	52%
28	Derivatives (total - fair value - positive)	96%	59	CDS spread (senior, volatility)	52%
29	Income (total)	99%	60	CDS spread (subordinated, average)	37%
30	Income (interest - net)	99%	61	CDS spread (subordinated, yr. end)	37%
31	Income (interest - income)	97%	62	CDS spread (subordinated, volatility)	37%

APPENDIX II. ASSUMPTIONS ON NSF

The assumptions for the net stable funding (NSF) are similar to those put forward in IMF (2011a). Introduced by the Basel Committee on Banking Supervision (BCBS, 2010c), the NSF aims to restrict banks from having an excessive reliance on short-term funding in an attempt to promote a more balanced mid- to long-term financial resources to support the assets through stable funding sources. More specifically, the measure requires the available stable funding to exceed required stable funding.

Available stable funding sources include total Tier-1 and Tier-2 capital as well as reserves that count as part of equity. Stable forms of funding, including customer deposits and other liabilities with more than one-year maturities, are also included. Lower maturity liabilities, including term deposits and retail deposits from non-financial institutions, enter as available funding after the application of various haircuts. Short-term liabilities to financial institutions and secured wholesale funding are generally not included as available, due to substantial rollover risks and potential margin calls that may materialize in times of market stress.

Required stable funding includes assets that cannot be quickly sold off without substantial costs during adverse market conditions lasting up to one year. Most of customer loans are assumed to have long-term maturities and will thus face liquidation costs. All encumbered securities that are posted as collateral enter directly into calculation of required stable funding as they cannot be sold off without changing the original contract. Shorter maturity retail loans are also treated as required funding, albeit with an appropriate haircut. In turn, more liquid unencumbered assets, such as cash or marketable securities receive lower factors, as they are typically readily available for sale without substantial potential losses.

Since the available data are substantially restricted in nature, assumptions regarding many specific items were made. The following table provides the assumptions and the relevant multiplicative factors that were used to build the NSF measure used in the study. Although comparable to the measure developed by IMF (2011a), the validity of the results is likely to depend on the assumptions on certain factors more than others. This is particularly the case for the debt liabilities and trading assets, which make up more than one-third of the balance sheets of most banks, especially the investment and wholesale banking models.

Balance sheet items	Factors
AVAILABLE STABLE FUNDING	
Customer deposits	85%
Deposits from banks	0%
Derivative liabilities (negative, fair-value)	0%
Repurchase agreements	0%
Debt liabilities	50%
Equity & reserves	100%
REQUIRED STABLE FUNDING	
Cash	0%
Customer loans	80%
Loans to banks	0%
Derivative assets (positive, fair-value)	90%
Trading assets	50%

APPENDIX III.
CALCULATION OF Z-SCORE

The Z-score used in the study is the one derived in Boyd & Runkle (1993), which is a simple indicator of the risk of failure or the distance to default. To derive the measure, it is assumed that default occurs when the one-time losses of bank j in year t exceed its equity, or when

$$\pi_{jt} + E_{jt} < 0. \tag{A1}$$

Then, assuming that the bank's return on total assets (RoA), or π_{jt}/TA_{jt}, is normally distributed around the mean μ_j, and standard deviation σ_j, the probability of failure is given as

$$pr(\pi_{jt} < -E_{jt}) = pr(\pi_{jt}/TA_{jt} < -E_{jt}/TA_{jt}) = \int_{-\infty}^{D_{jt}} \phi(r)dr, \tag{A2}$$

where ϕ represents the standard normal distribution, r is the standardised return on assets and D is the default boundary that separates a healthy bank from an unhealthy one, described as the normalised equity ratio:

$$D_{jt} = \frac{-(E_{jt}/TA_{jt}) - \mu_j}{\sigma_j}, \tag{A3}$$

Note that a greater D implies a greater probability of default and, therefore, a greater risk for the bank. The average and standard deviation calculations were obtained using available data for the years 2006-09.

Since D admits negative values in most cases, the Z-score is set to be represented as a positive number, or as

$$Z_{jt} = -D_{jt}. \tag{A4}$$

This implies that a greater Z-value implies a lower probability of default.

