No 211

Four Futures for Finance

A scenario study

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Abstract in English

We develop four scenarios for the future of finance. Our scenarios differ in two dimensions. First, to what extent soft information lies at the core of banks' business. Second, to what extent scope economies exist between different banking activities. By combining these two dimensions, we obtain four scenarios: Isolated Islands, Big Banks, Competing Conglomerates, and Flat Finance. Market structure, market failures, and government failures vary between scenarios. These differences then translate into differences in the complexity of balance sheets, the ability to coordinate policy internationally, the information gap faced by regulators, the size of banks' balance sheets, the tradability of banks' assets, the level of interconnectedness, the potential for market discipline, and the threat of regulatory capture. As a result, each scenario calls for a different set of policies to combat systemic risk.

Key words: Financial sector, systemic risk, regulation, scenario study

JEL code: G10, L51

Abstract in Dutch

We ontwikkelen vier scenario's voor de toekomst van de financiële sector. De scenario's verschillen in twee dimensies. Ten eerste, in welke mate zachte informatie aan de basis van het business model van banken ligt. Ten tweede, in welke mate er synergie bestaat tussen verschillende bancaire activiteiten. Door deze twee dimensies te combineren, krijgen we vier scenario's: Islands, Big Banks, Competing Conglomerates, and Flat Finance. Marktstructuur, marktfalen, en overheidsfalen verschillen tussen de scenario's. Deze verschillen vertalen zich in variatie in de complexiteit van de bankbalans, de mate waarin internationale coördinatie van beleid tot stand komt, de informatieachterstand van toezichthouders ten opzichte van banken, de grootte van banken, de mate van internationale verwevenheid, de effectiviteit van marktdiscipline, en de kans op regulatory capture. Hierdoor hangt de effectiviteit van beleidsinstrumenten om systeemrisico in te perken af van het scenario.

Steekwoorden: financiële sector, systeemrisico, regulering, scenariostudie

Contents

Preface

This document presents four scenarios for the future of finance. The goal of our study is to imagine the future of finance and to identify challenges faced by policymakers in fighting systemic risk. It builds upon a tradition within the CPB to develop scenarios for policy analysis.

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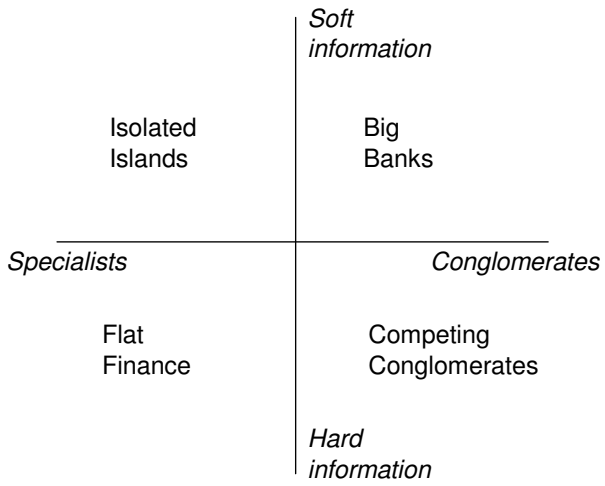
Coen Teulings,
Director

Summary

In this study, we present four scenarios that aim to imagine the future of finance in 20 years' time and try to identify the main challenges faced by policymakers in reducing systemic risk. In this respect, our study complements other scenario studies such as a recent Dutch Central Bank study (DNB, 2009), which 'aims at providing a fact-based review of developments that have taken place since the crisis erupted and that are relevant for Dutch financial institutions.' In addition, whereas an important dimension in their scenario is the speed and type of recovery of the real economy, we focus on the role that financial intermediaries play vis-à-vis markets.

The scenarios that we present differ in two dimensions. The first dimension refers to the type of information – hard or soft – lying at the core of banks' business models. Examples of hard information are data on a client's credit history, cash flow realisation, revenue, investments, liabilities etc. A bank can credibly transfer such information to other banks or investors. These outside parties can then base their commercial decisions on this information. In contrast, soft information cannot credibly be transferred to other banks or investors. Examples are an assessment of creditworthiness based on a relationship of mutual trust between an account manager and his client, or intimate knowledge of the day-to-day operations within a particular firm. Such information only has value to the bank that generates it. The second dimension is to what extent scope economies exist between different banking activities, i.e., whether banks specialize or form conglomerates. As depicted in figure 1 below, by combining these two dimensions we obtain four scenarios: isolated islands, big banks, flat finance, and competing conglomerates.

Figure 1 **Four scenarios**



The first dimension of our scenarios arises because future developments in information and communication technology (ICT) can have two opposite effects. On the one hand, they may allow banks and potential borrowers to generate more hard information, which can be processed

in statistical models. Long-term relationships matter less, informational frictions in direct credit markets are reduced, and banks focus on reducing remaining frictions. On the other hand, technological developments may also help banks in generating more soft information. In that case, banks will focus on fostering long-term relationships. The value of a bank's assets will depend on soft, non-transferable information and outsiders have difficulties assessing their quality. In this sense, assets will become more informationally opaque.

The second dimension of our scenarios arises because future developments in ICT may increase economies of scope in the banking sector, but may also increase the potential to use contractual means, such as outsourcing or partnerships, to achieve particular synergies between different activities. The latter will induce specialisation.

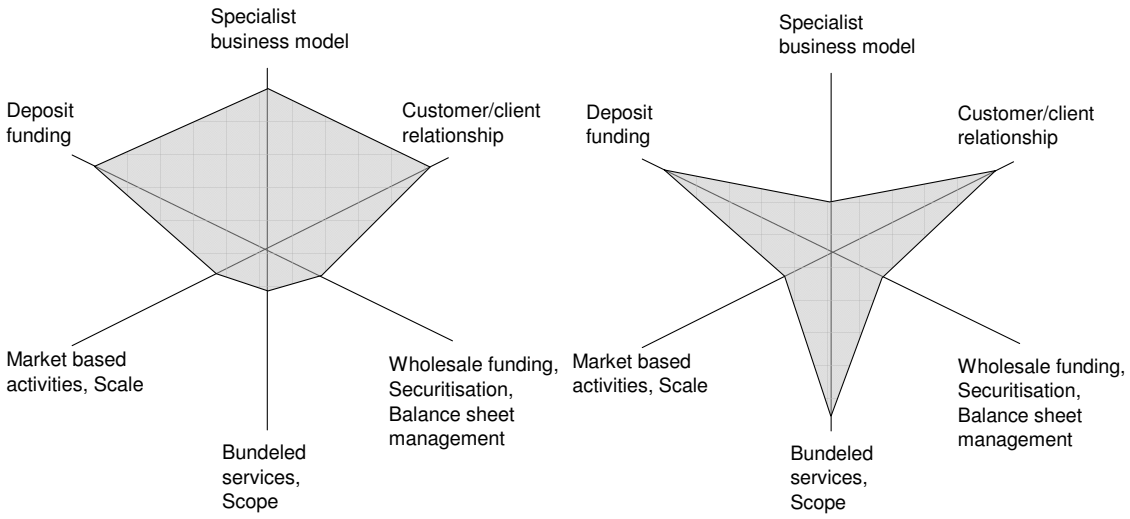
Important variations between scenarios concern the complexity and size of balance sheets, , the tradability of banks' assets, the level of interconnectedness, the potential for market discipline, the threat of regulatory capture, the ability to coordinate policy internationally, and the information gap faced by regulators These variations lead to differences in market structure, the importance of market failures, and the extent of government failures. As a result, policies to mitigate market and government failures will differ between scenarios.

Market structure

Figure 2 and 3 illustrate how market structure differs between the scenarios. In Isolated Islands, banks specialize because economies of scope are absent. They invest heavily in their relationship with their clients because this generates the soft information that is the key to a bank's success. To generate soft information, banks have to stay in close contact with their clients, which gives rise to a local orientation. A local orientation also implies that scale matters less. In addition, competition is muted because bank clients are locked in due to the absence of hard information on their credit status. To fund their activities, banks depend heavily on deposit funding. Funding in the interbank wholesale markets is difficult because assets are opaque and therefore have relatively little collateral value.

In Big Banks, soft information still plays a central role. In contrast with Isolated Islands, however, scope economies are important. Banks offer their clients a complete and functionally integrated set of products and services. As a result, banks' balance sheets contain a diversity of assets and are more complex. When customers need a particular service, they will first turn to the bank from which they already buy several products. This creates an additional lock-in effect, which reduces competition even further.

Figure 2 **Market structure: Isolated Islands (lhs) and Big Banks (rhs)**

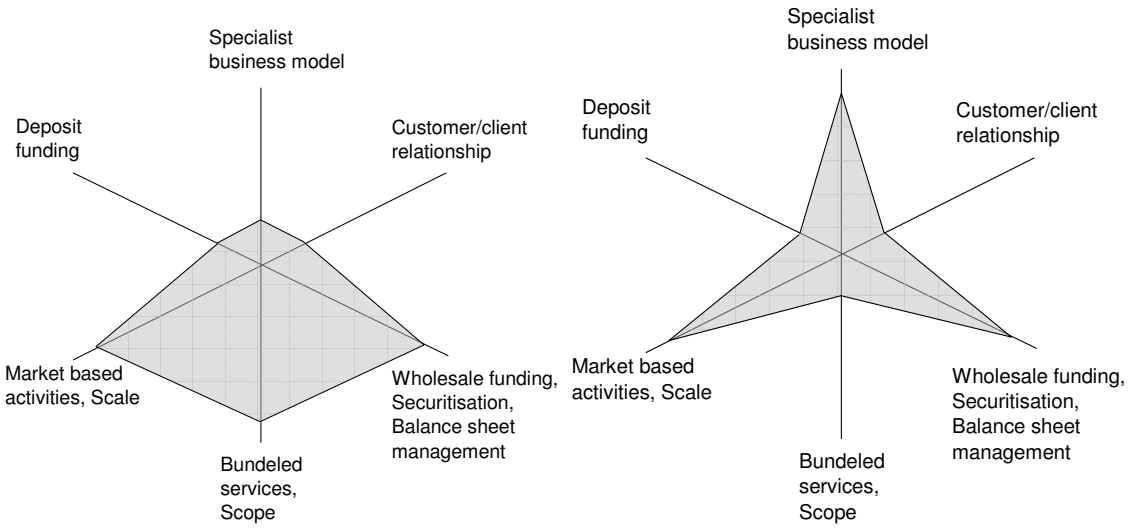


In Competing Conglomerates, scope economies are important, but now hard information is abundant, which reduces the importance of soft information. As a result, bank assets are less informationally opaque: third parties can more accurately determine the value of these assets by using hard, transferable information. This makes banks' assets more liquid. As a result, securitisation is easier, which allows banks to finance themselves more easily through wholesale markets, thus reducing their reliance on deposit funding. Because banks can select and monitor clients based on hard information, distance matters less. Consequently, banks are footloose and can serve their clients from anywhere in the world. For some services and products, consumers and firms can turn directly to markets. For these activities, banks compete head-on with markets and economies of scale become more important.

In Flat Finance, finally, hard information remains abundant, but scope economies are absent. This implies that large international banks specialize for example in investment services or retail internet banking. Clients can easily change banks, as information on their creditworthiness is credible and transferable to other banks, while they are not restricted to buying package deals. As a result, banks that operate in a particular market segment compete fiercely.

It may be tempting to identify existing banks that fit a particular scenario. However, a particular scenario reflects a whole ecosystem of banks, i.e., retail banks, corporate banks, investment banks, hedge funds, money market mutual funds, special purpose investment vehicles etc. If one wants to think of our future scenarios in terms of the current world, it is best to think in terms of countries or regions. For example, although one should not take such comparisons too seriously, Isolated Island may be compared to Germany, big banks may be compared to Japan, competing conglomerates may be compared to Europe, and flat finance may be compared to the United States.

Figure 3 **Market structure: Flat Finance (lhs) and Competing Conglomerates (rhs)**



Market and government failures

Because the economics that drives market structure differ between scenarios, the severity of market failures and government failures will also differ. The market failures that differentiate banks from non-financial firms such as car manufacturers are twofold. First, shareholders' limited liability creates an incentive to shift risk to small creditors (i.e., depositors) who are unable to monitor and intervene to discipline banks. Here, banks and car manufactures differ because the latter usually have a few large creditors. Second, one bank's risk-taking decisions have negative external effects for other banks due to contagion. Interconnectedness (for example through cross holding of deposits, credit lines, or interbank lending) or information spillovers (for example through perceived correlations in risks, assets values, or the quality of regulation) can cause one bank's problems to affect other banks as well. In contrast, the failure of a car manufacturer has no such negative consequences for its competitors.

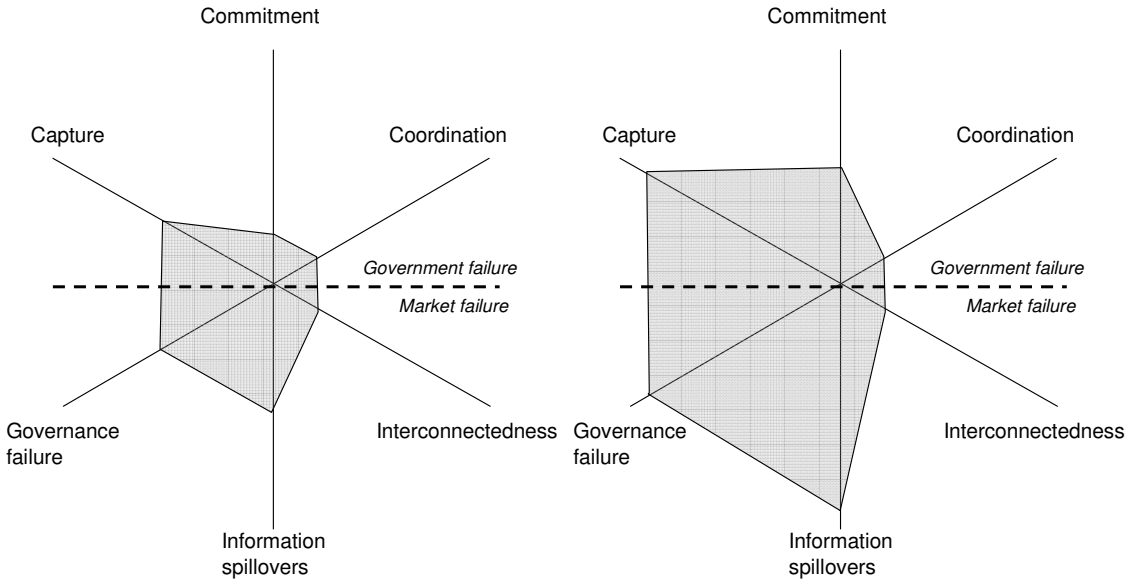
Government failure arises when government intervention introduces a new inefficiency. In the context of bank regulation, we distinguish between three forms of failure: capture, lack of commitment, and coordination failure. Capture arises when a regulator puts the interests of the sector above those of society. Commitment is problematic when a conflict exists between ex ante and ex post goals and regulators can not credibly commit themselves to a particular course of action. Coordination failures can arise if free-riding effects exist among regulators.

Figure 4 and 5 summarize the market failures and government failures in the four scenarios. In Isolated Islands, debt and equity holders have difficulties monitoring the probability of losing their money because banks have private information about the value of their assets, interconnectedness is rather low, because banks hold their assets to maturity and fund themselves through deposits. The potential for information spillovers is somewhat larger because banks' assets are relatively opaque. Coordination is relatively easy due to banks local orientation, while governments are able to commit themselves not to bail-out small banks. .

Although capture is much less probable than in other scenarios, it remains a potential issue because of the information gap between regulator and regulated..

In Big Banks, interconnectedness is rather low, as in Isolated Islands. A difference is that, debt holders have even more difficulties monitoring banks, because banks' balance sheets are so complex. For the same reason, the potential for information spillovers is also larger. As in Isolated Islands, coordination is feasible because banks are local. Commitment, however, is more difficult due to banks' size. Capture is particularly problematic in this scenario because the regulator faces bigger banks as well as a larger information gap.

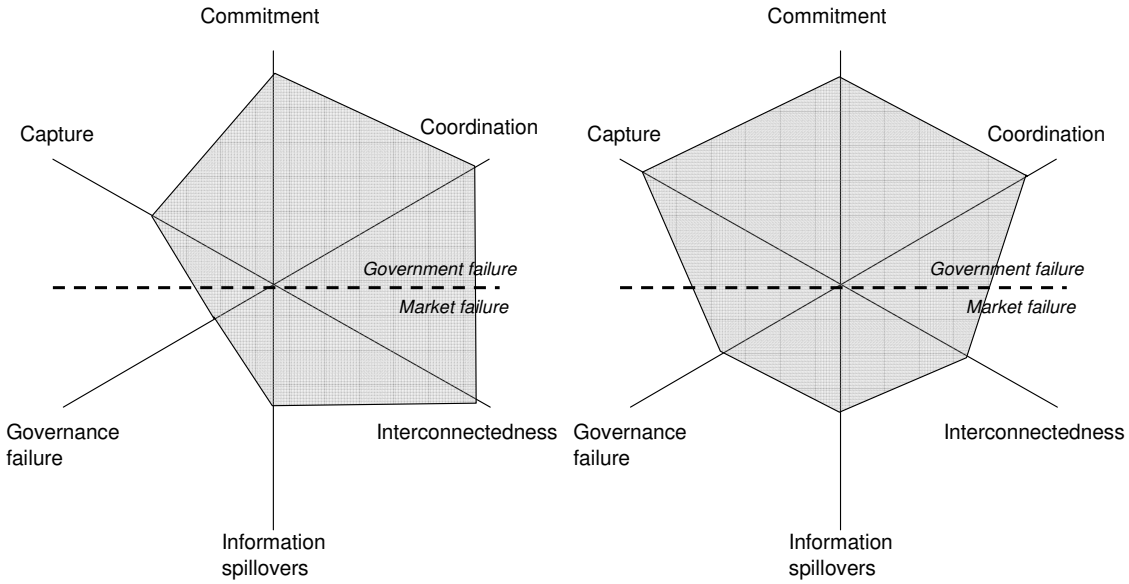
Figure 4 **Market and government failures Isolated Islands (lhs) and Big Banks (rhs)**



In Competing Conglomerates, assets are less informationally opaque. Therefore, debt and equity holders can more easily monitor banks. In addition, banks fund themselves to a larger extent through wholesale markets. This improves banks' corporate governance. Competing Conglomerates has a high probability of capture, because balance sheets are complex. In addition, commitment and coordination are central issues because banks are footloose and large.

Flat Finance combines a high degree of interconnectedness with effective corporate governance and limited informational spillovers. Flat Finance scores badly on coordination. It scores relatively well on capture because information asymmetry is limited. Commitment remains an important issue because of the size of banks, but also because banks may be too-interconnected-to-fail.

Figure 5 **Market and government failures Flat Finance (lhs) and Competing Conglomerates (rhs)**



Policy challenges

Our scenarios translate into policy challenges that vary across scenarios. We distinguish between four categories of policy challenges. First, how should we monitor financial instability? If banks are local, we should focus on local risks because these matter most. When soft information matters, market information will signal trust and reputation. In case bank assets are opaque, information spillovers are an important source of instability. If banks are able to securitize and sell their assets, then interconnectedness will play an important role.

Second, how should we reduce government failure? If government failure is rather mild, transparent reporting suffices. In other cases, more drastic measures such as splitting monitoring and intervention, arranging external visitations, or preventing long-term relationships may be called for. Market information can also be useful in reducing government failure if it can be used as an independent indicator of risk.

Third, what type of ex ante prudential regulation should be in place? If regulators are at an informational disadvantage, regulation that requires complex information will be less effective. Simple indicators that trigger close scrutiny may be a useful complement in that case. When information is hard, regulation that uses market forces to discipline banks may play an important role.

Finally, how should regulators intervene ex post, i.e., once potential threats to financial stability have materialized? When banks are big and systemic crisis difficult to predict, it may help to separate out crucial banking functions. In that case, it is also crucial to introduce bank-specific bankruptcy law. Table 1 below summarizes the policy challenges in each scenario.

Table 1 Policy challenges

	Monitoring financial stability	Reducing government failure	Ex ante prudential supervision	Ex post crisis management
II	* Focus on local risks, correlated exposures, information spillovers * Monitor different types of financial institutions * Market information as indicator of trust	* Transparent reporting by regulator (see FDIC)	* Complement incentive regulation with simple indicators that trigger close scrutiny * Guarantee independent board	* PCA works well * Facilitate crisis funding for SMEs
BB	* Focus on local risks, correlated exposures, information spillovers * Use information other local banks * Market information as indicator of trust	* Split monitoring and intervention * Arrange external visitation * Prevent long-term relation between regulator and banks	* Use simple indicators that trigger close scrutiny * Guarantee independent board * Put more emphasis on quantitative restrictions	* Adapt PCA to large national banks * Facilitate crisis funding for SMEs
CC	* International monitoring of macro and micro exposure important * Focus on information spillovers * Design markets to generate information on systemic risk	* Use institutional design to reduce probability of capture (see Big Banks) * Use market information to trigger intervention * Act unilaterally * Make banks 'more local' * Devise mechanisms to punish deviating countries	* Price systemic risk, * Complement pricing with quantitative restrictions. * Use market discipline * Regulate incentive schemes	* Adapt PCA to large international banks * Isolate crucial banking functions from crisis * LOLR to prevent liquidity-draining runs * Introduce contingent capital * Introduce bank-specific bankruptcy law
FF	* International monitoring of macro and micro exposure important * Focus on interconnectedness * Focus on activities instead of institutions * Design markets to generate information on systemic risk	* Use institutional design to reduce probability of capture (see Big Banks) * Use market information to trigger intervention * Act unilaterally * Make banks 'more local' * Devise mechanisms to punish deviating countries	* Price systemic risk * Use market discipline * Regulate incentive schemes	* Adapt PCA to large international banks * Isolate crucial banking functions from crisis * LOLR to prevent liquidity-draining runs * Introduce contingent capital * Introduce bank-specific bankruptcy law

Conclusion

The challenges that policymakers face give rise to several generic lessons. First, improved financial infrastructure may help by reducing market frictions and improving the robustness of payment systems in case of systemic shocks. In addition, countries may not succeed in coordinating policy due to free riding effects. These allow one country to attract profitable

business by lowering regulatory standards. Furthermore, policies that aim at reducing systemic risk can only be effective if they deal with government failure at the same time. Also, ex post measures may be more effective than ex ante regulation in situations where ex ante risks are very hard to manage. Finally, Governments should prepare to cope with big foreign banks in a world where banks are international and footloose.

A scenario study helps to prepare for an unknown future. Of course, our scenarios are necessarily an oversimplification of reality. We present extremes, where reality will be somewhere in the middle. We have focused on two particular dimensions, thereby neglecting other developments that may be important. We contrast scenarios with each other, where different scenarios in reality perhaps co-exist in different parts of the financial sector. In spite of all these limitations, we think that our scenarios provide a useful exploration of the future of finance and the implications for policymakers.

1 Introduction

Several forces have been gradually changing the structure of the financial sector over the last decades, and will continue to do so. First, advances in information technology have made storing and retrieving data cheap and reliable, and collecting and processing information fast and easy. This has reduced transaction costs and increased the availability of verifiable, hard information. Second, globalisation has resulted in larger and more diverse markets in which banks operate. As a result, the profits from outperforming competitors have increased and performance pay has become a central instrument to attract and retain highly-talented employees. Third, changes in regulation have levelled the international playing field, enabling banks to offer a wider range of services, and stimulating international expansion.

On top of these gradual changes, the events of 2007-2008 created an abrupt shock. Before the near implosion of the financial system, both banks and regulators had a reputation for trustworthiness and solidity, and, as a result, a systemic crisis was deemed extremely unlikely. Such a crisis threatens the economy by interfering with banks' crucial role in reducing frictions in financial markets. Indeed, banks provide the bulk of credit financing in the economy, even though lenders can also provide credit to borrowers directly through financial markets.[1]

The financial crisis has changed the optimistic beliefs and expectations of market participants, regulators, and politicians. We now know that developments such as securitisation, growing leverage, increased interconnectedness, growing reliance on short-term funding, ballooning balance sheets, the fee-based business model of credit rating agencies, and high bonuses for short-term performance had substantially increased the risk of a systemic crisis. The crisis also showed that regulators overlooked – and may even have contributed to - serious risks to the financial system. In response, policymakers are seeking to reform financial sector regulation. Many of these reforms are expected to materialize within the next five years.

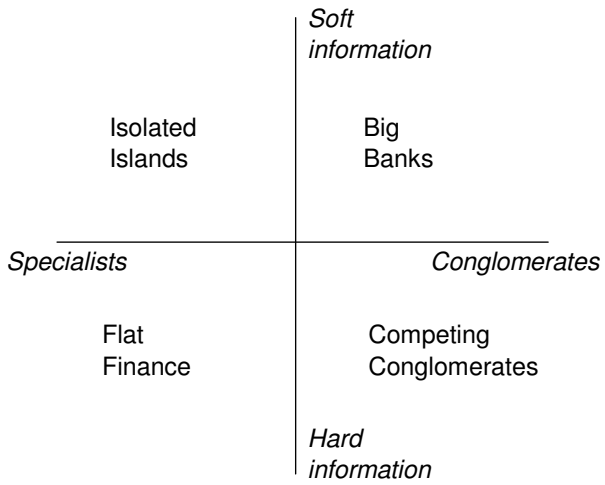
This combination of an abrupt shock on top of gradual change raises the question: what will the financial intermediary sector look like when the dust has settled in, say, twenty years time? In response to increasingly global markets, advancing technology, and changing regulation, financial intermediaries will decide, for example, whether to merge, what products to sell, how to fund their activities and how structure their corporate governance. These choices will determine the structure of the financial sector. But what drives these decisions? From an economic point of view, the costs and benefits of the choices banks make depend on the economic determinants of the added value of intermediaries relative to markets, the market failures that play a role in the financial sector, and the government failures that limit the effectiveness of regulation.

To study the future of financial intermediation, we formulate four scenarios. We arrive at these scenarios by combining two dimensions. The first dimension is the level of specialisation:

[1] We will simply refer to financial intermediaries as banks, although the former also includes hedge funds, private equity, money market mutual funds, commercial banks, corporate banks and investment banks.

will universal banks compete in bundles of products, or will specialized financial intermediaries compete in segmented markets? The second dimension is the importance of soft, private information in banking: will banks live in a world where distance is unimportant, securitisation is easy, banks compete fiercely with each other, and banks and markets are substitutes; or in a world where distance matters, securitisation is difficult, competition between banks is muted, and bank and markets are complements? As depicted in figure 1.1, by combining these two dimensions, we get four scenarios: Isolated Islands, Big Banks, Competing Conglomerates, and Flat Finance.

Figure 1.1 Four scenarios



In the first two scenarios, Isolated Islands and Big Banks, distance matters and information asymmetry is important. Consequently, securitisation is relatively difficult and banks have strong local ties. In the Isolated Islands scenario, scope economies are unimportant. In this scenario, financial intermediaries specialize and compete in segmented markets. In contrast, in the Big Banks scenario, scope economies are important. The result is a world where universal banks with strong local ties offer their clients bundles of product.

In the other two scenarios, Competing Conglomerates and Flat Finance, information asymmetries are smaller and financial markets play a more important role. As a consequence, banks are no longer the only source of financing, securitisation is relatively easy, and distance is less important. Banks can thus easily relocate their headquarters or businesses to another country. In the Competing Conglomerates scenario, economies of scope do matter. Large financial firms compete on a global scale. In the Flat Finance scenario, on the other hand, economies of scope are absent. Hence, financial intermediaries specialize, while they operate globally.

We justify these scenarios by arguing that advances in information technology can either raise or lower the level of soft, private information that banks have, and can either increase or decrease the importance of economies of scope.

Advances in information technology can have two opposite effects on the level of information asymmetry. On the one hand, improved information technology can be used to generate more hard information. For example, data generated by cash management software, electronic payment systems or credit rating agencies allows firms to more credibly convey their credit history to financiers. This may reduce the bank-specific nature of the relationship between a firm, if soft information becomes less important, which allows borrowers to switch banks more easily. It also allows banks to securitise a larger fraction of their assets, because it will become easier to assess the quality of bundles of securitised loans. On the other hand, improved information technology may also be used to generate more soft information and to make better use of it. A bank's long-term relationship with a client generates soft information on a client's creditworthiness and valuable bank-specific skills to manage this client. To optimally extract and use such information, however, banks' account managers have to be close to their clients. As a result, geographical distance matters. In addition, competition for existing clients becomes less fierce, but competition for first-time clients increases.

Improving information technology may also have two opposing effects on the importance of economies of scope. The importance of such economies of scope determines what services banks offer their clients. On the one hand, improved information technology may allow financial intermediaries to better reap the benefits of economies of scope between different services. Data mining may allow banks to approach their customers with tailor-made business proposals. Once banks have built an expensive IT infrastructure, they can use it to sell many different products. An assessment of a clients' creditworthiness may also provide information about cross selling opportunities. On the other hand, information technology creates more scope to arrive at optimal outcomes through contractual relations. Banks can sell information on customers to for example insurers who can then approach this customer. This reduces the advantage of conglomerates, and forces banks to focus on core activities instead.

Of course, our scenarios represent the extremes of a continuum of possibilities. We focus on these extremes to make the distinctions between them, as well as the consequence of these differences for policy, as clear as possible. From a policy perspective, our four scenarios differ in several important ways.

First, the extent to which international policy coordination is possible differs per scenario. If banks are footloose, policy coordination will be more difficult because banks can credibly threaten to move their business to other countries.

Second, the importance and scope of systemic regulation differs per scenario. The ability of financial intermediaries to fund themselves by issuing securities determines the length of intermediation chains. Longer chains increase interconnectedness and therefore systemic risk. The ability to offload assets quickly also increases moral hazard. To protect themselves against increased moral hazard, banks' financiers will prefer to provide short-term funding, which again increases systemic risk. Cross border activities and conglomeration also help to diversify

against liquidity shocks. In the absence of such natural diversification, banks will enter into contracts with other financial intermediaries to compensate.

Third, the extent of information asymmetry between regulator and regulated differs per scenario. This determines how effective regulation that requires complex information is. If banks form conglomerates or can quickly offload or hedge assets, intransparency increases and regulators will find it harder to assess a bank's risk. In addition, if soft information is needed to monitor the credit risk of assets, the information asymmetry between bank and regulator also increases.

Fourth, how effective banks' financiers can monitor and discipline banks determines how useful markets can be in creating information for regulators and in reducing the risks. Market-based financial intermediation, i.e., where banks depend on markets for their funding and not solely on deposits, increases market discipline. In addition, markets are better able to monitor and thus discipline specialized banks, compared to complex financial conglomerates.

The structure of this document is as follows. In chapter two, we briefly describe the determinants of banks' strategic choices. We discuss why banks have a competitive advantage over markets in intermediating between lenders and borrowers. In addition, we examine the market failures and government failures that play an important role in the financial sector. In section 3, we discuss important pre crisis developments in the financial sector. We argue that information technology is an important driver of most of these developments. Section 2 and section 3 form the background for the main part of this study: section 4 and section 5. In section 4 we introduce our scenarios and discus the differences between them with respect to market structure, market failures, and government failures. In section 5 we discuss the challenges faced by policymakers in each of these scenarios. Section 6 concludes.

2 Determinants of banks' strategic choices

In reaction to technological change, globalisation and deregulation, banks' strategic choices have reshaped the financial sector. Transactions have become more arms length, allowing broader participation in financial markets and increased diversification of risks. Financial markets and financial intermediaries have become increasingly intertwined. Banks competed fiercely for talent in global markets. These developments also drive the securitisation of bank loans and the increased reliance of banks on short-term financing through money markets.

To understand how future developments may affect the strategic choices that banks make, and thus to make an educated guess at relevant future scenarios, we have to understand what determines the costs and benefits of these choices. This is a very difficult question. But to develop scenarios for the future of the financial sector we have to provide an answer.

For the purposes of this document, we focus on three factors that play an important role in determining banks' strategic choices. In section 2.1, we discuss the economics of financial intermediation. What is the added value of financial intermediation over intermediation through markets? One answer is that financial intermediaries exist due to economies of scale in reducing frictions in financial markets. This competitive advantage determines the boundary between banks and markets. A second answer is that banks benefit from their ability to forge long-term relationships with their clients, which allows them to generate and use soft, non-contractible information. A third answer is economies of scope, which determine what services banks decide to offer and the potential for cross-subsidisation between these services. Our scenarios will build upon these three ingredients, by arguing, first, that future developments can either reduce the competitive advantage of banks over markets or increase the importance of soft information, and, second, that future developments can either increase or reduce economies of scope.

In section 2.2 we discuss the market failures that plague the financial intermediary sector. These market failures form the rationale for regulation of the financial sector. These determine what the most important risks for the financial sector are. Are they due to contagious bank runs, an opaque network of interconnections, or risk shifting by banks' shareholders? Our scenarios will differ as to which market failure is most important, and, consequently, as to what policy measures are most effective.

Finally, in section 2.3, we discuss the government failures that limit the effectiveness of regulation: the potential for capture, the absence of commitment and a lack of coordination. These government failures determine the limits of what government intervention may achieve, but also how much attention should be paid to the age-old question: who monitors the monitor. Again, our scenarios will differ as to which government failure is most important.

Note that in our discussion, we do not intend to provide an in-depth overview of the relevant literature.[2] Those interested in more detail on different theories of intermediation can consult the following reviews of the literature: Bhattacharya and Thakor (1993), Bhattacharya et al

[2]

(1998), Gorton and Winton (2003), Freixas and Rochet (2008), Allen and Carletti (2008), and Boot and Thakor (2008).

2.1 Banks versus markets

2.1.1 Reducing informational frictions

The financial system, consisting of banks and financial markets, channels funds into productive activities. The providers of these funds are mainly households and firms. The borrowers of these funds are firms, governments and households. Funds can flow from providers to borrowers in two ways: directly, through financial markets such as money markets, bond markets, or equity markets, or indirectly through a financial intermediary, such as banks, money market funds, pension funds, and insurers.

Banks offer loans to firms that want to invest and offer consumers the possibility to deposit savings for future use. But markets could in principle also offer these services. If markets were complete and efficient, financial markets could provide the same services as banks do. In that perfect world, banks would be redundant. In the words of Freixas and Rochet (2008): 'Banks are useless in an Arrow-Debreu world'.

To understand why banks exist, we should understand why banks have a comparative advantage over markets in providing these services. Financial markets are plagued by information asymmetry. Consumers and firms have private information about shocks to their liquidity needs. Borrowers have private information about their investments and are subject to moral hazard. Lenders and borrowers have difficulties in addressing these information asymmetries because markets for information exhibit free riding and economies of scale. The literature on financial intermediation argues that banks are a way to overcome these informational problems. The costs of adverse selection can be reduced if borrowers form coalitions, which in the literature is seen as an abstract way to define a financial intermediary. Investors can address moral hazard by appointing a delegated monitor. Banks can aggregate the liquidity needs of firms and consumers.

Delegated monitors

One line of thought in the literature is that banks act as delegated monitors to investors. Why would investors need to be monitored? Once firms have obtained external funds, they can choose actions that are privately profitable but costly to their financiers. For example, they may allocate too little time or too little effort to cutting costs or internal control, may invest in pet projects instead of the most profitable ones, or spend effort on entrenchment strategies to secure their position. In other words, borrowers are subject to moral hazard.[3]

[3] Alternatively one may assume that these actions can be observed, but only at a cost. This is know in the literature as costely state verification. Banks can then punish or audit borrowers if they fail to meet contractual obligations.

Firms with sufficient own funds can credibly commit not to engage in such opportunistic behaviour by investing enough of their own money in the project (Tirole, 2006). In this way, they have a stake in their own investment project that provides an incentive not to engage in moral hazard. Investors do not have to worry that such a firm will misbehave once it has obtained a loan. Cash-rich firms can therefore obtain funding directly from financial markets, for example by issuing bonds or shares, without having to turn to banks.

Firms that lack sufficient funds, however, will not be able to obtain such direct financing. These firms can only obtain external financing if they somehow reduce the scope for moral hazard. This is achieved if someone monitors their behaviour and punishes them for misbehaviour.

In principle, investors could monitor firms themselves. If economies of scale in monitoring exist, however, they can save on monitoring costs by delegating monitoring to banks. This avoids duplication of auditing or monitoring costs by all lenders and naturally leads to economies of scale in the provision of monitoring services (Diamond, 1984). Banks reduce the scope for opportunistic behaviour by auditing borrowers and punish borrowers if they fail to meet contractual obligations. This allows cash constrained firms to obtain external financing and engage in profitable investments.

An alternative view is that monitoring has the characteristics of a public good. If monitoring improves a firm's performance by reducing moral hazard, other stakeholders in that firm, such as investors, employees or customers, benefit. In addition, purchasers of information may be able to share or resell their information to others, without diminishing its usefulness to themselves. A monitor generating information on the quality of potential investments may then be able to appropriate only a fraction of what buyers in total would be willing to pay. In a market context, efforts of speculators to use their information may be self defeating, because market prices adjust too quickly to new information. This prevents speculators from profiting from their information gathering efforts (Grossman and Stiglitz, 1980). Thus monitoring is especially prone to free riding.[4] To solve this problem, they hire a delegated monitor to do the monitoring for them.

Information sharing

A second theory views banks as information sharing coalitions. The information sharing theory of intermediation originates from a classic paper on signalling by Leland and Pyle (1977). Suppose that firms have private information about the quality of an investment project. To obtain financing, they need to convince the market that their project is worth investing in. By putting some of their own wealth at stake, individual firms can signal the quality of their project to potential investors. If the cost of mimicking this behaviour is too high for a firm with 'bad' projects, such an investment serves as a credible signal of the quality of the project.