APPENDIX IV. TOPICS UNDER DISCUSSION IN THE 'TRIALOGUE' OVER CRD IV-CRR

Policy area	CRD IV-CRR		
	European Commission	**European Parliament**	**European Council**
Capital requirements			
Capital buffers	Capital conservation buffer of up to 2.5% and countercyclical capital buffer of up to 2.5% (CRDIV Article 123 and 130).	Introduction of a systemic risk buffer on top of the capital conservation buffer and countercyclical capital buffer. The systemic risk buffer increases the capital requirement by 1 to 10% for both global and domestic systemic institutions (European Parliament compromises AK and AL on CRD IV).	Introduction of a systemic risk buffer on top of the capital conservation buffer and countercyclical capital buffer. National authorities can increase the requirement by up to 3% with a notification. Between 3 and up to 5% approval of the European Commission is required (Council compromise on CRD IV Article 124a).
Risk weighted assets	The risk-weights for SME exposures of 75% (CRR Article 118).	The risk-weights for SME exposures are dropped to 50% (European Parliament compromise on CRR Article 118).	The risk-weights for SME exposures remain 75% (Council compromise on CRR Article 118).
Large exposures to SMEs	Maximum single exposure to a SME of €1 million (CRR Article 118).	Maximum single exposure to a SME of €2 millions (European Parliament compromise on CRR Article 118).	Maximum single exposure to a SME remains €1 million (Council compromise on CRR Article 118).
Leverage ratio			
Threshold	Suggesting leverage ratio of 3% (CRR Article 482).	Possibly allowing for divergence in leverage ratio based on riskiness of business model. Suggesting leverage ratios between 1.5-5% (European Parliament compromise on CRR Article 482).	Suggesting leverage ratio of 3% (Council compromise on CRR Article 482)
Off-balance sheet exposures	Risk weight of 10% for 'low risk' exposures and 100% for other off-balance sheet exposures (CRR Article 416).	Introduction of lower weight for 'medium risk' off-balance sheet exposures 20-50% (European Parliament compromise on CRR Article 416).	Introduction of lower weight for 'medium risk' off-balance sheet exposures 20-50% (Council compromise on CRR Article 416).
Timetable	Disclosure from 2015 onwards. The ratio might mitigate into a binding leverage ratio from 2018 onwards (CRR Article 482).	Disclosure from 2015 onwards. The European Commission shall, adopt by July 2017 a delegated act on the introduction of a binding leverage ratio (European Parliament compromise on CRR Article 482).	Disclosure from 2015 onwards; The ratio might mitigate into a binding leverage ratio from 2018 onwards (Council compromise on CRR Article 482).

Policy area	CRD IV-CRR		
	European Commission	**European Parliament**	**European Council**
Liquidity coverage requirement (LCR)			
Timetable	Disclosure from 2015 onwards. Suggesting binding liquidity coverage ratio from 2018 onwards (CRR Article 481).	Disclosure from 2015 onwards. Suggesting binding liquidity coverage ratio from 2018 onwards (European Parliament compromise on CRR Article 481).	Disclosure from 2015 onwards. Suggesting binding liquidity coverage ratio from 2018 onwards (Council compromise on CRR Article 481).
Liquid assets	At least 60% of the liquid assets should be 'highly liquid' (CRR Article 405).	At least 40% of the liquid assets should be 'highly liquid' (European Parliament compromise on CRR Article 405).	No minimum for highly liquid assets (Council compromise on CRR Article 405).
Net Stable Funding Ratio (NSFR)			
Timetable	The European Commission will consider proposing a stable funding ratio after an observation and review period in 2018.	By 31 December 2016, the European Commission shall adopt a delegated act setting out the requirements for a Net Stable Funding Ratio.	The European Commission will consider proposing a stable funding ratio after an observation and review period in 2018.
Compensation		The variable payment of bank employees may not exceed the fixed pay (European Parliament compromise on CRDIV Article 90).	
Other		On shadow banking, securities- and repo lending as well as the top ten exposures to unregulated financial entities need to be disclosed. In addition, it proposes to maximise the exposures to unregulated financial entities to 25% or €150 million (European Parliament compromises on Articles 483 and 484).	

APPENDIX V.
LIST OF BANKS BY BUSINESS MODEL

Model 1 – Investment

ABN Amro (2006-2008), Barclays, BNP Paribas, Commerzbank (2007-2008, 2009-2010), Deutsche Bank, HSBC, Nordea, Société Générale, The Royal Bank of Scotland, and WestLB.

Model 2 Retail – Focused

ABN Amro (2009), Agricultural Bank Of Greece, Allied Irish Banks (2006-2007, 2009-2010), Alpha Bank (2006, 2008-2010), Banca Intesa (2006), Banco Comercial Português (2006, 2010), Banco Popolare (2007), Banco Popular Español (2009, 2010), Bank Of Cyprus, Bank Of Ireland, Bank Of Valletta, Banque Et Caisse D'Epargne De L'Etat (2007-2010), Banque Populaire (2006-2008), Bayerische Landesbank (2006), BBVA (2007-2010), BFA-Bankia (2010), EFG Eurobank Ergasias, Erste Bank, Hellenic Postbank, Intesa Sanpaolo (2007), Jyske Bank, KBC (2006-2007), La Caixa (2006, 2007, 2009), Marfin Popular Bank, National Bank Of Greece, OTP Bank (2007), Piraeus Bank (2006-2008), PKO Bank Polski, Raiffeisen Bank International, Sydbank, UBI Banca (2008-2009), and UniCredit (2009-2010).