[4] In addition, the information generated through monitoring can be disseminated to other investors at a very low cost. This implies that monitoring is associated with economies of scale.

Suppose now that several entrepreneurs each have their own investment project. If the probabilities of their projects succeeding are uncorrelated, entrepreneurs with good projects can reduce total signalling costs by forming a coalition, because diversification then reduces uncertainty about the outcome (Diamond, 1984).[5]

Diversifying liquidity needs

Finally, banks can be seen as pools of liquidity that allow consumers and firms to smooth their liquidity needs. Firms and consumers may unexpectedly need funds. For example, an unanticipated investment opportunity may present itself, equipment may brake down, and people may get sick or face unemployment. Thus, firms and consumers experience idiosyncratic shocks to their liquidity needs and therefore want to hold funds to accommodate these needs. They hoard liquid assets in order to insure against such shocks. This is costly when long-term investments have higher returns than short-term ones. If consumers and firms self-provide liquidity, resources are wasted because short-term assets are held, but a liquidity shock does not always occur. When the shocks to firms' and consumers' liquidity needs are not perfectly correlated, pooling will reduce the amount of low-yield investments required to satisfy these liquidity needs. This creates economies of scale in the provision of liquidity.

Consumers can use money market funds or a bond market to pool their liquidity needs. For this, they do not need banks. These pools of liquidity can provide partial insurance against liquidity shocks. Banks may be able to provide depositors with additional insurance by subsidizing consumers that unexpectedly experience high liquidity needs (Bryant, 1980; Diamond and Dybvig, 1983). However, if banks coexist with financial markets where claims on the bank can be traded, such subsidization gives rise to arbitrage opportunities. The existence of arbitrage rules out cross-subsidization between consumers with high and low liquidity needs (Jacklin, 1987).[6] Thus it seems that markets may undermine banks' ability to provide liquidity insurance.

A theory of financial intermediation as liquidity pools can also be based on firms' liquidity needs instead of consumer liquidity needs (Holmström and Tirole, 1998). When firms face idiosyncratic shocks and hold claims on other firms as insurance against such shocks, lucky firms will end up holding excess liquidity. However, they cannot redistribute these claims to unlucky firms because borrowers are subject to moral hazard. Intermediaries may act as insurers and redistribute excess liquidity.

[5] Boyd and Prescott (1986) present an alternative formulation, using cooperative game theory. In their model, agents have a good or a bad project. An agent knows the quality of his own project and can – at a cost - produce a noisy signal of this quality. Outside investors can only observe the noisy signal. Because the signal is noisy, an agent with a bad project can evaluate the project and hope it will succeed. Therefore, in the absence of coalition forming some agents with bad projects will produce a costly signal. However, when agents form a coalition the coalition can induce bad and good agents to truthfully reveal the quality of their project to the coalition. The coalition then only produces signals on the good projects. Thus, coalition forming provides bad agents an incentive to truthfully reveal their information. Gorton and Pennacchi (1990) argue that intermediation can create adverse-selection-free demand deposits.

[6] Diamond (1997) argues that if a sufficiently large group of consumers has no access to financial markets, banks are still able to improve the allocation of risk by cross-subsidization.

Interestingly, if consumers' and firms' liquidity needs are uncorrelated these two views can be combined. Pooling the liquidity needs of both consumers and firms creates additional benefits from diversification (Kashyap et. al 2002). This provides a rationale for the stylized fact that banks combine illiquid debt on the asset side of their balance sheet with demand deposits on the liability side of their balance sheet.

2.1.2 Relationship banking

A complementary strand of literature claims that banks add value by facilitating long-term relationships between lenders and borrowers. Long-term relationships may be valuable for several reasons.[7]

First, aggregating signals over multiple periods may reduce uncertainty about behaviour. If firms choose each period between behaving or shirking, preventing shirking becomes easier the more periods a contract can be conditioned upon (Haubrich, 1989).

Second, repeated interaction generally increases the number of outcomes feasible in equilibrium. In the context of bank-borrower relationships, this is also true. If contracts are incomplete, long-term relations may have advantages over short-term relations. The loss of reputation or future revenue functions as a stick that enforces mutually profitable contracts.

For example, banks may face adverse shocks on which they cannot make their contracts with borrowers contingent. If such a noncontractible shock occurs and pushes a bank towards bankruptcy, it may want to be able to renege on its contractual obligations. If contracts allow a bank to renege on its obligations, however, it may want to renege also in the absence of a shock once a contract has been signed. Borrowers may therefore fear ex post opportunism. Long-term relationships can prevent such opportunistic behaviour by the bank (Boot et al., 1993).

Long-term contracts may also allow efficient intertemporal subsidization. Suppose that banks initially face an adverse selection problem, but learn the quality of their borrower over time once they have contracted. If banks have market power, they can charge lower initial interest rates (Petersen and Rajan, 1995).

But long-term relations are not only beneficial, they may also have costs. Lock-in between a bank and its borrower opens up the possibility of ex post expropriation for the bank and ex post renegotiation for the borrower. It also exposes borrowers to the risks faced by banks.

First, if a borrower encounters a new, profitable investment during its relationship with the bank, or new information on the profitability of existing investments arrives, the bank can fully appropriate these additional profits if it has sufficient bargaining power. A bank will have such bargaining power if it has more information than outside banks due to its long-term relationship with the borrower. Thus, borrowers may be held-up by the prospect of expropriation and underinvestment results because a bank may try to expropriate a locked-in borrower when new investment opportunities arise.

[7] Some valuable information may be hard to contract upon, because courts do not allow it, or because contracts become too complex. See Tirole (1999) for a discussion on the foundations of incomplete contracting.

Second, if a borrower gets into trouble, the bank may want to bail him out ex post, even though it would not want to do so ex ante. Banks may be subject to a soft-budget constraint. Once a bank and its customer become locked-in, it may be optimal for the bank to treat its customer leniently when problems arise. Because the borrower knows ex ante that he will get bailed out if in trouble, he will put in less effort to prevent bad outcomes (Sharpe, 1990; Rajan, 1992).

Finally, if borrowers are locked in to do business with one particular bank, they are also exposed to the risk that this bank will face bankruptcy. If this risk is sufficiently large, borrowers may not want to put all their eggs in one basket (Detragiache et al., 2000). Multiple relationships can reduce the potential for ex post expropriation and the dependency on one particular bank, although the inherent free riding also undermines incentives to monitor ((Jean-Baptiste, 2001; Carletti, 2004).

2.1.3 Economies of scope

Financial conglomerates offer a range of services to their clients in addition to the traditional services of holding deposits and extending loans. These include selling insurance, underwriting securities, and carrying out transactions on behalf of their clients. Other financial intermediaries specialize in offering one of these services. Conglomerate may have a competitive advantage over specialized firms because of economies of scope. If economies of scope are indeed important, we may see a continuing trend towards large, universal banks.[8] However, if economies of scope are limited, we might instead see a move away from large, universal banks and towards smaller, more specialized banks.

What are potential sources of economies of scope? In the process of making loans, banks acquire information about clients that may allow them to provide other financial services to these clients more efficiently (Rajan, 1992). For example, contact between a loan officer and a firm may offer opportunities to assess additional needs, such as credit facilities, securities underwriting or insurance needs. Similarly, brokerage, securities trading and securities underwriting may provide information that allows banks to provide loans more efficiently.

On the other hand, greater diversity of activities may also result in diseconomies of scope because it intensifies agency problems. For example, Stein (2002) argues that small organisations are better than complex, hierarchical organisations at handling soft information, which cannot be transmitted. Centralised decision-making blunts managers' research incentives because they face the risk that his superiors will cut his budget because of better investment opportunities in other business units. Kanatas and Qi (2003) present a model where economies of scope results in market power for conglomerates. However, this reduces their incentives to invest in costly underwriting efforts. Therefore, financial conglomerates are less successful in selling their clients' securities.

In the end, to what extent economies of scope exist, is an empirical question. The empirical evidence, however, is mixed at best. In reviewing the empirical literature on scope economies,

[8] This may also depend on another strategic benefits of being large: the value of being too-complex-to-fail.

Mester (2008) concludes: 'Most studies have not found strong evidence of scope economies, either between traditional commercial banking products, or between on-balance-sheet and off-balance-sheet bank products.' Berger and Humphrey (1997) argue that this is due to econometric difficulties in identifying cost function for financial conglomerates.

Leaven and Levine (2007) find a diversification discount for financial conglomerates relative to financial intermediaries that specialize in individual activities. They suggest this is due to increased agency costs. Drucker and Puri (2005), find that if a financial intermediary provides both loans and underwriting services to a firm, this will increase the probability of receiving current and future business. To attract firms, it will charge lower fees. On the other hand, combining these activities also creates a potential conflict of interest, because a financial intermediary may be tempted to inflate the price of the initial public offering (Krozner and Rajan, 1994; Puri, 1996; Schenone, 2004).

2.2 Market failures

The essence of government regulation of financial markets lies in the high costs for society that bank distress, either collectively or individually, may inflict. If the failure of banks would not be harmful to society, there would be no need for the extensive government intervention so familiar in the financial sector. The previous section argues that banks resolve information asymmetry. In this way, banks allow for a more efficient allocation of funds, which generates additional economic growth. If banks for some reason collectively get into problems, they can no longer play their role in easing these constraints by resolving information asymmetry.[9]

Indeed, empirical evidence shows that financial crises are typically very costly. Cerra and Saxena (2008) estimate that the loss due to a crisis varies from 4 to 16 percent of GDP, and Hoggarth, Reis, and Saporta (2002) find that the cumulative output losses incurred during crisis periods are roughly 15–20 percent of GDP. Claessens et. al (2008) find that recessions associated with credit crunches and house price busts tend to be deeper and longer than other recessions. The median cumulative loss in GDP of 13 recessions associated with both a credit crunch and a house price bust is 6.7 percent. Reinhart and Rogoff (2008) compare data from the 18 bank-centered financial crises with the 2007 US sub-prime crisis. For the five most catastrophic cases (which include episodes in Finland, Japan, Norway, Spain, and Sweden), the drop in annual output growth from peak to trough is over 5 percent, and growth remained well below pre-crisis trend even after three years.[10]

[9] In the words of Mishkin (1999) "financial instability occurs when shocks to the financial system interfere with information flows so that the financial system can no longer do its job of channelling funds to those with productive investment opportunities." A banking crisis negatively affects economic growth because some firms no longer have access to bank financing. The full cost of inefficient financial markets then becomes apparent.

[10] However, this is not necessarily evidence that banking problems contribute to the decline in output: the same exogenous adverse shocks that trigger banking problems may also cause a decline in aggregate demand, leading firms to cut investment and working capital and, ultimately, demand for bank credit. Dell'ariccia, Detragiache and Rajan (2008) provide

Another justification for government intervention that central bankers and policymakers often mention is safeguarding the integrity of the payment system. If a particular bank incorporates part of a market infrastructure, like payment- or settlement systems, such infrastructure may temporarily break down when a bank goes bankrupt. It is often somewhat unclear what is meant by 'the payment system'. It may refer to the potential for consumers to withdraw money from their bank accounts by using other banks' ATMs or the possibility to pay electronically when they purchase goods. Alternatively, it may refer to the interbank payment system, such as the large-value payment system TARGET2.[11] Preventing a breakdown of such market infrastructure is important because it may lead to contagion.

So far, we argued that banking distress is costly. But if car manufacturers or bakeries collectively run into troubles, this is also costly for society.[12] In what sense do banks differ from car manufacturers or bakeries? What are the market failures that differentiate banks from non financial firms? Banks have an incentive to take on too much risk because they do not take the external effects of their risk taking into account. These external effects arises because of two reasons. First, bank's and shareholders limited liability creates an incentive to shift risk to small, uninformed depositors who are unable to monitor and intervene to discipline banks. Here, banks and car manufactures differ because the latter usually have a few large creditors. Second, one bank's risk taking decisions have negative external effects for other banks because contagion can cause problems to spill-over to other banks. In contrast, the failure of a car manufacturer has no such negative consequences for its competitors.

2.2.1 Failing corporate governance

As we have seen, banks can solve free riding in monitoring by acting as a delegated monitor. However, banks themselves are not exempt from moral hazard. The question then becomes: who monitors the monitor? The complexity of financial products and ability of banks to quickly change their risk profile makes banks' balance sheets more opaque and more fluid than that of other firms. The risk profile of a bank's portfolio of loans and investments can change quickly as a result of a few transactions. It is therefore difficult for outsiders to accurately assess a bank's risks. Empirically, Morgan (2002) and Ianotta (2006) show that credit rating agencies more often have differing opinions on the creditworthiness of banks than that of non financial firms. Banks are inherently more opaque than other types of firms. The greater intransparancy increases the scope for moral hazard.

In addition, banks, like all firms, are subject to limited liability. Limited liability implies that banks are not liable for any remaining losses if they go bankrupt. As a consequence, the upside

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evidence that industries that are more dependent on external finance are hurt more severely after a banking crisis, suggesting that banking problems are the driving force.

[11] This payment system is accessible to commercial banks, central banks, clearing houses, government agencies and some non-commercial organizations like the IMF.

[12] Although some may argue that a collective failure of banks is more costly than a collective failure of bakeries.

of the risk they take is unbounded, but the downside is limited. If banks make a huge profit on risky investments, they are the beneficiary of this gain. But if the investment turns into a catastrophic loss, someone else, e.g., the bank's creditors and, ultimately, the taxpayer, will have to bear the burden. The combination of moral hazard and limited liability therefore makes banks risk loving.[13] As a result banks take more risk than its financiers, the bank's creditors and its stockholders, desire.

In principle, an appropriate corporate governance structure, i.e., monitoring by debtholders and the threat of intervention, can address this problem. As Dewatripont and Tirole (1994) show, interests can be aligned if corporate governance succeeds in creating a carrot and a sufficiently harsh stick. Promising equity holders and debtholders different cash flows provides them with incentives to credibly punish a firm if it is performing badly. This punishment comes in the form of strict intervention by a firm's debtholders. Optimal corporate governance shifts control from relatively passive claimholders (shareholders) when performance is good to more interventionist claimholders (debt holders) when performance is bad. The covenants of debt contracts specify the condition under which debtholders can partly take over control over a firm in order to safeguard their interests. Of course, debt holders also need to monitor the bank. Because each debtholder wants to benefit from other debtholders' monitoring efforts, monitoring is subject to free-rider behaviour. Banks solve this free riding problem by acting as delegated monitors.

Unfortunately, this solution does not work for banks. An important difference between ordinary firms and banks is that ordinary firms' debt is often held by large investors such as banks, whereas bank debt is held mainly by small and dispersed depositors. Bank depositors face unusually severe governance problems because, due to their large numbers, they suffer from free-rider effects and lack information about opaque and fluid bank assets. This limits their ability to discipline banks and curb excessive risk taking. Because depositors are unable to properly monitor banks and exercise their control rights, prudential regulation is needed to adequately represent them and alleviate their free riding problem (Dewatripont and Tirole, 1994).[14]

[13] Without limited liability, a bank's financier could costlessly eliminate moral hazard. Intuitively, making the bank residual claimant would then resolve the conflict of interest between the bank and its financiers.

[14] The literature provides several alternatives to regulation as a way to ensure the bank has proper incentives to monitor. First, diversification may reduce the agency cost of monitoring the monitor, because it reduces the uncertainty about outcome. Indeed, in the limit of perfect diversification, banks face no uncertainty about the payoff of their investments. Of course, in the absence of uncertainty, the agency costs of solving the moral hazard problem are zero (Diamond, 1984). Second, banks will have an incentive to monitor if they co-invest some of their own capital with the loans they extend to borrowers. A bank's own stake in a loan reduces its incentive to shirk (Holmstrom and Tirole, 1997). Third, fragile demand deposits create an incentive for banks to monitor depositors. If failing management triggers bank runs, a banker will face a bank run if he does not behave (Calomiris and Kahn, 1991; Flannery, 1994; Diamond and Rajan, 2001). The latter theories also provide a rationale for the fact that banks fund the long-term, illiquid, loans on the asset side of their balance sheet by issuing short-term debt on the liability side of their balance sheet, such as demand deposits or overnight-unsecured debt.

Because bank's moral hazard is so difficult to contain, long-term investors in banks face much larger agency costs than long-term investors in non financial firms. Some argue that banks finance themselves largely with short-term demandable debt to solve this problem. Such debt serves two purposes (Calomiris en Kahn, 1991; Flannery, 1994). First, it solves the free-rider problem. The holders of short-term debt have an incentive to monitor: if they are the first to identify potential problems, they will be first in line to withdraw their debt. If debtholders do not monitor, chances are they will lose their money. Second, it disciplines the bank's management because they will face bankruptcy if they mismanage the bank.

As a result, banks' balance sheets consist of liabilities in the form of short-term demandable debt, for example deposits that can be withdrawn at any time, and assets in the form of long-term loans. This mismatch in the maturity of bank's asset and liabilities creates the potential for bank runs (Bryant, 1980; Diamond and Dybvig, 1983). In the models of Bryant (1980) and Diamond and Dybvig (1983), bank runs are random 'sunspot' events. An alternative view of bank run is that they are not random, but triggered by information that indicates that the return on bank assets may be unusually low. Calomiris and Gorton (1991) present evidence that bank runs are related to the business cycle instead of a random event.

2.2.2 Loss of sunk investment

This market failure plays a minor role in the rest of this document, but we discuss it briefly for the sake of completeness. The failure of a bank (as opposed to the failure of multiple banks resulting in a banking crisis) may be costly to society because it inflicts negative externalities on bank customers. When a bank runs into trouble, some of the investment projects financed by the bank may have to be liquidated. The liquidation value of a loan is lower that its continuation value if some of this value is bank-specific. This may, for example, happen if a bank develops relationship-specific abilities to restrain its borrowers' moral hazard. Also, if banks have private, non-verifiable information about the creditworthiness of their borrowers, these borrowers may no longer be able to acquire funding for profitable investments if their bank has collapsed.

Note, however, that such negative effects on customers also exist for non financial firms if there are large relationship-specific investments. Nevertheless, it may be the case that the relationship-specific value of a bank and its customers is larger than that of non financial firms and their customers.

2.2.3 Interbank externalities

The potential for one bank's problems to infect other banks is a second important difference between banking and other economic activities such as car manufacturing. In most markets, a firm will benefit from its competitor's problems, because one firm's bankruptcy will most likely result in increased demand for its competitors. In the case of banks, however, one bank's problems, such as a bankruptcy or less extreme circumstances such as large losses may spread

to other banks and affect the banking system as a whole. Contagion refers to the mechanism by which shocks experienced by one bank or a group of banks propagate to other banks or feed back into banks to reinforce the shock.

Interbank externalities exist if banks do not take into account the effect of contagion when deciding on their contracts with other banks, the level of risk on their balance sheet, or their effort to recapitalize when hit by an idiosyncratic shock. The question now becomes what mechanisms give rise to these externalities? The literature identifies a number of potential mechanisms for shocks experienced by one bank to propagate to other banks, which can be roughly grouped into three classes.

First, the problems faced by bank A may lead to a loss for bank B because some of its assets drop in value. Such a negative effect on bank B's asset prices may occur directly or indirectly. Direct effects arise due to bilateral contracts or exposure (Freixas et al., 2000; Allen and Gale, 2000; Dasgupta, 2004). Direct contractual relations between banks exist in the form of interbank loans, credit lines, or insurance contracts bank have extended to each other. When for some reason banks default on these contracts, other banks suffer losses. As bank A becomes more likely to default on its payments, the value of such contracts decreases. Thus, some of the costs of increased risk taking by a bank are borne by competitors with whom the bank has direct contractual relations. Indirect effects arise due to exposure to mutual borrowers or creditors (Kyle and Xiong, 2001; Goldstein and Pauzner, 2004). Whereas under normal circumstances information about direct trading partners is enough to avoid large default risk, under stress more information is needed to secure the same level of counterparty risk. Due to the complex network of interconnections, this may become prohibitively expensive, reducing liquidity (Caballero and Simsek 2009).

Note, however, that even though problems may propagate from one bank to another through these interconnections, this does not immediately imply the existence of externalities. For example, assume that links between banks arise because of bilateral contracts that insure banks against liquidity shocks. The links between banks then arise endogenously. Because banks price the risk of a liquidity shock, what may look like an externality ex post can simply be a correctly priced exposure to risk ex ante. For example, Allen and Gale (2000) argue that a complete network where all parties involved are connected to all others is more robust than the incomplete networks.

Second, even if bank B's assets are unaffected, the problems faced by bank A may negatively affect bank B's ability to fund itself. Bank A's problems may cause conditions for recapitalisation or refinancing of bank B's short-term debt to tighten. Externalities then arise because a bank doesn't take into account the effects on other banks of its decision to sell assets or to withhold liquidity from the market. This can happen in several ways. First, one banks decision to sell asset may lower the value of other banks' assets because of fire sales. Fire sales arise when increased supply of assets lowers the market value of these assets. This negatively affects other banks' ability to withstand shocks by selling assets themselves. Second, adverse

selection due to asymmetric information may lead to a breakdown of the market. If lenders in the interbank markets do not know whether borrowers need cash because they experienced a liquidity shock, or because their assets turned out to be of bad quality, the ensuing lemons problem may cause the market to freeze (Heider, Hoerova and Holthausen, 2009). A final explanation for drying-up of liquidity may be liquidity hoarding. Banks with sufficient cash may strategically under-provide lending, thereby inducing inefficient sales of bank-specific assets. (Acharya, Gromb and Yorulmazer, 2008).

Third, shocks can also spread from bank to bank through informational spillovers. For example, bank runs can spread because a run on one bank implies information about other banks that allows rational agents to update their beliefs. More generally, one bank's problems may generate adverse information about other banks. This can be information about the intensity with which central banks or creditors monitor banks' management, the value of banks' assets[15], or an event that reveals the existence of an aggregate liquidity shortage.

2.3 Government failures

Government policy does not always improve social welfare. Economists often use the term government failure to refer to such a situation. Although no generally accepted definition of government failure exists, according to Winston (2006, pp. 2-3), government failure arises when government intervention, such as regulation or subsidization, introduces a new inefficiency "because it should not have intervened in the first place or when it could have solved a given problem [...] more efficiently, that is, by generating greater net benefits". He goes on to argue that government failures "appear to be explained by the inflexibility, and conflicting policies of government agencies; and by political forces that allow well-defined interest groups to influence elected and unelected officials to initiate and maintain inefficient policies that enable the interest groups to accrue economic rents."

2.3.1 Capture

The public interest theory of government intervention characterizes regulatory agencies as benevolent maximizers of social welfare, possibly subject to informational asymmetry. The private-interest theory of regulation, on the other hand, claims that the regulatory process can be captured by well-organized interest groups (Stigler, 1971; Peltzman, 1976). Interest groups can try to capture government decision making by providing biased information, offering monetary bribes, providing future employment opportunities, entering into personal relationships with decision makers, offering the prospect of an easy life for the regulator, and contributions to political campaigns.

Financial institutions' interests are at stake in the formulation and implementation of regulation. Government intervention in the financial sector regulation is not immune to capture.

[15] If correlations in underlying value across banks exist.

Laffont (1999) argues that the ease of regulatory capture depends on 'the variability of the environment, the extent of asymmetric information about tastes or technologies and the size of the majorities.'

Some features of financial markets increase the susceptibility of its regulators to capture. First, in many countries the financial sector comprises several very large institutions. These are often well connected to the political establishment and organized into powerful banking associations. These engage in lobbying efforts and participate in the public debate on regulatory measures. Typically, regulators initiate a consultation process when they introducing or change regulation. Sometimes regulators have an explicit mandate to further the interests of the financial sector from an international perspective. In contrast, other stakeholders, such as deposit holders, are less well organised. Second, the nature of banking supervision requires regular and close contact between bankers and regulators. This presents bankers with numerous opportunities to present their views. Third, banks are better informed than supervisors, who depend on the banks for their information. For effective supervision, regulators therefore need banks' cooperation. They need access to documentation and data and up to date information on new products and operations. Finally, staff regularly migrates between regulated institutions and the regulator. Those with intimate knowledge of the functioning of supervisory agencies can earn high salaries in the industry. This may soften regulators handling of banks and may result in forbearance.

Although empirical evidence on regulatory capture in finance is scarce, some empirical papers illustrate how restrictions on banking activities can be abused for rent seeking activities. Kroszner and Strahan (1999) find that deregulation in the US occurs earlier in states with fewer small banks, in states where small banks are financially weaker, and in states with more small, presumably bank-dependent, firms. Also, a larger insurance industry delays deregulation when banks may compete in the sale of insurance products. Interest group factors related to the relative strength of potential winners (large banks and small firms) and losers (small banks and the rival insurance firms) can thus explain the timing of branching deregulation across states. Kwahja and Mian (2005) find that in Pakistan politically-connected firms obtain exclusive loans from public banks and have much higher default rates. In the context of the 2007-2008 financial crisis, Igan et al. (2009) find that financial institutions lobbying on specific issues related to mortgage lending and securitisation adopted significantly riskier mortgage lending strategies in the run-up to the crisis.

2.3.2 Commitment

In regulating banks, governments face a classic trade-off. To discipline banks ex ante, governments should be as tough as possible. Banks that expect not to be saved if they take too much risk will behave more prudently. However, when a crisis arises, being tough on banks may not be the best course of action. Ex post, the failure of a large, highly interconnected financial firm can destabilize the financial system and the broader economy. The failure of a

large financial institution directly harms its counterparties in the financial system, can induce liquidity freezes, and can negatively affect expectations about other financial institutions. As a result, regulators may postpone intervention (i.e., engage in forbearance). In addition, governments are very reluctant to let large, interconnected banks fail or impose substantial costs on the bank's creditors.

To prevent bank failures, governments provide banks and their creditors with explicit guarantees. Explicit guarantees take the form of deposit insurance and the central bank's lender of last resort role. Banks that are perceived as too big to fail or too interconnected to fail, however, also receive the benefit of implicit guarantees. No matter what, the government will save these banks by extending guarantees or full-blown bailouts.

The expectation that a financial firm or its creditors will be saved because it is too-big-to-fail or too-interconnected-to-fail, however, has undesirable effects. It reduces market discipline and encourages excessive risk-taking by the firm. When a bank's creditors are fully protected, they have little incentive to monitor its activities and charge higher interest rates or withdraw their funds if a bank is taking on too much risk. In the absence of such discipline, banks can costlessly engage in risky activities. It also provides an incentive for firms to grow and creates an uneven playing field with firms that do not have such implicit government support.

Governments therefore face a trade-off between ex ante discipline and ex post efficiency. If the government cannot commit itself to a particular course of action, this will result in too little ex ante discipline and too much ex post efficiency. Governments will then save too many banks and impose too little ex ante discipline.

2.3.3 Coordination

When financial stability creates international spillovers, all measures that promote financial stability, such as burden sharing agreements or tougher regulation, will be subject to free rider behaviour. As a result, individual countries will generally invest too little to increase financial stability. For example, when discussing burden sharing mechanisms, Schoenmaker and Goodhart (2009) state: "burden-sharing arrangements are subject to the free-rider problem. Countries that do not sign up for burden sharing profit from burden sharing, as the stability of the European financial system is a public good."

International spillovers can arise in several ways. First, through cross-border banks are active in multiple countries. Such cross-border activities create the potential for spillovers from one country to another. If banking supervision in one country is less strict than in another country, the more prudent country bears part of the risk created by soft supervision. Second, even if banks are not active in multiple countries, contagion can also lead to spillovers from one country to another. If banks are interconnected, for example through direct credit lines or a common interbank market, losses in one country will affect banks in other countries. Because of such spillovers, individual countries will do too little to reduce systemic risk and one government's decision not to bail out a particular financial intermediary may have international

consequences. Finally, one country's intervention in times of crisis can have repercussions for other countries as well. For example, when governments extend guarantees to banks they often favour national institutions and have a bias towards local lending, putting foreign banks at a competitive disadvantage.

A small literature explores the consequences of this lack of coordination in financial regulation. Acharya (2003), for example, shows that competition in capital standards may result in a race-to-bottom. Regulators will try to improve the competitive position of domestic banks. Dell'Ariccia and Marquez (2006) study competition among regulators. They show that such competition reduces regulatory standards compared to a centralised setting. Freixas (2003) investigates the efficiency of lender of last resort facilities in a multi-country setting. Underprovision of resources results because small countries want to free ride on the efforts made by larger countries.

Currently, there exists no framework for regulating, supervising and restructuring large cross-border financial institutions. And no international cross-country burden sharing arrangements to coordinate intervention in times of crisis. Also, there exist no global institutions that are able to reduce free rider effects and force countries to internalise the effect of their soft regulation on other countries.

This should not come as a surprise, because building such a framework requires coordination between countries that may have diverging interests, are able to free ride on other countries efforts, or actively compete to be attractive to profitable industries. We are not aware of theoretical or empirical research that explores how effective international coordination on financial markets regulation is, or how the incentive to coordinate internationally can be improved. Anecdotal evidence, however, is in abundance. For example, according to the Financial Times the intention of European Commission to regulate "the hedge fund and private equity industries could cause a transatlantic rift by discriminating against US groups." It goes on by saying that "A letter sent by Mr Geithner this month to Michel Barnier, Europe's internal market commissioner, makes it clear that the European Union is heading for a clash with Washington if it pushes ahead with what the US – and Britain– fear could be a protectionist law."[16] Views on how to regulate may also differ. When Barack Obama's launched his plan to limit deposit-taking banks from proprietary trading, the UK business secretary Lord Mandelson said "Trying to apply sweeping rules about the structure, content and range of activities of banking entities is too difficult to do".[17]

[16] *Financial Times*, Geithner warns of rift over regulation, 10 March 2010.

[17] *Financial Times*, Mandelson knocks 'Volcker rule' as too difficult, March 3 2010.

3 Pre crisis developments

Financial systems around the world have changed profoundly over the past decades. These changes are driven by three factors: developments in ICT, government policy in the form of deregulation and subsidies, and an increasing demand for liquid stores of value due to globalisation (see also Mishkin and Strahan, 1999; Rajan, 2005; Boot and Thakor, 2008; Bikker and Bos, 2008).

The first key driver of the pre-crisis developments in the banking sector is technological progress and more specifically the advances in information and communications technology. The lasts five decades, the computational power of computers has developed according to what is referred to as Moore's law: the number of transistors on integrated circuits roughly doubles every two years. The performance of computers per unit cost thus increases at the same rate. The same type of exponential growth applies to storage capacity and network capacity.[18]

Information technology and telecommunications are an important part of banks' production technologies. Indeed, in the U.S., financial institutions are the most IT-intensive industry as measured by the ratio of computer equipment and software to value-added (10,9%, see table 2 in Triplett and Bosworth, 2002). The same applies to the finance industry in the Netherlands if measured by ICT capital as a percentage of total capital (5.6% in 1995, Van der Wiel, 2001). As software adapted, and the Internet developed, the costs of individual transactions and the costs of acquiring information decreased.[19] This led to the emergence of credit scoring models, internet banking, electronic payment systems, and electronic trading platforms. Although the impact of technological progress on banks is difficult to measure, Berger (2003) concludes that scale economies appear to have risen, that multi-bank holding companies improved control over their affiliate banks, and that banks have been able to make small business loans at greater distances.

The second important factor is government policy. Governments liberalised and deregulated financial markets, introduced and strengthened deposit guarantees schemes, and stimulated house ownership among low-income households. Liberalisation and deregulation levelled the international playing field. It enabled banks to offer a wider range of services and stimulated international expansion. Changes in regulation allowed banks to hold less equity. And subsidies for house ownership increased indebtedness and fuelled the securitisation of mortgages.

Deregulation took place both in the US and in Europe. In the US, deposit rate ceilings were removed, restrictions on interstate branching were lifted, and limitations on banking activities abolished.

Until the 1980s, most US states prohibited cross-state bank holdings and limited branching within a state. Because states received fees for granting a bank charter, owned banks, or levied

[18] Of course, the laws of physics imply that exponential growth cannot continue indefinitely.

[19] The BIS triennial survey showed that 20-30% of interbank trading in the major currencies was conducted using electronic brokers in 1995 and this rose to about 50% in 1998 and it is now likely to exceed 90% in 2001 (BIS, 2001).

taxes on them, they had an incentive to reduce competition to increase their revenues. Technological developments such as the automated teller machine (ATM) in the early 1970s, however, lowered the value of geographic protections to local banks (Krozner and Strahan, 2007). Between 1970 and 1998, 38 states deregulated their restrictions on branching. The Riegle-Neal Interstate banking and branching Efficiency Act of 1994 finally removed interstate banking restrictions and permitted banks to enter another state without permission. The US Federal Reserve also imposed ceilings on banks' interest rates through regulation-Q. In the 1970s market interest rates rose due to economic circumstances, which reduced banks' deposit supplies and forced them to cut back lending. To allow banks to compete with non-regulated financial intermediaries such as money market mutual funds, US congress passed the Depository Institutions Deregulation and Monetary Control Act in 1980, which lowered reserve requirements and gradually phased out deposit rate ceilings. Finally, the restrictions imposed by the Glass-Steagall Act from 1933 were gradually eased during the late 1980s and in the 1990s, until the Financial Modernization or Gramm-Leach-Bliley Act of 1999 removed the remaining limitations.

In Europe, the creation of a single market and the introduction of the euro removed national boundaries and fostered the integration of capital markets. In addition, banking regulation was partly harmonised. An important step in the process of integration of the EU financial market was the Second Banking Co-ordination Directive that came into force in January 1993. This directive introduced the so-called single bank license, which allowed banks to freely branch out in other EU countries. A bank's home country supervisors became responsible for the supervision of operations in other countries. The introduction of the euro created markets with deeper liquidity that served as a cradle for innovations. The high-yield bond market took an enormous flight, because the liquidity risk of high yield bonds reduced dramatically (De Bondt and Marques Ibanez, 2004), in particular in the segment of low rated (A rated or lower) corporate bonds (p.55, ECB, 2007).

On a global level, the Basel Committee on Banking Supervision initiated a coordinated attempt at reforming the capital adequacy framework. In 1988, Basel I was introduced, setting international standards for banks' capital requirements. Basel II, finalised in 1999, was designed to create a more risk sensitive capital adequacy framework, by providing more granularity in the measurement of credit risk, correcting for differences in risk management across banks, and taking into account other risks such as operational risk.[20] Although Basel II was seen by many as a step forward, as a consequence of the new rules especially large banks were able to reduce their regulatory capital. Blundel-Wignall and Atkinson (2008) estimate that the transition to Basel II's achieved a reduction of $220 billion in regulatory capital for American commercial banks. It also made regulation even more dependent on the risk assessments by credit rating agencies.

[20] Credit risk is the risk of loss due to a debtor's non-payment of a loan or other line of credit (either the principal or interest (coupon) or both). Operational risks are risks arising from execution of a bank's business functions.

A third factor that had a great impact on the development of the financial sector are the global imbalances that contributed to the increasing demand for liquid stores of value. The U.S. current account deficit started to deteriorate in 1991 and reached 6.4% of U.S. GDP in the fourth quarter of 2005. The mirror image of these deficits were the large surpluses in Japan, Europe emerging Asia and countries such as Norway, Kuwait or Saudi Arabia. These resulted in a large demand for liquid stores of value in some regions of the world, and the potential to supply such stores of value in other regions of the world (Caballero, Fahri, Gourinchas, 2008). Securitisation allowed banks to bring supply and demand together.

These drivers have led to a number of developments that lie at the hart of the 2007-2008 financial crisis. First and foremost, the commoditisation of credit risk. Second, the rise of longer intermediation chains and market-based financial intermediation. Third, increased leverage and short-term funding. Fourth, the emergence of new financial intermediaries. Fifth, increased interconnectedness between financial intermediaries. Sixth, the growing importance of performance pay. And finally, consolidation and conglomeration. We discuss these developments in more detail below.

3.1 Commoditisation of credit risk

A first important development is the commoditisation of credit risk, as exemplified by the rise of securitisation and the growing market for credit default swaps. Securitisation of loans and mortgages implies that a bank sells these assets to a Special Purpose Vehicle (SPV), that fund itself by issuing several tranches of asset backed securities (ABS) with differing seniority. In this way, credit risk is first pooled and then redefined in tradable securities. Usually, the bank retains the tranches with the highest risk, to guarantee that it has incentives to monitor the underlying assets.[21] A credit default swaps (CDS) is an agreement between a protection buyer and a protection seller, whereby the buyer pays a periodic fee in return for a payment by the seller contingent on a credit event, such as bankruptcy or restructuring of debt. Figure 3.1 shows the growth of securitisation and the credit default swaps market. This growth originated from an increased demand for liquid stores of value as well as the ability of banks to supply these products, which resulted from, technological progress and regulation.

The demand for liquid stores of value resulted from an ageing population in the west and rapidly growing economies in China and East Asia. The export led growth strategies in emerging countries created large surpluses that needed to be stored. The need to save now to be able to spend later created a huge demand for liquid 'stores of value', i.e., easily tradable claims on future cash flows. Securitised loans provide such liquid stores of value. In addition, regulation stimulated the demand for triple-A rated products by requiring pension funds to hold

[21] In synthetic securitisations, the transfer of a portfolio of loans is mimicked using credit derivatives such as credit default swaps (CDS), total returns swaps of credit-linked notes. Thus, assets stay on the bank's balance sheet. Basel II consists of three pillars: risk-adjusted minimum capital requirements (Pillar I), Basel II a supervisory review process (Pillar II), and disclosure requirements to enhance market discipline (Pillar III).