Model 3 Retail – Diversified

ABN Amro (2010), Allied Irish Banks (2008), Alpha Bank (2007), Banca Monte Dei Paschi Di Siena, Banco BPI, Banco Comercial Português (2007-2009), Banco Popolare (2008-2010), Banco Popular Español (2006-2008), Banco Santander, Bank Of Ireland (2007-2009), BBVA (2006), Caixa Geral De Depósitos, Danske Bank (2009-2010), DnB NOR Bank, Espírito Santo Financial Group, ING, Intesa Sanpaolo (2008-2010), Irish Life And Permanent (2006-2007), KBC (2010), La Caixa (2008, 2010), Lloyds Banking Group (2006-2007, 2009-2010), Nova Kreditna Banka Maribor, Nova Ljubljanska Banka, Nykredit, OP-Pohjola, OTP Bank (2006, 2008-2010), Rabobank (2007-2010), Sanpaolo IMI (2006), Skandinaviska Enskilda Banken (2010), SNS Bank, Svenska Handelsbanken, Swedbank, and UBI Banca (2006-2007, 2010).

Model 4 Wholesale

Bank of Ireland (2006), Bayerische Landesbank (2007-2010), BPCE Group (2009-2010), Caisse D'Epargne (2006-2008), Commerzbank (2008), Crédit Agricole S.A., Danske Bank, Dekabank (2006-2008), Dexia, DZ Bank, Helaba, HSH Nordbank, Hypo Real Estate (2007-2010), Irish Life And Permanent (2008-2010), KBC (2008-2009), Landesbank Baden-Württemberg, Landesbank Berlin, Lloyds Banking Group (2008), Norddeutsche Landesbank, Oesterreichische Volksbank, Rabobank (2006), Skandinaviska Enskilda Banken (2006-2009), Svenska Handelsbanken (2006), UniCredit (2006-2008), and WGZ Bank.

APPENDIX VI.
TANGIBLE EQUITY RATIOS (%)

	Country	2006	2007	2008	2009	2010
Erste Bank	AT	2.7	2.8	3.2	5.7	6.2
Oesterreichische Volksbank	AT	3.6	3.2	4.0	4.1	4.2
Raiffeisen Bank International	AT	6.2	7.7	6.6	8.0	7.1
Dexia	BE	2.8	2.3	0.5	1.7	1.5
KBC	BE	5.1	4.3	3.3	4.3	5.2
Bank Of Cyprus	CY	7.8	10.6	4.4	5.2	5.6
Marfin Popular Bank	CY	7.1	6.4	5.2	5.3	4.9
Bayerische Landesbank	DE	3.6	2.5	2.1	4.1	4.3
Commerzbank	DE	2.2	2.4	3.0	2.8	3.4
Dekabank	DE	2.7	3.0	2.2	2.5	3.1
Deutsche Bank	DE	1.5	1.4	1.0	1.9	1.8
DZ Bank	DE	2.5	2.5	1.9	2.5	2.7
Helaba	DE	2.8	2.7	2.4	2.8	3.0
HSH Nordbank	DE	2.2	2.0	0.9	2.4	3.3
Hypo Real Estate	DE	..	0.9	-0.4	1.3	2.3
Landesbank Baden-Württemberg	DE	2.5	2.3	1.1	2.4	2.5
Landesbank Berlin	DE	1.4	1.5	0.9	1.4	1.6
Norddeutsche Landesbank	DE	2.6	3.1	2.3	2.4	1.7
WestLB	DE	2.3	1.5	1.3	1.5	2.1
WGZ Bank	DE	3.5	3.2	2.7	3.2	3.2
Danske Bank	DK	3.2	2.3	2.1	2.5	2.6
Jyske Bank	DK	5.8	4.4	4.4	5.5	5.4
Nykredit	DK	5.0	4.7	3.7	3.7	3.9
Sydbank	DK	5.5	5.1	4.5	5.8	6.3
Banco Popular Español	ES	6.1	5.7	5.9	6.2	5.9
Banco Santander	ES	3.7	4.6	3.8	4.3	4.4
BBVA	ES	4.7	4.0	3.4	4.5	5.4