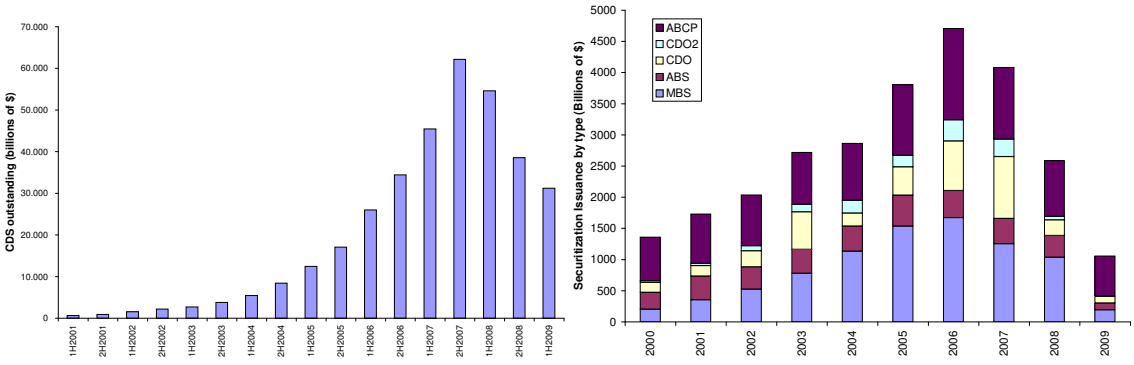
certain amounts of their assets in such products, and by allowing banks to hold lower capital reserves against triple-A rated assets.

On the supply side, ICT development made securitisation an off-the-shelf technology, which could be routinely applied to bundles of loans. The new technology allowed financial intermediaries to store and analyse the credit histories of large numbers of individuals and companies. Credit scoring models rely on the statistical analysis of default risk and require large databases on default histories. To build a good model, developers need sufficient historical data, which reflect loan performance in periods of both good and bad economic conditions. Information technology allowed these techniques to develop in the 1990s. For example, BankAmerica used about 30.000 small business loans to develop a credit-scoring model to evaluate small-business loan applications (Mester, 1997). Also for high risk mortgage loans such models were developed, but given their short history, these were not tested through an economic cycle.

Regulation also contributed, because it allowed banks to use this financial innovation to satisfy demand. In the US, several policy measures contributed to the rise of securitisation and the increasing importance of credit default swaps (Levine, 2010). The Federal Reserve decided in 1996 that banks could reduce their capital cushions using credit default swaps (CDS). Regulators treated CDSs as having the risk level of the counterparty to the swap. As a result, counterparties such as AIG, with a triple-A rating amassed large exposures to credit risk. Finally, in the mid-1990s, regulators started to use quantitative guidelines to stimulate lending by Freddie Mac and Fannie Mae to low-and moderate-income areas and borrowers.[22]

All this created the conditions under which loans could be bundled together, split up in different securities with different seniority, liquidity, maturity, and risk, and sold to investors who do not have the origination capability of banks.

Figure 3.1 **Growth of outstanding CDS (LHS) and Development of securitisation (RHS). Sources: ISDA Market Survey and IMF, Global Financial Stability Report October 2009.**



[22] Since the collapse of Lehman on September 15, 2008 markets for credit risk have seen a sharp drop in liquidity and volume. The gross notional amounts outstanding worldwide for credit derivatives dropped from 54.6 trillion US dollars in December 2007 to 41.9 trillion US dollars in December 2008 (ECB, 2009).

3.2 Longer intermediation chains

Traditionally, banks were the dominant supplier of credit and the main source of maturity transformation in the economy. They were funded by short-term liabilities such as deposits and invested these funds in long-term illiquid assets that they held to maturity. In the decades before the crisis, however, the intermediation chain between ultimate borrower and ultimate lender grew (Adrian and Shin, 2010). Increasingly, households put their money in mutual funds; mutual funds in turn funded commercial banks by buying short-term paper; commercial banks funded securities brokers by buying repos; securities firms funded SPVs by buying their asset backed securities; and SPVs funded banks by buying their mortgages loans. Each part of this chain functions as a bank, borrowing short and lending long. The middle part of the longer intermediation chain, however, no longer funds itself through consumer deposits, but through the wholesale capital markets in which repos, ABSs, and short-term commercial paper are traded.

As a result, market-based financial intermediaries, such as structured investment vehicles (SIVs), finance companies such as General Electric (GE), broker dealers, or banks such as Northern Rock, have increasingly taken over the role of traditional banks. They fund themselves by issuing (short-term) securities in wholesale markets instead of deposits. Because markets require collateral in return for funding, market-based intermediaries hold liquid, partly securitised, assets, which can be sold easily.

In the pre crisis decades, the importance of relationship banking seemed to decline. Increasingly, the idea was that customers could be served from all over the world. In Germany, the head of its national development bank was dreaming of a '*Kreditfabrik* (loan factory), for processing standardised loans cheaply on behalf of many banks. The banks would deal with customers, as now; the factory would do the back-office work.'[23] Infomediaries such as Dun and Bradstreet and credit scoring models would facilitate this kind of outsourcing and specialisation. James Dimon, JPMorgan Chase's boss, stated in a letter to shareholders that the bank's job was to deliver the right bundle of products at the right price. He said. "Where the products are 'manufactured' is of little interest" to customers.[24] Petersen and Rajan (2002) find that in the U.S. the distance between small firms and their banks grew from 16 miles in the 1970s to 68 miles in the 1990s. They interpret this as evidence that 'the tyranny of distance' in small business lending is slowly breaking.[25]

[23] *Economist*, The loan factory, Apr 14th 2005

[24] *Economist*, The limits to size, May 18th 2006

[25] Degryse and Ongena (2004) argue that retail banking remains to a large extent local because they do not alter the fundamental trade-offs that determine the extent of exchange of information inside a bank, between firms and banks and between banks and banks.

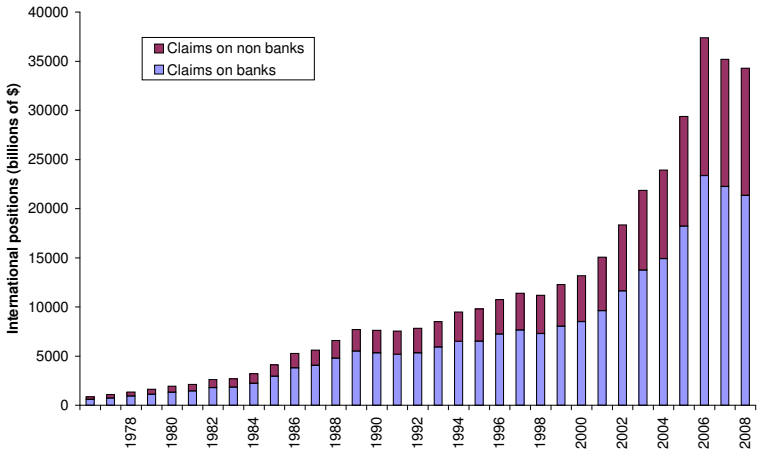
3.3 Increased interconnectedness

Over the past decades, several developments have contributed to the increasing number of linkages among banks. Banks are lending more money to more banks in more countries. These connections arise through interbank markets, derivatives such as credit default swaps, securitised loans, and cross-border banking. The resulting increased interconnectedness of financial institutions implies a greater dependency between financial institutions with regard to liquidity risk, counterparty risk, and credit risk. How this increased interconnectedness can lead to the unexpected breakdown of parts of the financial system has been illustrated in the recent 2007-2008 financial crises.

An important source of interconnectedness is the interbank money market. As banks tend to hold over 10 percent of their assets in the form of deposits with other banks (Degryse e.a. 2007), the failure of a counterparty could wipe-out a substantial part of bank capital. The internationalization of the banking sector over the past decades has increased the number of interbank cross-border connections (see figure 3.2). This internationalization of finance industry is driven by capital account liberalization, deregulation (including removal of restriction on foreign entry), the introduction of the euro, falling communication costs and more recently trends such as securitisation, the rise of hedge funds and the widespread use of special purpose vehicles (Lane and Milesi-Ferretti 2008, De Nicoló e.a. 2003).

In addition, the commoditisation of financial transactions has contributed to the growing web of connections. An obvious example is the enormous growth in credit derivatives market, transferring the default risk on an underlying contract. As a result, a complicated network of cross-border credit risk exposures has arisen. Next to banks, large insurers and hedge funds are active in this (CDS) market, thereby creating connections with other industries as well. This is vividly illustrated by the rescue of AIG an international insurance cooperation in September 2008. Authorities found that a failure would jeopardize the stability of the financial system, especially through its enormous exposure in the CDS market.

Figure 3.2 **Development of banks' cross-border claims (Source: BIS).**

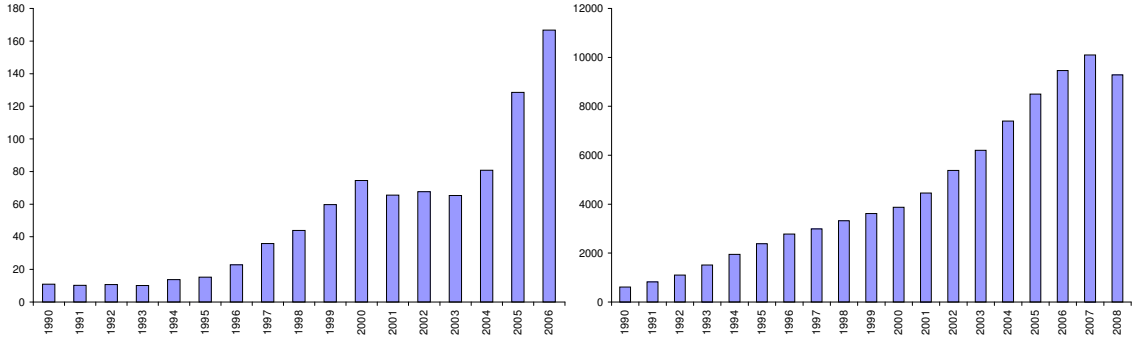


The consolidation and conglomeration within the financial industry has also contributed to interconnectedness. These trends have led to a set of so-called *large complex financial institutions* (LCFIs) that combine retail, corporate and investment banking with insurance services. These players have become central hubs at the core of the international financial system, connecting different markets and different regions. Their central function within the network has consequences for the stability of the network as a whole.

3.4 Emergence of specialized intermediaries

The increased importance of arm's length financing has created a new group of participants in markets: private equity firms[26], venture capitalists, and hedge funds. They have re-intermediated themselves between individual investors and markets. As the rise of ICT increased the complexity of products and the volume of information increased, many investors preferred to delegate their decisions to a specialist. Some specialists, like insurance companies and pension funds, focus on reducing transaction costs. Other firms, like hedge funds or venture capitalists, focus on profiting from specialist knowledge or skills. As a result, the share of direct investment by households in markets in the US has fallen, even though participation in equity markets has grown (Rajan, 2005). The world-wide growth in hedge funds is illustrated in figure 3.3.

Figure 3.3 **Growth of transaction value of buyout investments in billions of Euros (Lhs) Source: presentation EVCA for the European Parliament, february 2008), number of hedge funds including funds of funds (Rhs) Source: Banque de France financial stability review, April 2007.**



Another, more recent development has been de rise of limited-purpose banks that specialize in particular products. Examples are credit card banks, subprime lenders and internet banks. The development of these institutions has been facilitated by the securitisation of loans, which has been the main financing channel for credit card banks since the early nineties (Yom 2005). These lenders also profited from advances in computational techniques, which they use for credit scoring their often high-risk customers. Together with the rise of internet, and advances

[26] See Boot and Thakor (2008).

in payment systems, banks' retail deposit services were increasingly handled through the internet. This made it possible to penetrate foreign retail markets quickly.

Internet banking has partly replaced the brick-and-mortar branch. The costs of a pure internet bank are 100 times lower than its brick-and-mortar counter part (BIS, 2001). They are easy to set up and allow banks to enter financial markets at low costs. The contestability of markets has increased tremendously due to this new development.

3.5 Consolidation

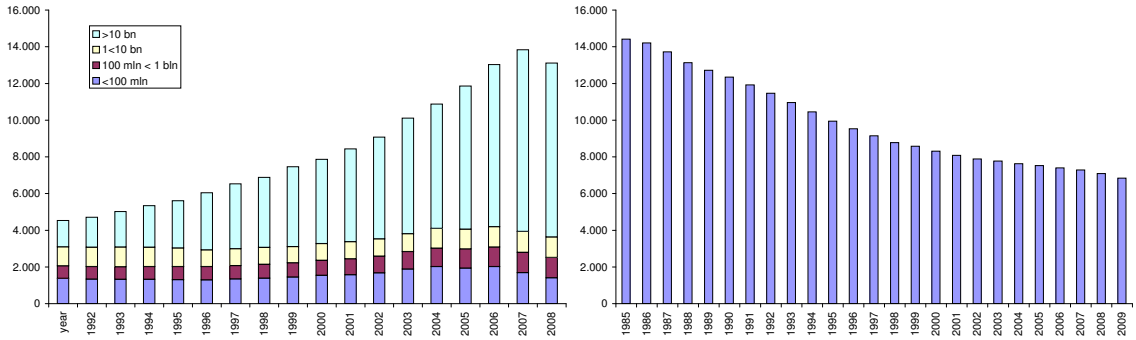
In response to new technologies, deregulation and globalisation, the banking sector has consolidated (Group of Ten, 2001; Jones, 2008). Figure 3.4 shows the development of the number of banking organisations in the US, which almost halved between 1985 and 2003. In the US, most mergers and acquisitions were interbank mergers on the domestic market, although some mergers took place between banks and insurance companies. The same trend prevailed in Europe. Between 1990 and 2005, the number of banks in the four main euro area countries Germany, France, Italy and Spain decreased by 48% (Bikker and Bos , 2008).

One possible explanation for the consolidation wave is that advances in communication and information technology increased the distribution capacity of banks, which enabled them to provide a larger array of services to a larger number of clients over a wider geographical region. This increased the competitive pressure in the industry, which has been a driving force behind bank consolidation over the past two decades. In this view, consolidation allowed banks to benefit from scale and scope economies, for example resulting from the implementation of information technology in the back office or from reducing marketing costs for brand naming. Although the empirical evidence for scale economies is limited (Bikker and Bos, 2008), this may be due to identification problems, as well as the fact that studies mostly use data which is almost two decades old.[27]

A second important rationale for consolidation lies in managers' self-serving motives. De Young et al. (2009) find evidence for other non-profit maximisation motives for mergers and acquisitions, such as compensation schemes for top-level management that stimulated mergers even then this does not lead to efficiency gains, or too-big-to-fail subsidies that arise if banks become so large that market participants expect the government to step in to prevent default.

[27] Boot and Marinc (2008) point out that it is difficult to distinguish market power from scale economies. That increases in scale go hand in hand with a rise in market power and reduced competition in Europe is confirmed by studies that have measured competition over the past ten years (Bikker and Spierdijk, 2008; Van Leuvensteijn et al. 2007). Increased size may also help banks to obtain a "too-big-to-fail" status, which increases profitability as well by allowing banks to shift risk to the government, thereby reducing risk premia.

Figure 3.4 **Development of the distribution of banks according amount of assets in billions of dollars (Lhs) and the number of banking organisations in the US (Rhs), Source: FDIC)**



Deregulation facilitated the consolidation process by removing restrictions on permissible banking activities and geographical limitations on branching. In addition to these structural trends, the macroeconomic environment has influenced the consolidation process. In the 80's, adverse macroeconomic developments put many banks under pressure, best evidenced by the Savings and Loans crisis in the US, which created a motive for banks to merge in order to avoid failure. Later, in the 90s, soaring stock markets provided banks with new opportunities, as in this environment banks could easily issue new shares to finance acquisitions.

3.6 Higher leverage and more short-term funding

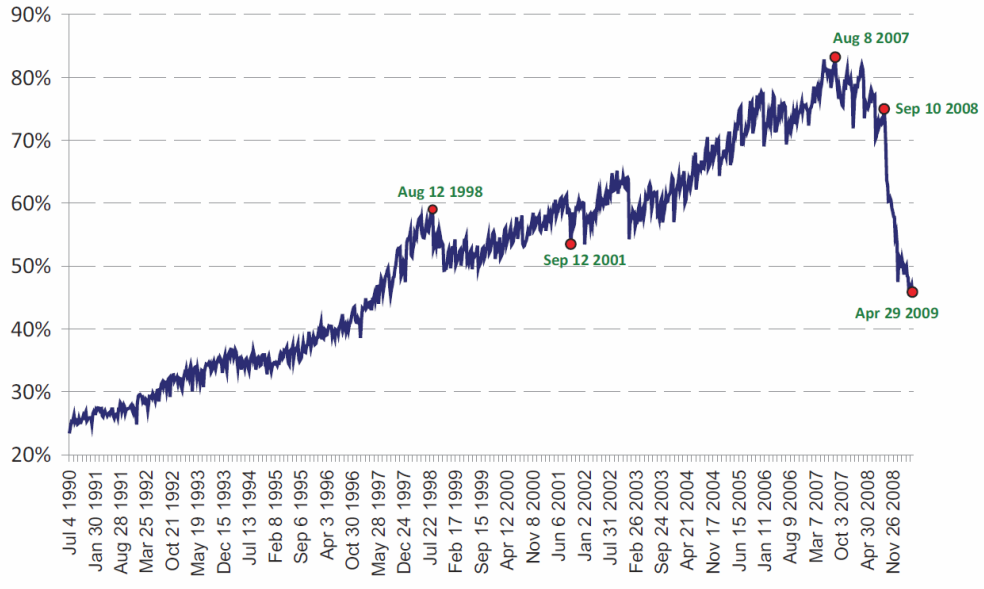
Another important trend in the pre crisis decade was the changing structure of banks' balance sheets. In general, banks fund their balance sheets through: demandable deposits, by issuing short-term liabilities (commercial paper, certificates of deposit, swapped foreign exchange liabilities, and wholesale deposits), by issuing long-term liabilities (consisting of subordinated debt, and hybrids, plus medium- and long-term senior debt), and by issuing equity. .

In pre-crisis decades, banks became more dependent on short-term funding, and increased their leverage. Securitisation played a crucial role in this development. Banks can fund a larger fraction of their assets in wholesale markets if securitisation allows them to sell these assets as collateral. It increases the liquidity of banks' assets and facilitated banks moving assets off-balance sheet, which were subject to light capital requirements.

Banks increasingly transferred assets they traditionally kept on their books to off−balance−sheet vehicles, such as asset backed commercial paper (ABCP) conduits and Structured Investment Vehicles (SIVs). They funded these conduits with a small amount of equity and a lot of short-term debt in the form of ABCP. In order to improve the credit ratings of these vehicles, they provided them with liquidity lines and credit enhancements. These enhancements gave investors recourse to banks' funds in case the quality of assets deteriorated. Existing Basel rules treated such enhancements as capital−light. By shifting assets off-balance to special purpose vehicles that were funded with short−term liabilities, banks both raised their leverage and maturity mismatch by creating a "shadow" banking system.