	Country	2006	2007	2008	2009	2010
BFA-Bankia	ES	..	..	..	..	5.0
La Caixa	ES	4.0	4.7	4.5	8.0	7.0
OP-Pohjola	FI	6.6	6.8	5.4	6.3	6.7
BNP Paribas	FR	3.0	2.8	2.2	3.3	3.6
Banque Populaire	FR	5.8	4.8	3.6	..	..
Caisse D'Epargne	FR	3.3	3.1	2.3	..	..
BPCE Group	FR	..	..	..	3.9	4.3
Crédit Agricole S.A.	FR	1.8	1.9	1.6	2.0	2.0
Société Générale	FR	2.9	2.3	2.9	3.8	3.7
Agricultural Bank Of Greece	GR	6.5	6.2	3.1	3.9	2.4
Alpha Bank	GR	7.0	7.6	5.8	8.3	8.4
EFG Eurobank Ergasias	GR	6.1	6.8	4.8	6.7	6.2
Hellenic Postbank	GR	7.0	5.6	3.5	6.8	5.5
National Bank Of Greece	GR	8.5	6.4	5.8	6.6	7.1
Piraeus Bank	GR	5.3	6.6	5.0	..	..
OTP Bank	HU	8.1	5.4	6.5	7.7	8.9
Allied Irish Banks	IE	5.9	6.0	5.3	6.1	2.9
Bank Of Ireland	IE	2.6	3.1	2.9	3.1	4.2
Irish Life And Permanent	IE	2.8	3.1	3.0	4.1	3.7
Banca Monte Dei Paschi Di Siena	IT	4.2	4.1	3.4	4.4	4.1
Banco Popolare	IT	..	3.8	4.2	5.2	5.2
Sanpaolo IMI	IT	3.7	..	..	..	..
Banca Intesa	IT	5.7	..	..	..	..
Intesa Sanpaolo	IT	..	4.7	4.0	4.7	4.7
UBI Banca	IT	-3.2	6.3	4.1	5.0	4.4
UniCredit	IT	3.3	3.7	3.1	4.1	4.7
Banque Et Caisse D'Epargne De L'Etat	LU	..	6.6	6.0	7.1	7.4

	Country	2006	2007	2008	2009	2010
Bank Of Valletta	MT	6.7	6.9	6.3	6.9	7.3
ABN Amro	NL	1.7	3.0	2.4	3.9	3.1
ING	NL	3.1	2.6	1.7	2.9	3.4
Rabobank	NL	5.0	5.0	4.9	5.7	5.7
SNS Bank	NL	2.9	1.5	1.6	1.9	1.9
DnB NOR Bank	NO	4.6	4.7	4.0	5.2	5.6
PKO Bank Polski	PL	9.1	10.1	9.5	12.2	11.7
Banco BPI	PT	4.8	4.7	4.5	4.8	4.3
Banco Comercial Português	PT	5.5	5.0	6.1	7.0	6.9
Caixa Geral De Depósitos	PT	4.6	5.0	4.6	5.6	5.9
Espírito Santo Financial Group	PT	6.8	7.3	5.8	7.5	7.8
Nordea	SE	3.8	3.8	3.2	3.9	3.7
Skandinaviska Enskilda Banken	SE	2.7	2.6	2.6	3.6	..
Svenska Handelsbanken	SE	3.0	3.7	3.2	3.6	3.8
Swedbank	SE	3.3	3.0	3.7	4.1	4.7
Nova Kreditna Banka Maribor	SI	7.0	6.8	6.7	7.0	7.1
Nova Ljubljanska Banka	SI	..	5.1	6.1	5.5	5.0
Barclays	UK	2.0	2.0	1.8	3.6	3.6
HSBC	UK	4.3	4.2	3.0	4.6	5.2
Lloyds Banking Group	UK	2.6	2.8	1.7	3.7	4.2
The Royal Bank of Scotland	UK	3.1	2.3	2.5	4.6	4.3
Investment banks		2.7	2.6	2.3	3.3	3.5
Retail banks - Focused		6.0	5.9	5.0	6.3	6.0
Retail banks - Diversified		4.3	4.7	4.5	4.8	5.0
Wholesale banks		2.9	2.5	2.1	2.9	2.9
TOTAL		4.2	4.2	3.6	4.6	4.6

APPENDIX VII. TIER I RATIOS (%)

	Country	2006	2007	2008	2009	2010
Erste Bank	AT	6.6	7.0	7.2	10.8	11.8
Oesterreichische Volksbank	AT	7.7	7.1	7.1	9.2	9.4
Raiffeisen Bank International	AT	9.0	10.5	8.1	11.0	9.7
Dexia	BE	9.8	9.1	10.6	12.3	13.1
KBC	BE	8.0	8.0	8.9	10.8	12.6
Bank Of Cyprus	CY	9.0	9.7	7.3	8.8	11.0
Marfin Popular Bank	CY	11.5	9.2	8.1	9.1	10.0
Bayerische Landesbank	DE	6.5	6.3	8.0	10.9	11.2
Commerzbank	DE	6.8	7.0	10.8	10.5	11.9
Dekabank	DE	..	..	..	..	..
Deutsche Bank	DE	8.9	8.6	10.1	12.6	11.0
DZ Bank	DE	9.2	7.7	7.4	9.9	10.6
Helaba	DE	..	..	..	..	..
HSH Nordbank	DE	6.1	6.2	8.3	9.8	18.6
Hypo Real Estate	DE	..	7.0	3.4	7.8	34.7
Landesbank Baden-Württemberg	DE	7.4	8.3	6.9	9.8	11.4
Landesbank Berlin	DE	..	..	..	..	..
Norddeutsche Landesbank	DE	7.7	7.0	8.1	8.7	9.1
WestLB	DE	7.6	5.3	6.4	8.2	11.4
WGZ Bank	DE	10.3	9.1	..	..	..
Danske Bank	DK	8.6	6.4	9.2	14.1	14.8
Jyske Bank	DK	..	..	..	..	..
Nykredit	DK	..	..	..	..	..
Sydbank	DK	8.1	..	..	..	..
Banco Popular Español	ES	8.0	7.9	8.1	9.1	9.6
Banco Santander	ES	7.4	7.7	8.7	9.4	9.3
BBVA	ES	7.8	6.8	7.9	9.4	10.5

	Country	2006	2007	2008	2009	2010
BFA-Bankia	ES	..	..	..	..	7.7
La Caixa	ES	8.3	9.8	10.1	10.4	9.9
OP-Pohjola	FI	12.7	12.6	12.6	12.6	12.8
BNP Paribas	FR	7.2	7.0	7.9	10.1	11.4
Banque Populaire	FR	..	9.1	7.7	..	..
Caisse D'Epargne	FR	..	..	..	..	..
BPCE Group	FR	..	..	..	9.8	10.7
Crédit Agricole S.A.	FR	8.2	8.1	9.1	9.5	10.6
Société Générale	FR	7.8	6.6	8.8	10.7	10.6
Agricultural Bank Of Greece	GR	10.9	8.9	6.5	9.1	7.5
Alpha Bank	GR	10.2	9.6	8.0	11.7	11.9
EFG Eurobank Ergasias	GR	8.5	9.2	8.0	11.2	10.6
Hellenic Postbank	GR	13.3	12.1	8.6	17.1	18.5
National Bank Of Greece	GR	12.4	9.2	10.0	11.3	13.1
Piraeus Bank	GR	..	..	8.0	..	..
OTP Bank	HU	..	..	15.3	18.5	18.4
Allied Irish Banks	IE	8.2	7.5	7.4	7.2	4.3
Bank Of Ireland	IE	7.5	8.2	8.1	12.0	9.7
Irish Life And Permanent	IE	14.0	13.1	23.0	24.0	23.7
Banca Monte Dei Paschi Di Siena	IT	6.2	6.1	5.1	7.5	8.4
Banco Popolare	IT	..	5.2	6.4	7.7	7.2
Sanpaolo IMI	IT	7.0	..	..	..	..
Banca Intesa	IT	4.9	..	..	..	..
Intesa Sanpaolo	IT	..	6.5	7.1	8.4	9.4
UBI Banca	IT	10.6	7.4	7.7	8.0	7.5
UniCredit	IT	7.0	6.5	6.8	8.6	9.5
Banque Et Caisse D'Epargne De L'Etat	LU	..	9.4	14.6	14.4	13.1

	Country	2006	2007	2008	2009	2010
Bank Of Valletta	MT	..	..	9.9	11.2	10.5
ABN Amro	NL	8.5	12.4	10.9	19.9	12.8
ING	NL	7.6	7.4	9.3	10.2	12.3
Rabobank	NL	10.7	10.7	12.8	13.8	15.7
SNS Bank	NL	8.2	8.4	10.5	10.7	10.7
DnB NOR Bank	NO	6.7	7.2	6.7	9.3	10.1
PKO Bank Polski	PL	12.9	11.1	13.1	16.8	14.1
Banco BPI	PT	7.4	6.5	9.1	7.8	8.7
Banco Comercial Português	PT	6.6	5.5	7.1	9.3	9.2
Caixa Geral De Depósitos	PT	7.4	6.7	7.0	8.5	8.9
Espírito Santo Financial Group	PT	8.2	7.1	6.5	7.7	8.2
Nordea	SE	7.1	7.0	7.4	10.2	9.8
Skandinaviska Enskilda Banken	SE	8.2	8.6	10.1	13.9	14.2
Svenska Handelsbanken	SE	6.8	10.6	8.7	10.9	11.8
Swedbank	SE	6.5	6.2	8.1	10.4	11.0
Nova Kreditna Banka Maribor	SI	..	..	..	..	..
Nova Ljubljanska Banka	SI	6.8	5.4	7.9	7.2	6.4
Barclays	UK	7.7	7.6	8.6	13.0	13.5
HSBC	UK	9.4	9.3	8.3	10.8	12.1
Lloyds Banking Group	UK	6.5	6.4	5.6	9.6	11.6
The Royal Bank of Scotland	UK	7.5	7.3	10.0	14.1	12.9
Investment banks		7.8	7.8	8.7	11.1	11.6
Retail banks - Focused		9.1	8.8	8.8	11.3	10.6
Retail banks - Diversified		8.2	8.0	8.7	10.3	11.0
Wholesale banks		8.2	7.5	8.9	11.3	14.8
TOTAL		8.1	8.8	10.9	11.6	11.6

APPENDIX VIII. RETURN ON ASSETS (%)