Figure 3.5 shows the amount of primary dealer (i.e., dealers that have a trading relationship with the Federal Reserve Bank of New York) repos and financial commercial paper as a fraction of M2. The steady growth shows the increasing reliance of financial intermediaries on this type of funding and the big drop during the crisis clearly shows how this funding channel dried up. Simultaneously, the percentage of U.S. banks that were able to fund at least two-thirds of their total assets with core deposits fell from nearly 91 percent to 59 percent between 1978 and 2005 (Bradley and Shibut, 2006).

Figure 3.5 Repos and financial commercial paper as a fraction of M2 (Source: Adrian and Shin, 2009)



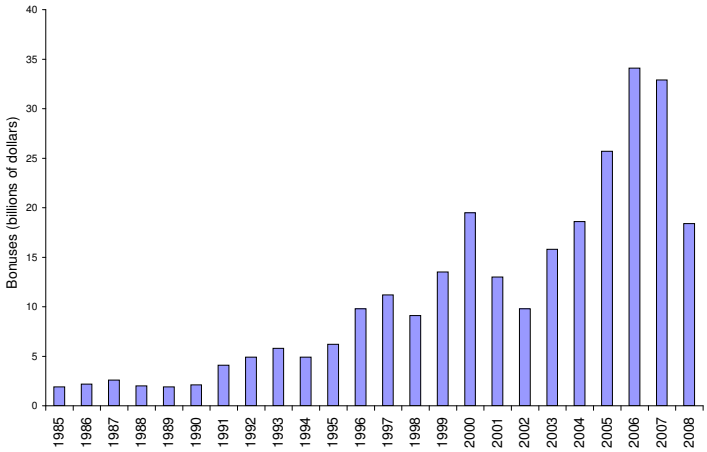
In addition to increasing off-balance sheet leverage in the shadow-banking system, banks also increased their on-balance sheet leverage. For example, average leverage of UK banks, defined as total assets divided by total equity excluding minority interest, increased from approximately 25 to somewhat less than 35. Large differences between banks existed: minimum leverage hardly changed but maximum leverage roughly doubled. At the same time, these banks also became more dependent on short-term funding. The customer funding gap for UK banks, which measures the difference between banks' debt to customers holding deposits and their assets, has been growing rapidly since the early 2000s (Bank of England Stability Report, October 2008).

3.7 Performance-based remuneration

Remuneration policies of financial institutions have become more performance-based, with larger components of variable salary. Figure 3.6 shows the increase in Wall Street bonuses since the 1980s. Deregulation and increased competition have been important factors behind the development of rewarding CEO's with stock options. Philippon and Reshef (2009) find that

deregulation accounts for 83% of changes in the relative compensation of the US financial sector with respect to the rest of the non-farm private sector from 1909 to 2006. Cunat and Guadalupe (2009) argue that deregulation and increased competition in the nineties triggered an increase in the variable component.

Figure 3.6 Growth Wall Street bonuses (Source: Office of the State Comptroler, New York, January 2009)



John and Qian (2003) study the distribution of direct compensation from 1992-2000. They identify three noteworthy aspects. First, total direct compensation increases over the years. Second, option grants as a fraction of the level of salary also increased. In fact, the percentage of option grants in direct compensation has increased from 20 percent in 1992 to 54 percent in 2000. Third, both the increase in total direct compensation and the increase in the number of option grants do not seem to be strongly correlated with stock performance.

Amendments in tax and accounting rules may have contributed to the increase in variable incentive-related compensation. In particular the US congress passed an Omnibus Budget Reconciliation Act that did not allow to deduct non-performance related compensation of managers in excess of 1$ million dollars for corporate tax income. The purpose of this Act was to diminish excessive CEO salary levels. In response to this Act many companies increased their cash allowances to below the threshold of 1 million dollars and began to add option grants to restore de facto the tax deductibility.

4 Scenarios

In this chapter, which forms the core of our study together with chapter 5, we develop four scenarios for the financial sector to provide insights in possible future developments in the financial sector. The main questions in this section are twofold. First, what future scenarios do we foresee? Second, how does a particular scenario affect market structure, market failures, and government failures discussed in section 2?

Section 3 provided insights in the main drivers behind past developments in the financial sector. We argued that developments in information and communication technology were the main factor driving developments in the financial sector. Also after the crisis, ICT will remain the driving factor behind our scenarios. Technological development affects economies of scope, the contractibility of transactions and the asymmetric information between buyers and sellers in financial markets. As we will argue in more detail below, the direction in which ICT influences these elements is not clear.

Our scenarios are a tool to analyse the effectiveness of different policies. In some scenarios, policy makers have a different toolkit than in others, while even if the same type of policies are useful, priorities might differ. In section 5, we will discuss the various challenges faced by policymakers.

Any scenario study should be clear about its limitations. Our scenarios do not describe all possible futures, but focus on a subset that aims to identify the main uncertainties relevant for policymakers. In addition, we do not give a detailed picture of those futures selected. Instead, we paint a broad-brush picture of each scenario, focusing on market structure, the effect on market failures, and the consequences for government failure. Also, we do not consider one scenario to be more likely than another. All scenarios can materialise and we have no view on how probable each scenario is.

Finally, and most importantly, our scenarios arise through developments that policymakers cannot influence. In terms of this study, policymakers are not able to choose how important markets are relative to financial intermediation, whether banks add value by monitoring their clients or by generating soft information, and whether economies of scope are important or not. Instead, one day they will have to act in a certain scenario to increase welfare by reducing market failures and government failures. Nevertheless, in each of our scenarios, policymakers can influence the structure of the financial sector. For example, banks' size or banks' scope can be limited by limiting the size of banks' balance sheets or the type of services banks are allowed to provide. However, the costs and benefits of such policy measures depend on the scenario that materialises.

An analogy may help to clarify this point. Our four scenarios can be compared to four different landscapes, and the policymaker with a traveller who, being located at some particular point, wants to decide where to go and how to travel. The traveller cannot choose which landscape to travel in. Instead, the landscape exogenously arises. Whether the landscape is

mountainous, has large forests, or deep rivers determines the time it takes to travel from one place to another. Of course, our traveller can a go to any particular point independent of what landscape materialises. But where a policymaker would want to travel, how he would travel and how long it would takes to get there, differs between different landscapes.

4.1 Four scenarios for the financial sector

Main driver

As we have seen in section 2, information technology has played a major role in most pre-crisis developments. In this section, we argue that information technology will be the most important driver of change in the financial sector on a timescale of 20 years. Advances in information technology can affect the structure of the financial sector in different ways. As a result, four potential scenarios for the future of financial intermediation emerge.

Soft versus hard information

The first uncertainty that defines our scenarios is the impact of technological development on the relative importance of soft and hard information. Hard information is quantitative, verifiable, and can be easily stored or transmitted. As an example, when banks decide on whether or not to extend credit for a home mortgage loan, they may consult a borrower's income statement or credit card history. Another example is banks using credit-scoring models, which try to quantify credit risk based on measurable firm characteristics. Soft information, in contrast, is qualitative, non-verifiable, and can not easily be stored or transmitted. Stein (2002) defines it as 'information that cannot be directly verified by anyone other than the agent who produces it.' As an example, consider a loan officer who, through close, regular contact with a small-company, has come to believe that it faces good prospects and extends credit based on that subjective judgement.

On the one hand, improved information technology may increase the role of hard information because it facilitates the gathering, storing, and transmitting of such information. Banks can use a borrower's historic cash flow data, credit history, revenue, profits, stock market data etc. to determine the quality of a particular loan. As a result, advances in ICT may lead banks to rely more on hard information from data warehouses when assessing and monitoring a client's creditworthiness, and less on soft information based on mutual trust and close consultation.

A larger role for hard information has several effects. First, outsiders will be able to assess the quality of a bank's assets more accurately. Because of this better assessment, investors will more readily buy securitised loans from banks. In addition, it will become easier to use ever more complex forms of securitisation. In this way, more hard information will enable banks to

securitise loans and use increasingly complex forms of securitisation.[28] Second, the availability of hard data reduces the importance of distance. Statistics can travel the world in a spilt second and can be analysed everywhere. Thus, banks can supply services to clients all over the world without having a dense network of local offices. Third, companies will rely less on banks for financing. Investors are willing to finance these firms as they can make a reasonable judgement of the underlying credit risk, even when they are not in close contact with the companies' management. Companies will then find it easier to tap financial markets directly by issuing bonds and commercial paper.

On the other hand, improved information technology may increase to role of soft information because of several reasons. First, improved information technology can facilitate the collection of soft information, for example, because it makes frequent direct contact between banks' account managers and their clients cheaper and easier, or by streamlining relationship management. Second, more hard information implies fiercer competition between banks offering commoditised financial services. Because soft information allows banks to gain a competitive edge over competitors, soft information may become banks' prime source of rents. Banks will therefore focus on generating soft information.

A larger role for soft information has a number of consequences. First, companies that have to seek their financing through the banking system will get tied in, as banks gain private knowledge on credit risk based on soft information and close contacts with management. Second, banks will have to stay in close touch with their clients. Effective monitoring will require regular, face-to-face contact. Hence, in a world where credit risk can only be predicted by knowing the borrower, banks need to be much closer to their customers compared to a situation where hard information suffices. The importance of distance will therefore increase. Third, Banks will acquire private information on the quality of their borrowers. This increases adverse selection in the secondary market because potential buyers of banks' assets face a lemons problem. Banks' assets will then become less liquid.

Specialisation versus conglomeration

The second uncertainty that defines our scenarios results from the impact of technological progress on the importance of scope economies. On the one hand, advances in information technology may allow an increasing array of financial products and services to be offered through the same distribution network. Once a bank has set up an advanced IT infrastructure, it may be able to integrate new products with small costs. Also, information technology may allow financial intermediaries to better reap the benefits of economies of scope between different services. For example, data mining may allow banks to approach their customers with

[28] Of course, this is a sliding scale. Information on some types of loans may be better than for other types of loans. The former are more likely to be accepted in securitised form than the latter. Some forms of securitisation will therefore always be possible.

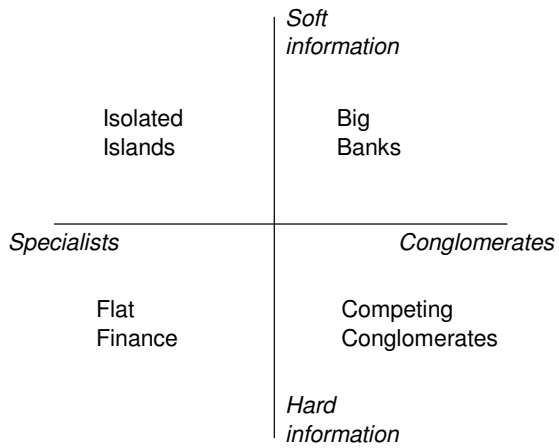
tailor-made business proposals. Or an analysis of the aggregate cash flow data of its clients may allow a bank to better assess credit risk or investment proposals.

On the other hand, information technology may improve the possibilities to arrive at optimal outcomes through contractual relations. Information technology may help specialized firms in reaching their customers. For example, platform interfaces may function as intermediaries that help in bundling products from different providers. Also, improved search possibilities through the Internet may help firms in reaching customers. Where a bank could only approach its own clients with tailor-made business offers with relative ease, the internet and sophisticated data mining technology allows banks to reach non-clients more easily. In addition, ICT may facilitate the outsourcing of all kinds of activities, such as administration, quantitative data analysis, servicing clients etc. These developments reduce the advantage of conglomerates, and forces banks to focus on core activities instead.

Four scenarios

Based on these two uncertainties, we define four scenarios for the financial sector, graphically depicted in figure 4.1: Isolated Islands, Big Banks, Competing Conglomerates and Flat Finance. Below we discuss for each scenario what the financial sector will look like, and how the scenarios differ with regard to market failures and government failures. These differences will then be an important input in section 5, where we discuss the policy challenges faced in the various scenarios.

Figure 4.1 Four scenarios

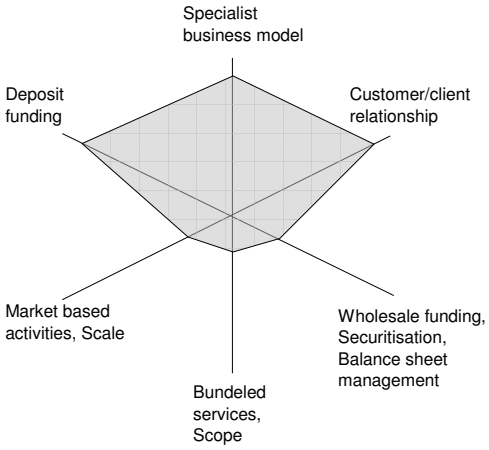


4.2 Isolated Islands

In this scenario, scope economies in the banking sector are relatively unimportant, while banks play a pivotal role in financing economic activity because they generate soft, relationship-specific information through monitoring the credit status of companies and other customers.

The latter implies that distance matters and banks are limited in their ability to securitise and sell their assets. Figure 4.2 summarizes the characteristics of the Isolated Islands scenario.

Figure 4.2 Isolated Islands



Market structure

Policymakers face a landscape dominated by small, relatively locally oriented banks that specialize in offering different banking services, such as retail banking (e.g., deposit holding, mortgages, payments services, retail lending), corporate banking (e.g., cash management, trade finance, corporate lending, some structured finance) or investment banking (e.g., underwriting, mergers and acquisitions, market making, asset management, structured finance). Local companies seek financing from local banks that fund themselves through consumer deposits. Hence, bank assets are less geographically diversified. Although banks are of local nature, they may have branches in a limited number of other countries. The international banks that arise in this way are more aggregates of small local banks, than unified big international banks, given the informational costs in this scenario. Consumer deposits may also be of foreign origin.

Direct credit markets are small: only large, international firms with ample cash are able to tap financial markets directly. Small and Medium Enterprises need banks to invest because they cannot invest sufficient own cash. At the same time, competition between banks is muted and SMEs pay high prices for access to financial resources. Once firms enter into a relation with a bank, they get tied in. If entry in a particular (national) market does take place, it is mainly due to mergers and acquisitions. For example, a foreign bank may take over a small local retail bank. The importance of soft information implies that geographical distance matters. Because soft information is not easily passed on, the chain between lender and borrower is small. Consequently, the hierarchical structure in banks is relatively flat.

The importance of soft information also increases the opaque and information-intensive nature of banks' assets. It is difficult to determine the market value of illiquid loans, which depends on soft, relationship-specific information. As a result, the loans granted by banks, e.g., mortgages, student loans, credit card debt, remain on their balance sheet until they mature,

implying that banks' business models do not revolve around securitisation and balance sheet management. This limits the amount of loans banks can provide. Because assets have limited value as collateral, banks fund themselves largely with deposits.

In this scenario, the size of the financial sector in the Netherlands is limited, and focussed on providing credit, savings and payment facilities to Dutch firms and consumers. Bankruptcy of an individual bank does not create a systemic threat. To get a flavour of what such a market may look like, on may think of the banking sector in Germany, with its different types of local banks that have strong ties with their clients.

How will the financial sector in the Netherlands change if the Isolated Islands scenario materializes? One possibility is that Dutch banks with large international activities will sell their oversees branches to foreign banks and will focus on serving clients in the Netherlands. As a result, the balance sheets of the large Dutch banks will shrink. Another possibility is that banks will formally remain international, but that these international banks will more or less function like strings of local banks. In addition, banks will get rid of, or outsource, non-core activities. This will make room in the market for specialized intermediaries.

Mortgages in Isolated Islands

In Isolated Islands, a consumer buying his first house will compare a number of offers of different banks. In several face-to-face meetings with account managers from different banks, he will try to find the lowest interest rate against the best conditions. The consumer will buy additional products, like insurance or private pension schemes from other financial intermediaries. The banks he compares will be well-known national banks and may even be banks that specialize regionally. Banks compete quite fiercely for such first-time clients. From the banks' point of view, these new clients are blank slates, whose creditworthiness will be revealed during the course of a long-term relationship. A consumer who already has a mortgage or a substantial credit history, however, will visit his current bank first and will most likely get a good offer. A house-owner who needs other loans, for example for buying a car or temporary credit, will also visit his mortgage lender. The bank scrutinizes such second time clients carefully. Local account managers are consulted and their opinion weighs heavily in deciding whether or not the client gets additional credit, or whether his credit is renewed. When he visits other banks, these will most likely offer higher interest rates. When a consumer switches banks, this is seen as a signal of low creditworthiness. Regulators should carefully watch new banks that grow quickly because they will probably extend relatively many loans to clients with a low creditworthiness.

Market failures

In this scenario, the presence of soft information hampers corporate governance, i.e., the potential for a bank's financiers to align their interest with those of the bank through monitoring and intervention. For two reasons, creditors have difficulty monitoring banks. First, because banks mainly fund themselves through deposits, and depositors are bad monitors due to their large numbers and relative ignorance, corporate governance suffers. Second, debt and equity holders have difficulties obtaining good information on the quality of banks' assets and are unable to judge the creditworthiness of banks' borrowers. On the other hand, compared to conglomerate banks, the specialized banks in this scenario have relatively simple balance

sheets, consisting of a limited number of products. This improves corporate governance by facilitating monitoring.

Informational spillovers arise if an event arising at one bank generates new information about other banks. For example, the holders of a banks short-term debt may learn that some banks are in trouble, but not which banks. As a result, depositors will withdraw their funding also from healthy banks. As information asymmetry between banks and their financiers increases, the probability for such sudden regime switches grows.

Interconnectedness decreases if banks fund themselves to a lesser extent through wholesale interbank markets. Soft information reduces banks' ability to use the loans on their balance sheet as collateral for funding. It also limits the possibilities to move assets off-balance sheet to other investors. Specialisation increases the level of interconnectedness, because specialized firms need to fund themselves in some way, and part of this funding will come from other financial firms. Table 4.1 summarizes the above discussion.

Table 4.1 Market Failures

Market failure	Soft information	Specialisation
Corporate governance	Less effective	More effective
Information spillovers	Increases	Decreases
Interconnectedness	Decreases	Increases

Government failures

The importance of soft information increases the information gap between the regulator and banks. In addition, makes it more difficult for politicians or other regulatory institutions to monitor the regulator. As a result, the probability of regulatory capture increases. Specialisation, on the other hand, decreases the information gap because it reduces the complexity of banks' balance sheets.

Governments can more easily commit to a particular intervention strategy, the more difficult it is to hide the fact that a bank is in trouble, and the less of a systemic threat a particular bank's failure poses. As soft information becomes more important, commitment becomes more difficult because it is easier to hide potential problems and postpone intervention. On the other hand, if banks specialize, their size will decrease. This effect is enhanced by the local nature of banks, which keeps them relatively small. The failure of smaller banks is less likely to have systemic consequences. As a result, commitment becomes easier.

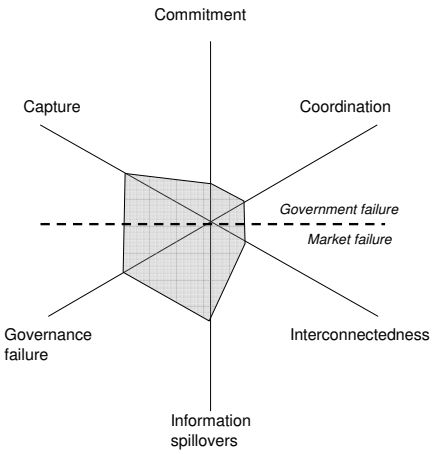
In this scenario, banks depend on geographical proximity to their clients. Because banks are unable to relocate their business to other countries without losing revenues, lowering regulatory standards will not attract many new banks. This makes international coordination easier. Table 4.2 summarizes the above discussion.

Table 4.2 Government failures		
Government failure	Soft information	Specialisation
Capture	More probable	Less probable
Commitment	Easier	Easier
Coordination	Easier	-

Summary

To summarize, the Isolated Islands scenario scores low on interconnectedness and has average scores on all other market failures as is shown in figure 4.3. It scores maximally on coordination and relatively good on commitment. Capture remains an issue because of the information gap between regulator and regulated, although, as we will see, not as severe as in other scenarios. Other government failures are relatively unimportant, because banks are local and small.

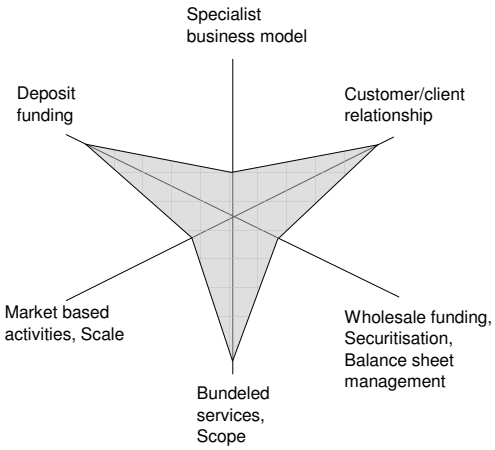
Figure 4.3 Market and government failures in Isolated Islands



4.3 Big (local) Banks

This scenario differs from Isolated Islands because scope economies are important. We thus assume that developments in ICT allows banks to realise more economies of scope between different banking activities. This implies that banks are bigger and balance sheets more complex. Banks generate soft information during their relationship with their clients. Therefore, banks cannot easily securitise their assets and consequently strongly rely on deposits for funding. The importance of soft information for monitoring credit risk also implies that banks need to be located close to their customers. Figure 4.4 summarizes the characteristics of these Big Banks scenario.

Figure 4.4 Big Banks



Market structure

In this scenario, distance is still important and banks' activities are concentrated in the domestic market. Cross-border activity is relatively limited. The existence of scope economies creates barriers to entry and leads to bigger banks. In contrast with Isolated Islands, a few big banks, which supply a wide range of banking services, dominate the financial sector. This implies that banks are complex institutions with a wide range of assets and liabilities on their balance sheet. In addition, competition is limited, as new firms have to enter in multiple markets simultaneously. Given the limited possibility to securitise loans, these banks depend mainly on consumer deposits for funding. Direct credit markets are small. Local companies seek financing from these large local banks, which implies that bank assets are less geographically diversified.

To get some feel of what such a financial sector may look like, one can look at certain aspects of the Japanese financial sector. Japanese banks have close ties with their customers and provide a broad range of services to their clients.

How will the financial sector in the Netherlands change if the big banks scenario materializes? If we move towards big banks, the financial sector in the Netherlands will see further concentration, because the few specialized banks that currently exist will be taken over by local banks. These remaining banks will concentrate on local markets and reduce their foreign activities. Competition for many financial products will be muted because financial products are bundled together.

Mortgages in Big Banks

In Big Banks, a consumer buying his first house will compare a number of offers of different banks. In addition, the consumer will buy other products, like insurance or private pension schemes from the same bank. Based on face-to-face meetings, the consumer will decide which bank to choose by comparing the offer for a bundle of products, including payments and savings accounts. The banks he compares will be well-known, relatively large national banks. The banks may cross-subsidize between products in their bundle. For example, they will offer low interest rates, but realize high returns on insurance products or credit card services. Banks compete fiercely for such first-time clients. Once a mortgage is sold, other commercial units within the bank are notified and will approach the client with business offers. From the banks point of view, these new clients are blank slates, whose creditworthiness will be revealed during the course of a long-term relationship. The bank scrutinizes second time clients carefully. Local account managers are consulted and their opinion weighs heavily in deciding whether or not the client gets additional credit, or whether his credit is renewed. Information from other sources within the bank may also play a role in rejecting or accepting a client. In addition, local account managers are constantly monitoring their clients and try to find out whether they may need additional services. Creditworthy consumers almost never switch their house bank once they have bought a number of services.

Market failures

In this scenario, the presence of soft information hampers corporate governance for the same reasons as in Isolated Islands. In this case, however, balance sheets are complex due to the large number of different products banks offer their clients. This further limits effective corporate governance. Conglomeration increases the complexity of balance sheets, which increases information asymmetry between those inside and those outside the bank. This results in a larger probability for information spillovers. Finally, relative to a financial sector populated with specialists, conglomeration reduces interconnectedness because there is more scope for internal funding markets. Table 4.3 summarizes the above discussion.

Table 4.3 Market Failures

Market failure	Soft information	Conglomeration
Corporate governance	Less effective	Less effective
Information spillovers	Increases	Increases
Interconnectedness	Decreases	Decreases

Government failures

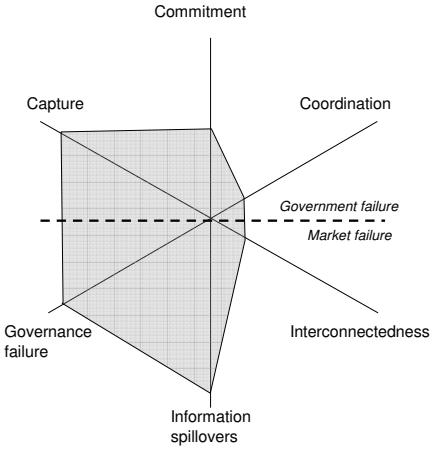
As we have seen, soft information increases the information gap between regulator and banks. Conglomeration further increases this information asymmetry because it increases the complexity of banks' balance sheets. It also increases banks' size. The scope for regulatory capture is therefore particularly large in this scenario. Because banks are bigger and more complex balance sheets increase information asymmetry, governments will find it more difficult to commit to a particular intervention strategy compared to the isolated islands scenario. International coordination is unproblematic, for the same reasons as in the Isolated Islands scenario. Table 4.4 summarizes the above discussion.

Table 4.4 Government failures		
Government failure	Soft information	Conglomeration
Capture	More probable	More probable
Commitment	Less difficult	More difficult
Coordination	Less difficult	-

Summary

To summarize, the Big Banks scenario scores maximally governance failure, has high informational spillovers and has low interconnectedness (see figure 4.5). Big Banks scores good on coordination and average on commitment. Capture, however, is particularly problematic in this scenario because the regulator faces relatively big banks as well as a larger information gap.

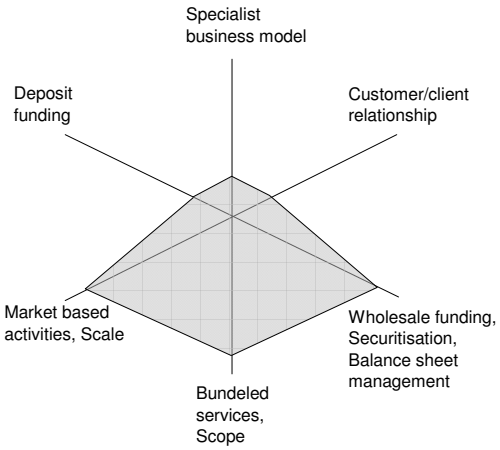
Figure 4.5 Market and government failures in Big Banks



4.4 Competing Conglomerates

In the competing conglomerate scenario, we assume that advances in information technology have created scope economies in the banking industry. In addition, information asymmetries in the direct credit market are reduced to such extent that many firms can tap financial markets directly. For the same reason, securitisation of bank assets is thriving. This also implies that distance is no longer an obstacle to interact with customers or to find funding. Figure 4.6 summarizes the characteristics of the Competing Conglomerates scenario.

Figure 4.6 Competing Conglomerates



Market structure

In this scenario, the financial sector consists of large, international conglomerates that can easily reallocate headquarters from one country to another. Because information is 'hard', the chain between lender and borrower can be long, and banks can have extensive hierarchical structures. Thus, policymakers face large internationally active banks that are centrally led and cross-subsidize between many different banking activities. In a small country such as The Netherlands, most banks are foreign, except maybe one or two domestic conglomerates. Assets move relatively easily off banks' balance sheets. This allows financial institutions such as hedge funds and money market funds to play an important role in financial markets. These institutions an important source of funding for banks in addition to consumer deposits, because they invest in securitised loans. A relative large part of finance bypasses the banking system as companies can directly tap capital markets. Borrowers can shop around for the best deal, as information on their creditworthiness is transferable. Banks therefore compete fiercely for business

This type of banking system is dominated by large foreign players and can be compared to that of some eastern European countries. Large banks from other countries such as Germany, Austria or the Netherlands are very active in, for example, Poland or Hungary.

How will the financial sector in the Netherlands change if the competing conglomerates scenario materializes? If we move towards competing conglomerates, existing big Dutch banks are likely to be taken over by foreign ones. Of course, one of the big banks may remain Dutch, but this will be largely by coincidence.

Mortgages in Competing Conglomerates

In Competing Conglomerates, a consumer buying his first house will compare a number of offers of different banks. The banks he compares will be large international banks. He will search for these offers and approach the banks largely trough the internet. In addition, the consumer will buy other products, like insurance or private pension schemes from the same bank. The consumer will decide which bank to choose by comparing the offer for a bundle of products, including payments and savings accounts. When the bank and a client negotiate actual offers, the bank requires a large amount of data, salary records, data on personal circumstances, data from credit card accounts, etc. This data plays an important role in the banks' acceptance decision. Banks minimize face-to-face contact with their clients and cross-subsidize between products in their bundle. During their relationship with a client, banks use software packages to scrutinize his transactions on a day-to-day basis. These packages generate automatic offers whenever sales opportunities arise. Once a loan has been made, the bank sells the loan to an investment vehicle.

Market failures

In this scenario, the presence of hard information facilitates monitoring of banks. This improves corporate governance because banks' creditors are better able to assess the risks that bank management takes. On the other hand, the complexity of the balance sheets of conglomerate banks decreases the effectiveness of monitoring, which hampers corporate governance.

Hard information reduces information asymmetry between banks and their creditors. This reduces the potential for information spillovers. On the other hand, conglomeration increases the complexity of banks' balance sheets. This increases the opaqueness of banks' balance sheets, and hence the potential for informational spillovers.

Interconnectedness increases if banks fund themselves to a larger proportion through wholesale interbank markets. Because banks generate and use hard information instead of soft information, the value created by a bank-customer relationship is less bank-specific. As a result, when a bank goes bankrupt, a large part of the value embedded in its loan portfolio will be transferable to other banks. Thus, hard information allows banks to use their loans as collateral for wholesale funding, and gives them the ability to move assets off-balance sheet to other investors quickly. Table 4.5 summarizes the above discussion.

Table 4.5 Market Failures

Market failure	Hard information	Conglomeration
Corporate governance	More effective	Less effective
Information spillovers	Decreases	Increases
Interconnectedness	Increases	Decreases

Government failures

Hard information decreases the information gap between regulator and banks. As a result, the probability of regulatory capture decreases. Conglomeration, on the other hand, increases the information gap because it increases the complexity of banks' balance sheets. Both hard information and conglomeration result in bigger banks. Because banks are increasingly too-big-to-fail, it becomes more difficult for governments to commit to a particular intervention

strategy. Because banks can successfully relocate their business to other countries without losing revenues, lowering regulatory standards will attract new banks. This makes international coordination more difficult. Table 4.6 summarizes the above discussion.

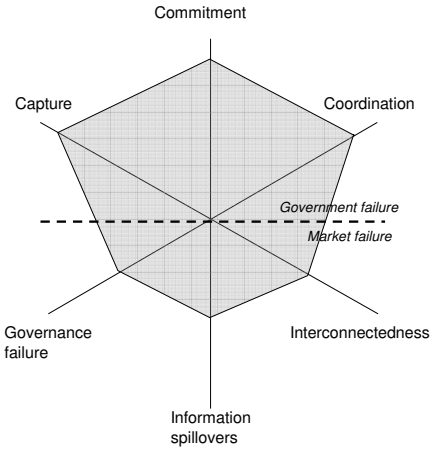
Table 4.6 Government failures

Government failure	Hard information	Conglomeration
Capture	Less probable	More probable
Commitment	More difficult	More difficult
Coordination	More difficult	-

Summary

To conclude, Competing Conglomerate scores average on corporate governance, informational spillovers, and interconnectedness. Competing Conglomerates has a high probability of capture, because we assume that the costs of a larger size outweighs the benefits of more hard information because banks become very large. In addition, commitment and coordination are central issues because banks are large and footloose (see figure 4.7).

Figure 4.7 Market and government failures in Competing Conglomerates

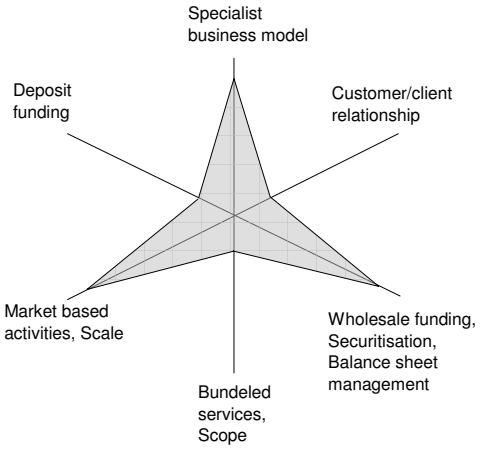


4.5 Flat Finance

In this scenario, economies of scope in the banking sector are absent and information technology reduces asymmetric information problems. This implies that banks become less important and that firms can finance investment by issuing bonds, commercial paper and other tradable securities. Hence, relation specific information is not particularly valuable and distance is no obstacle when serving customers or finding investors. Banks can securitise and trade a wide range of loans and other financial products, which provides an additional source of funding. Financial institutions other than traditional banks, such as money market funds,

security broker-dealers, hedge funds or special purpose vehicles also engage in maturity transformation. Figure 4.8 summarizes the characteristics of the Flat Finance scenario.

Figure 4.8 Flat Finance



Market Structure

Policymakers face a landscape of many different types of banks specialized in, for example, retail banking, corporate banking, investment banking, or transaction banking. These firms operate on international level: financial intermediaries can serve their customers from anywhere in the world, which means that in all these market domestic institutions compete head-on with foreign banks. Cross-subsidization is largely absent and firms shop around for the best service and the lowest interest rate. Because banks have little that binds them locally, financial intermediaries can credibly threaten to relocate their business to another country.

In these international hubs, financial markets play an important role. Banks depend on markets for funding and risk sharing, while many firms can find financing through issuing commercial paper and long-term bonds. These securities are sold to non-bank financial institutions, such as hedge and money market funds from all over the world. Maturity and liquidity transformation thus also takes place outside the banking sector. Local financial systems are typically interconnected through financial markets with the world's financial centres as important "nodes" within this network, even though the degree of interconnectedness varies from country to country. In term of market failures, this scenario's weakness is the interconnected nature of the system. Individual banks or other financial intermediaries do not take into account the effect of their actions on markets and or on other financial firms.

Current examples of what this scenario might look like are the international market-based financial systems of Wall Street, The City, or Singapore, where internationally active, sometimes relatively specialized banks dominate.

How will the financial sector in the Netherlands change if the Flat Finance scenario materializes? In that case, banks will specialize, some banks may survive and may even expand

internationally, other banks will be subject to international take-over bids, and there will be many entrants on the Dutch financial market.

Mortgages in Flat Finance

In Flat Finance, a consumer seeking a mortgage will look for the lowest interest rate through the internet. The bank he finds will be a large international bank, for example located in the U.S. or Germany. The consumer will buy other products, like insurance or private pension schemes from other specialized financial intermediaries. When the bank and a client negotiate actual offers, the bank requires a large amount of data, salary records, data on personal circumstances, data from credit card accounts, etc. This data plays an important role in the banks' acceptance decision. Banks minimize face-to-face contact with their clients and contact is mainly through a specialized helpdesk. This helpdesk offers such services to multiple banks. Once a loan has been made, the bank sells the loan to an investment vehicle.

Market failures

In Flat Finance, the combination of hard information and relatively simple balance sheets facilitates monitoring and hence allow for effective corporate governance. Hard information and specialisation both reduce information asymmetry between banks and their creditors. This reduces the potential for information spillovers. As in the competing conglomerates scenario, interconnectedness increases compared to Isolated Islands or Big Banks because the availability of hard information allows for long financing chains. In Flat Finance, however, interconnectedness increases compared to these scenarios because specialist banks fund themselves partly by borrowing from other financial intermediaries. Table 4.7 summarizes the above discussion.

Table 4.7 Market Failures

Market failure	Hard information	Specialisation
Corporate governance	More effective	More effective
Information spillovers	Decreases	Decreases
Interconnectedness	Increases	Increases

Government failures

Hard information and specialisation both decreases the information gap between regulator and banks. As a result, the probability of regulatory capture decreases compared to Competing Conglomerates. Although specialisation reduces banks' size, they will still be large relative to the Isolated Island or the Big (local) Banks scenario. Compared to these scenarios, interconnectedness also comes into play, because banks may now be too-interconnected-to-fail. This makes it more difficult for governments to commit to a particular intervention strategy. Because banks can successfully reallocate their business to other countries without losing revenues, lowering regulatory standards will attract new banks. This makes international coordination more difficult. Table 4.8 summarizes the above discussion.

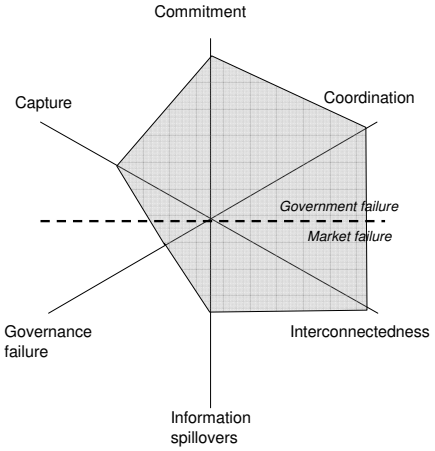
Table 4.8 Government failures

Government failure	Hard information	Specialisation
Capture	Less probable	Less probable
Commitment	More difficult	Easier
Coordination	More difficult	-

Summary

To conclude, the Flat Finance scenario combines high interconnectedness with effective corporate governance, and limited informational spillovers. Flat Finance scores badly on international coordination. It scores relatively well on capture because information asymmetry is limited. Commitment remains an important issue because of the size of banks, but also because banks may be too-interconnected-to-fail, as shown in figure 4.9.