	Country	2006	2007	2008	2009	2010
Erste Bank	AT	0.8	1.0	0.6	0.6	0.7
Oesterreichische Volksbank	AT	0.5	0.5	-0.8	-2.0	0.2
Raiffeisen Bank International	AT	2.6	1.7	1.7	0.5	1.0
Dexia	BE	0.6	0.5	-0.6	0.2	0.2
KBC	BE	1.4	1.2	-0.8	-0.9	0.6
Bank Of Cyprus	CY	1.5	1.8	1.5	0.9	0.8
Marfin Popular Bank	CY	0.8	2.3	1.2	0.5	0.3
Bayerische Landesbank	DE	0.4	0.1	-1.2	-0.8	0.3
Commerzbank	DE	0.4	0.4	-0.1	-0.6	0.2
Dekabank	DE	0.4	0.5	0.0	0.4	0.7
Deutsche Bank	DE	0.5	0.4	-0.3	0.3	0.2
DZ Bank	DE	0.5	0.2	-0.4	0.2	0.4
Helaba	DE	0.3	0.2	0.0	0.2	0.2
HSH Nordbank	DE	0.6	0.1	-1.3	-0.7	0.0
Hypo Real Estate	DE	..	0.1	-1.3	-0.6	-0.3
Landesbank Baden-Württemberg	DE	0.3	0.1	-0.6	-0.3	-0.1
Landesbank Berlin	DE	0.6	0.2	0.0	0.2	0.2
Norddeutsche Landesbank	DE	0.6	0.2	0.0	0.0	0.1
WestLB	DE	0.4	-0.5	0.0	-0.2	-0.1
WGZ Bank	DE	0.4	0.3	-0.4	0.4	0.2
Danske Bank	DK	0.7	0.6	0.1	0.2	0.2
Jyske Bank	DK	1.7	1.1	0.5	0.3	0.4
Nykredit	DK	0.5	0.4	-0.1	0.0	0.4
Sydbank	DK	1.8	1.7	0.5	0.6	0.4
Banco Popular Español	ES	1.9	1.8	1.3	0.8	0.6
Banco Santander	ES	1.3	1.3	1.1	1.0	1.0
BBVA	ES	1.7	1.7	1.3	1.1	1.2

	Country	2006	2007	2008	2009	2010
BFA-Bankia	ES	..	..	..	..	0.0
La Caixa	ES	1.1	1.6	0.5	0.4	0.5
OP-Pohjola	FI	1.3	1.5	0.5	0.6	0.7
BNP Paribas	FR	0.7	0.7	0.2	0.4	0.7
Banque Populaire	FR	1.4	0.4	-0.1	..	..
Caisse D'Epargne	FR	1.0	0.3	-0.4	..	..
BPCE Group	FR	..	..	..	0.0	0.5
Crédit Agricole S.A.	FR	0.5	0.3	0.1	0.1	0.2
Société Générale	FR	0.8	0.2	0.4	0.1	0.5
Agricultural Bank Of Greece	GR	1.4	1.3	-1.9	-0.8	-1.3
Alpha Bank	GR	1.6	1.9	1.0	0.7	0.2
EFG Eurobank Ergasias	GR	1.5	1.5	1.0	0.5	0.2
Hellenic Postbank	GR	1.4	0.4	0.0	0.2	0.0
National Bank Of Greece	GR	1.7	2.1	1.9	1.1	0.5
Piraeus Bank	GR	1.8	1.7	0.7	..	..
OTP Bank	HU	2.9	3.0	3.1	1.7	1.4
Allied Irish Banks	IE	1.7	1.4	0.6	-1.5	-8.2
Bank Of Ireland	IE	0.9	1.0	1.0	0.0	-0.6
Irish Life And Permanent	IE	0.6	0.6	0.1	-0.4	-0.2
Banca Monte Dei Paschi Di Siena	IT	0.9	1.2	0.0	0.1	0.5
Banco Popolare	IT	..	0.9	-0.4	0.4	0.2
Sanpaolo IMI	IT	1.1	..	..	..	..
Banca Intesa	IT	1.3	..	..	..	..
Intesa Sanpaolo	IT	..	1.6	0.3	0.6	0.6
UBI Banca	IT	1.5	1.2	0.3	0.4	0.3
UniCredit	IT	1.0	0.9	0.5	0.3	0.2
Banque Et Caisse D'Epargne De L'Etat	LU	..	0.6	0.3	0.7	0.7

	Country	2006	2007	2008	2009	2010
Bank Of Valletta	MT	1.6	1.8	0.7	1.3	1.6
ABN Amro	NL	0.5	1.0	0.2	-1.0	-0.1
ING	NL	0.8	0.8	-0.1	-0.1	0.4
Rabobank	NL	0.5	0.5	0.5	0.4	0.5
SNS Bank	NL	0.6	0.6	-0.6	0.0	-0.2
DnB NOR Bank	NO	1.1	1.2	0.8	0.6	0.9
PKO Bank Polski	PL	2.6	3.2	3.5	1.8	2.4
Banco BPI	PT	1.2	1.2	0.5	0.7	0.6
Banco Comercial Português	PT	1.3	0.8	0.4	0.3	0.4
Caixa Geral De Depósitos	PT	1.0	1.0	0.6	0.3	0.3
Espírito Santo Financial Group	PT	1.5	1.1	0.6	0.8	0.8
Nordea	SE	1.1	1.0	0.7	0.6	0.6
Skandinaviska Enskilda Banken	SE	0.8	0.7	0.6	0.1	0.4
Svenska Handelsbanken	SE	0.9	1.1	0.8	0.6	0.7
Swedbank	SE	1.0	1.0	0.9	-0.5	0.5
Nova Kreditna Banka Maribor	SI	1.3	1.4	0.4	0.3	0.3
Nova Ljubljanska Banka	SI	1.1	1.0	0.2	-0.4	-1.3
Barclays	UK	0.7	0.6	0.3	0.8	0.4
HSBC	UK	1.2	1.1	0.3	0.3	0.8
Lloyds Banking Group	UK	1.2	1.2	0.2	0.1	0.0
The Royal Bank of Scotland	UK	1.0	0.6	-1.8	-0.2	-0.1
Investment banks		0.7	0.5	0.0	0.2	0.4
Retail banks - Focused		1.5	1.5	0.8	0.4	0.1
Retail banks - Diversified		1.2	1.1	0.6	0.3	0.4
Wholesale banks		0.6	0.3	-0.3	-0.2	0.2
TOTAL		1.1	1.0	0.3	0.2	0.3

APPENDIX IX. RETURN ON EQUITY (%)

	Country	2006	2007	2008	2009	2010
Erste Bank	AT	14.0	16.8	11.0	7.8	8.8
Oesterreichische Volksbank	AT	10.9	13.2	-18.1	-44.5	4.4
Raiffeisen Bank International	AT	32.2	18.7	21.9	5.3	12.4
Dexia	BE	18.5	17.6	-69.0	11.7	8.6
KBC	BE	24.9	23.7	-19.6	-16.3	10.5
Bank Of Cyprus	CY	19.2	17.1	26.8	14.7	12.3
Marfin Popular Bank	CY	6.0	19.7	12.9	5.8	3.1
Bayerische Landesbank	DE	10.6	2.0	-46.0	-19.7	6.4
Commerzbank	DE	15.6	15.5	-2.0	-17.5	4.7
Dekabank	DE	14.7	15.4	-2.0	14.2	20.7
Deutsche Bank	DE	25.4	23.6	-18.0	13.7	7.9
DZ Bank	DE	19.1	9.7	-18.4	8.2	15.1
Helaba	DE	10.9	8.3	-1.2	8.2	7.6
HSH Nordbank	DE	26.7	3.4	-130.3	-28.4	0.3
Hypo Real Estate	DE	..	9.7	..	-48.2	-11.1
Landesbank Baden-Württemberg	DE	12.5	3.3	-43.5	-11.6	-3.2
Landesbank Berlin	DE	29.9	10.2	0.5	12.5	11.6
Norddeutsche Landesbank	DE	22.3	8.0	0.4	-1.6	5.9
WestLB	DE	14.9	-33.9	0.7	-13.5	-3.2
WGZ Bank	DE	10.4	8.8	-12.9	11.8	5.3
Danske Bank	DK	19.4	18.5	2.3	4.7	6.2
Jyske Bank	DK	29.1	23.4	12.0	5.0	7.5
Nykredit	DK	8.6	8.1	-1.7	0.3	8.3
Sydbank	DK	32.3	33.7	11.4	10.9	5.8
Banco Popular Español	ES	29.1	29.3	20.7	12.7	10.1
Banco Santander	ES	22.3	20.8	18.7	14.8	14.9
BBVA	ES	31.5	30.4	25.9	18.6	17.1

	Country	2006	2007	2008	2009	2010
BFA-Bankia	ES	..	..	..	..	0.5
La Caixa	ES	26.6	33.3	11.0	4.6	6.6
OP-Pohjola	FI	15.6	17.8	7.1	7.5	8.5
BNP Paribas	FR	19.3	18.6	6.7	11.2	15.2
Banque Populaire	FR	22.4	7.1	-1.5	..	..
Caisse D'Epargne	FR	25.6	7.8	-15.2	..	..
BPCE Group	FR	..	..	..	-0.8	11.2
Crédit Agricole S.A.	FR	17.5	10.4	2.5	3.2	5.0
Société Générale	FR	24.2	6.0	9.8	1.7	11.5
Agricultural Bank Of Greece	GR	20.7	20.8	-57.7	-19.6	-52.6
Alpha Bank	GR	22.2	24.8	15.9	7.7	2.7
EFG Eurobank Ergasias	GR	23.0	19.6	17.7	6.3	2.2
Hellenic Postbank	GR	19.5	6.7	0.5	3.2	0.3
National Bank Of Greece	GR	14.4	22.3	23.4	12.3	5.1
Piraeus Bank	GR	30.4	23.7	12.8	..	..
OTP Bank	HU	26.4	28.1	27.7	13.8	10.8
Allied Irish Banks	IE	27.6	22.4	10.0	-23.4	-273.0
Bank Of Ireland	IE	29.1	29.0	29.6	-0.1	-12.8
Irish Life And Permanent	IE	18.4	18.0	2.7	-9.1	-5.9
Banca Monte Dei Paschi Di Siena	IT	18.4	26.2	0.0	1.5	7.7
Banco Popolare	IT	..	10.3	-4.3	4.1	1.9
Sanpaolo IMI	IT	23.8	..	..	..	..
Banca Intesa	IT	21.9	..	..	..	..
Intesa Sanpaolo	IT	..	17.2	4.1	6.7	7.1
UBI Banca	IT	31.8	11.2	3.3	4.8	3.8
UniCredit	IT	19.6	15.0	8.6	4.6	3.2
Banque Et Caisse D'Epargne De L'Etat	LU	..	8.6	5.1	9.8	9.9

	Country	2006	2007	2008	2009	2010
Bank Of Valletta	MT	24.2	25.4	10.3	18.8	21.1
ABN Amro	NL	19.9	31.2	5.9	-25.5	-2.2
ING	NL	24.1	27.9	-5.1	-3.8	9.5
Rabobank	NL	9.2	9.7	8.5	6.8	8.1
SNS Bank	NL	14.3	15.8	-14.4	1.0	-5.6
DnB NOR Bank	NO	22.6	22.7	17.8	10.3	15.9
PKO Bank Polski	PL	26.1	28.6	33.6	13.7	19.0
Banco BPI	PT	24.4	25.2	11.7	13.9	14.5
Banco Comercial Português	PT	20.5	14.0	5.5	4.1	4.9
Caixa Geral De Depósitos	PT	19.7	19.4	12.1	5.2	4.6
Espírito Santo Financial Group	PT	20.9	14.8	10.2	10.4	9.3
Nordea	SE	24.9	22.6	19.1	13.7	14.8
Skandinaviska Enskilda Banken	SE	22.6	22.6	16.8	3.3	8.8
Svenska Handelsbanken	SE	25.2	26.6	23.4	16.0	15.9
Swedbank	SE	23.1	23.3	18.1	-10.2	9.8
Nova Kreditna Banka Maribor	SI	17.4	19.1	5.5	4.1	4.1
Nova Ljubljanska Banka	SI	..	16.3	2.9	-6.9	-22.0
Barclays	UK	25.7	22.4	14.5	19.4	9.8
HSBC	UK	20.2	19.2	8.8	5.4	12.4
Lloyds Banking Group	UK	36.4	34.5	9.4	2.4	0.6
The Royal Bank of Scotland	UK	19.9	11.4	-54.5	-2.8	-1.3
Investment banks		21.0	13.7	-0.8	3.5	8.0
Retail banks - Focused		22.3	20.8	10.3	4.7	-9.1
Retail banks - Diversified		22.6	20.7	9.5	4.8	6.3
Wholesale banks		19.1	10.8	-16.8	-6.3	5.5
TOTAL		21.3	17.4	0.9	1.9	1.7

APPENDIX X. LIST OF ABBREVIATIONS

BCBS   Basel Committee on Banking Supervision

BIS   Bank for International Settlements

CDO   Collateralised debt obligation

CDS   Credit default swap

CET1   Common Equity Tier 1

CIR   Cost-to-income ratio

COREP   Common reporting

CRD   Capital Requirements Directive

CRR   Capital Requirements Regulation

DFA   Dodd-Frank Act

EBA   European Banking Authority

ECB   European Central Bank

ECON   Economic and monetary affairs committee

ELA   Emergency lending assistance

ESRB   European Systemic Risk Board

FAT   Financial Activities Tax

FDIC   Federal Deposit Insurance Corporation

FED   Federal Reserve System

FINREP   Financial reporting

FSC   Financial stability contribution

FSOC   Financial Stability Oversight Council

GAAP   Generally accepted accounting principles

GDP   Gross domestic product

ICB   Independent Commission on Banking

IFRS   International financial reporting standards

IMF	International Monetary Fund
IRB	Internal rating based
LCR	Liquidity coverage ratio
NSFR	Net stable funding ratio
NSF	Net stable funding
OCC	The Office of the Comptroller of the Currency
OTC	Over-the-counter
OTS	Office of thrift supervision
OLA	Orderly Liquidation Authority
OLS	Ordinary least squares
PCA/	Prompt corrective action
RoA	Return on assets
RoE	Return on equity
RoRWA	Return on risk-weighted assets
RWA	Risk-weighted assets
SEIR	Structured early intervention and resolution
SHV	Shareholder-value
SMEs	Small- and medium sized enterprises
SIFI	Systemically important financial institution
SIVs	Structured investment vehicle
SPV	Special purpose vehicle
TCE	Tangible capital equity
TBTF	Too-big-to-fail
VAT	Value-added tax
XBRL	eXtensible Business Reporting Language