Figure 4.9 Market and government failures in Flat Finance



5 Policy challenges

In the aftermath of the financial crisis, The G20 launched a reform agenda that covers a broad range of themes, ranging from 'Building high quality capital and liquidity standards and mitigating procyclicality', to 'Broadening the scope of regulation of hedge funds'.[29] Other international standard-setting bodies and international financial organizations that play an important role in developing new initiatives are the FSB, BCBS, BIS and the IMF.

Most recently, the BCBS has reached agreement on higher capital buffers for banks. The minimum common equity ratio, the highest form of capital, will increase from the current 2% level to 4,5% by January 2015 and the Tier 1 capital requirement will increase from 4% to 6% over the same period. These measures imply an improvement in the required quality of capital, of which the total regulatory minimum stays at 8% of risk-weighted assets. However, banks also need to build-up a capital conservation buffer of 2,5% above this minimum that can be drawn in times of crisis. Doing so requires banks to constrain earnings distributions, such as bonuses and dividend payments, as these earnings need to be used to restore the buffer. The new rules also introduce a non-risk-based minimum Tier 1 leverage ratio of 3% as backstop to the risk-based measures above. In addition, two minimum liquidity ratios are introduced. A *liquidity coverage ratio*, which defines a minimum of high quality, liquid assets relative to the potential liquidity needs over the next 30 days under a stress scenario and a *net stable funding ratio*, which equates the available amount of stable longer-term funding (>1 year) to the required amount, derived from the characteristics of both assets and liabilities on the bank's balance sheet.

The EU has taken policy initiatives in each of the areas defined by the G20. Recent examples are the proposed rules for hedge funds and private equity as well as the establishment of a EU network of bank resolution funds, aimed at protecting the taxpayer from the cost of resolving failing banks. These proposals recently won the backing of European Union finance ministers, although the UK (which hosts about 80% of hedge funds in Europe) pushes to water-down the agreement. In addition, the EU has developed a financial supervision package that includes measures to establish a two-pillar structure of a European Systemic Risk Board, which shall be responsible for the macro prudential oversight of the EU financial system as a whole, alongside a European System of Financial Supervisors. Thereby, the EU aims to monitor financial stability on a European wide level. The EU is also in the process of harmonizing their deposit guarantee systems.

In the US, financial regulation has been strengthened through the Dodd-Frank bill that passed congress in July 2010. This bill includes new regulations for hedge funds and credit

[29] In particular, the themes are: Building high quality capital and liquidity standards and mitigating procyclicality; Reforming compensation practices to support financial stability; Improving over-the-counter derivatives markets; Addressing systemically important financial institutions and cross-border resolutions; Strengthening adherence to international supervisory and regulatory standards; Strengthening accounting standards; Developing macro prudential policy frameworks and tools; Broadening the scope of regulation of hedge funds; and strengthen oversight of credit rating agencies.

rating agencies, measures to discourage financial institutions from growing excessively large or becoming too complex, the creation of an orderly liquidation mechanism to unwind systemically significant institutions in order to prevent future bailouts by the taxpayer (including a living will) and limits proprietary trading. In addition, the bill simplifies the fragmented supervisory structure, establishes a Financial Stability Oversight Council that aims to address systemic risk as well as a Consumer Financial Protection Bureau, which consolidates consumer protection responsibilities and strengthens such protection by regulating mortgages and credit cards.

We distinguish between four categories of policy challenges. First, how should we monitor financial instability? What type of information is important; to what extent should monitoring of financial stability be centralized internationally; should the role of monitor of financial stability be integrated with the role of regulator?

Second, how should we reduce government failure? Policymakers can reduce government failures by changing institutional structure of financial sector regulation, by increasing the role of market information, by introducing third-party monitoring of regulators, by increasing transparency, by attracting better personnel, and by introducing the right kind of accountability.

Third, what type of ex ante prudential regulation should be in place? To reduce systemic risk, supervisors can use regulation of incentives (regulation of remuneration policies, capital requirements, liquidity charges, counter cyclical capital buffers), resort to quantity regulation (minimum liquidity buffers, maximum leverage ratios, limitations on size, or restrictions of banking activities), and increase market discipline (no-bailout clauses, contingent capital, prompt corrective action). How should we improve the regulation of financial markets, i.e., OTC markets, credit rating agencies, central-clearing parties, and financial innovations?

Finally, how should regulators intervene ex post, i.e., once potential threats to financial stability have materialized? Policymakers can reduce systemic risk by extending the ex post crisis safety net, which prevents financial intermediaries from defaulting or reduces the fall-out from such a default. Examples of such measures are public guarantees for bank loans, lender of last resort, living wills and bank specific bankruptcy laws, Prompt Corrective Action and contingent capital.

As we will argue below, the effectiveness of particular policy measures will often differ between scenarios. The driving forces of these differences are the complexity of balance sheets, the ability to coordinate policy internationally, the information gap faced by regulators, the size of banks' balance sheets, the tradability of banks' assets, the level of interconnectedness, the potential for market discipline, and the threat of regulatory capture. The financial sector needs a different type of regulation when markets play a major role than when this is not the case. To optimize the mitigation of market and government failures the prioritization of the different types of regulation may differ between the scenarios.

5.1 Isolated islands

The most important market failures that regulation needs to address in this scenario are banks' failing corporate governance and information spillovers. From the viewpoint of policy, this is a benevolent scenario, because government failures such as regulatory capture are limited compared to other scenarios. Policymakers can focus on enhancing bank regulation and supervision, without having to worry too much about international cooperation and developments in foreign markets. At the same time, risks originate mainly from within the local financial system and can thus be monitored and tackled. Bank supervisors have a firm grip on the relatively small local banks.

Monitoring financial stability

Since banks are locally oriented specialists that fund themselves largely with deposits, credit risks to the banking system come largely from within the local economic and financial system. This makes identifying potential threats to financial stability easier. Policies aimed at preventing financial instability are therefore more effective. Such policies could target the deflation of a house price bubble or could aim at increasing buffers in the banking systems when economic growth is strong. Because information spillovers are a source of systemic risk, a particular challenge in this scenario is to identify correlated exposures within the banking system. Because banks are specialists, supervision should monitor many different types of financial institutions.

Because outsiders have difficulties assessing the quality of banks' assets, the value that banks' represent to their owners depends largely on the value of banks' reputation. Changes in market valuation therefore indicate a loss of reputation and a lack of trust. Such changes do not automatically imply impending risks, but they do warrant scrutiny by the regulatory.

Although bank loans are local, international links between financial systems may still arise from traded financial instruments. In this scenario, these investments are largely kept and traded on behalf of customers, which reduces their threat to banks' stability. On the liability side, international linkages may stem from cross-country deposit holdings. While banks are local on the assets side, they may be more international on the liabilities side. Coordination of deposit guarantee systems will be easier because banks business is local and therefore banks cannot easily relocate to other countries.

Reducing government failure

Government failures due to capture and implicit guarantees are relatively mild in this scenario, because banks are small and the information gap between regulator and banks limited. Due to banks' local orientation, international coordination is less important, and at the same time possible on those issues where it is needed, such as DGS.

Although government failures are relatively benign in this scenario, one potential way to reduce remaining threats is to increase transparency or reporting obligations. The transparent way in which the US FDIC reports on banks under its supervision could be a role model for regulators. The FDIC maintains an online database that contains detailed information on the balance sheets of the banks under its supervision on a quarterly basis. For example, it reports on nonperforming loans, an overview of the banks liabilities, a measure of interest rate risk, it lists the various components of bank capital, etc.

Ex ante prudential supervision

Financial regulation is largely a national matter. Although balance sheets are relatively simple (local loans and retail as well as wholesale deposits are the main items), soft information is necessary to evaluate credit risk and bank loans are not traded but in principle kept to maturity. Supervisors will therefore find it difficult to assess the risk that these assets will default at some point in time. Market prices provide an imperfect measure of this probability, because they are distorted by the expected losses from the bank-specific nature of these assets. Hence, assessing banks' capital ratios is a challenge in this scenario and risk-adjusted capital regulation address systemic risk rather imperfectly. Instead of trying to fine-tune the pricing of risk through capital requirements, regulators should use simple indicator such as high growth rates, questionable marketing strategies, excessive bonus schemes, or high leverage ratios, that trigger close scrutiny of a bank by the regulator. Because information is soft, such scrutiny implies sending specialized teams into the banks to check the quality of a banks' balance sheet and the risk of its business.

Bank supervision could also target the banks' board and try to ensure members of the board are independent and critical. For example, the regulator could appoint at least one member of the board, or could hold regular undisclosed meetings with individual board members.

Another challenge in this scenario is to find the right balance between limiting risks in the banking sector and reaping the benefits of an innovative and competitive financial industry. As bank supervisors have a firm grip on local oriented banks, there might be a tendency to reduce risks to such extent that new entrance and innovation are hampered. This may lead to high prices for bank product and a stagnant, inflexible financial sector. Therefore, some countervailing power might be necessary, for example in the form of a strong competition authority that prevents cartelisation of the banking market.

Ex post crisis management

The US experience during the current and earlier crises has proven the value of a special bank bankruptcy law in combination with a framework for *prompt corrective action* (PCA), especially when it comes to dismantling small local banks. PCA limits losses for the financial system and thus the economy by placing a mix of discretionary and mandatory restrictions on banks' activities, including limitations on dividend payments, compensation schemes,

transactions, or appointing a representative in a banks' board of directors. Early intervention and mandatory actions reduce the potential for regulatory forbearance. The UK recently introduced a bank resolution framework, as one of the first lessons from the crisis. In a scenario where the financial system consists mainly of local banks, there is a clear-cut case for introducing a PCA framework.

A challenge for crisis management is that many bank assets are not tradable. This increases the risk a solvent bank will face liquidity problems, as it cannot easily sell its assets. The potential demand for the lender of last resort function of the central bank thus also increases. To perform this function, however, the central banks should be prepared to accept non-tradable bank loans.

In this scenario, banks are crucial in financing SMEs investments. The government can reduce the fallout from reduced bank lending by guaranteeing the loans made to such firms. However, at the same time governments should provide incentives to banks to monitor these borrowers. In addition, such guarantees should not be allowed to crowd out other private investors.

5.2 Big Banks

In this scenario, corporate governance failure and information spillovers are the important market failures that regulation needs to address. These market failures are more severe than in Isolated Islands. In addition, the threat of regulatory capture and a lack of commitment hamper effective regulation. Policy challenges stem from the concentration of the banking system and the severity of asymmetric information of regulators vis-à-vis banks due to opaque assets and complex balance sheets. Policy makers should give priority to policies that reduce these problems and can do so without having to worry about international coordination, as banks cannot credibly threaten to move their businesses elsewhere. Because risks stem from within the local financial-economic system, ex ante measures can be effective.

Monitoring financial stability

As in Isolated Islands, risk will come mainly from within the local economic or financial system because, seen from the assets side, banks are local. Therefore, local policymakers can more easily implement policies that mitigate threats to stability. In Big Banks, the local financial conglomerate are too-big-to-fail. A threat to either one of these banks constitutes a threat to financial stability. Monitoring financial stability implies monitoring the risk to these large banks. Although interconnectedness is low, information asymmetry is high, and a crisis may spread through information spillovers.

Because outsiders have difficulties in assessing the quality of banks' assets, a banks' value depends on its reputation, whether investors trust the bank. Hence, changes in market valuation indicate a loss of reputation and do not automatically imply the materialisation of risk, but they

do warrant scrutiny by the regulator. Supervisors could also try to use information from competing banks. In this case, a challenge would be to devise mechanisms that would elicit credible information.

Reducing government failure

Given that these big banks combine many different banking functions, balance sheets will be complex because they consist of many different non-tradable assets. As a result, supervisors will have an information disadvantage and it will be even harder for outsiders to judge whether or not a regulator is taking the correct action. As a result, regulatory forbearance is a substantial threat. At the same time, banks tend to be too-big-to-fail and markets expect that governments will guarantee bank assets. Such implicit guarantees induce banks to take excessive risk. Policies should therefore focus on restoring the power balance between the banks and the supervisor and reducing government failures. Institutional design can be an important instrument to reduce regulatory capture. If different regulatory bodies perform different regulatory tasks, they can monitor each other to some extent. Other policy measures include arranging regular external visitations of a supervisor, counteracting powerful financial lobby groups by funding independent research (as an example, take the recent BIS study on the effect of higher capital ratios (BIS, 2010)), or increasing the public transparency on career changes that a supervisor's employees make. In addition, regulators should prevent their employees from developing long-term relations with any particular bank.

Ex ante prudential supervision

The information asymmetry between the bank and the regulator cannot easily be reduced. This limits the effectiveness of regulation that requires detailed information on bank assets, such as risk-adjusted capital regulation. Instead of trying to fine-tune the pricing of risk through capital requirements, regulators should use simple indicators that trigger scrutiny by a specialized intervention team. Such indicators may include high growth rates, questionable marketing strategies, excessive bonus schemes, high leverage ratios, or substantial activity in the trading of financial innovative products.

In addition, the focus of regulation could shift from incentive to quantity regulation, restrictions on banks' activities (such as the Volcker rule[30]), charges based on size, or limits to the amount of deposits a bank can manage may help to get a grip on large banks. In addition, in a situation where the financial system consists of only a few large banks, supervisors should consider to limit mutual exposure between these few banks. Bank supervision could also target the banks' board and try to ensure members of the board are independent and critical.

[30] The Volcker rule restricts banks from making certain kinds of speculative investments if they are not on behalf of their customers, such as proprietary trading and owning a hedge fund or private equity fund.

For the working of the national deposit guarantee system (DGS) it is important to anticipate the quantitative impact of bank failures, as the system as a whole is likely to be under strain when this happens.

In this scenario, banks have substantial market power. Banks offer bundles of products and bank borrowers face substantial switching costs when they want to change banks. To reduce the welfare loss associated with pricing and inefficiency in monopolistic markets, stimulating competition is important.

Ex post crisis management

Enhancing the crisis management toolkit of supervisors should have priority in this scenario. This is especially important because a well-designed toolbox can reduce the need for a government bailout in this scenario and thus the expectation thereof, while it also reduces the impact of a bank failure when it occurs. The "too-big-to fail" problem can be reduced by installing a framework for the orderly liquidation of banks. Policies that help in this regard are measures to protect the payment system from a bank failure, a living will for large banks, or a PCA framework that facilitates early intervention. Given that banks are relatively large, and will probably be bailed-out, effective PCA requires sufficient commitment by the regulator to intervene. Such policies should aim at enhancing the chances of an orderly wind-down, while shifting the cost of bad bank management to shareholders and non-senior creditors.

Given that most assets on banks' balance sheets are non-tradable, the lender of last resort function of the central bank needs to be able to provide liquidity based on the collateral value of such assets. A thorough assessment of assets that might one day be used as collateral could facilitate this process.

As in Isolated Islands, banks are again crucial in financing SMEs investments. The government can reduce the fallout from reduced bank lending by guaranteeing the loans made to such firms.

5.3 Competing Conglomerates

In the competing conglomerates scenario, the most important market failures are interconnectedness and failing corporate governance. Compared with the other scenarios, government failures are particularly threatening. Commitment is difficult; capture is real threat; and coordination problematic. The competing conglomerates scenario is challenging for policymakers because they need to create the right tools to get a grip on the large foreign banks that dominate the local banking system, while at the same time reducing these government failures. Hence, arrangements between supervisors are important, but not likely to secure a firm grip on the local system as local supervisors have less information than foreign home supervisors. In this scenario, monitoring of risk is likely to be difficult and subject to large uncertainty. Policies should therefore concentrate on ex post interventions.

Monitoring financial stability

Because most banks are in foreign hands, monitoring the stability of the local financial system requires an assessment of the risks to which these banks expose themselves. For a local supervisor, a comprehensive assessment of these banks' risks is difficult, as only the home supervisors can closely watch all activities of such an international banking conglomerate. In addition, supervisors need detailed information about the interconnectedness of the financial system as a whole in order to assess systemic risk. This requires information not only about the foreign banks active in their country, but also information on these banks exposure to other foreign banks not active in their country, the latter's exposure etc. This implies that supervisors have difficulties in overseeing all risks to the local banking system. Hence, threats to local financial stability are hard to anticipate and difficult to prevent.

The more geographically diversified nature of banks' assets limits exposure to local macroeconomic shocks. Global shocks, however, remain a potential threat to stability. While bank runs will always be a risk, contagion through information spillovers is less likely if banks differ from one another. In this sense, an internationally diversified banking system might be helpful for securing financial stability.

As the financial system is not fully bank-based, policies to guarantee its stability should have a wider scope as well. Important non-bank market participants should be subject to some regulation that favours the functioning of markets, such as transparency of their portfolios or the restriction from dominating a certain market. In addition, because many firms tap financial markets directly contingency tools for malfunctioning markets should also be available.

Finally, the regulator can design financial instruments that complement their activities in monitoring financial stability. For example, they may force banks to issue contingent capital that converts into equity when certain systemic events occur. The market prices of these instruments may complement other indicators of systemic risk.

Reducing government failure

Since banks can easily relocate activities to other countries in this scenario, they have significant bargaining power. Politician and civil servants are perceptive to banks' arguments because having a large international bank gives more influence in international policy matters. In addition, policymakers are often convinced that national banks are better able to serve and promote the interests of national firms, although we are not aware of evidence in this direction. An independent regulator, i.e., free from political pressures, is an essential bulwark against political pressures.

The footlooseness of international conglomerates also fuels competition between countries to host these banks, which undermines coordination. To reduce systemic risk, governments should be prepared to unilaterally implement regulation. Examples are Spain and Canada, who unilaterally implemented policy measures that reduced the impact of a systemic crisis in their

countries.[31] Countries could also try to devise mechanisms to punish deviators. For example, based on rankings of regulatory toughness, banks from certain countries could face higher capital requirements.

Another solution would be to require a foreign bank to be more "local". For example, supervisors could require a local branch of a foreign bank becomes a full-fletched local subsidiary if it reaches a certain scale. This would enhance the power to impose measures and acquire information of the local supervisors. A different measure could be the requirement that a foreign bank that attracts local deposits, invests a certain percentage of these deposits in the local economy. The idea is that these assets can be used to repay local claimants in the event of a default. In addition, supervisors could require banks to keep a minimum balance of liquid assets deposited at the local central bank. Note that in a European context such measures may conflict with the goal of a free internal market. Of course, if countries within the European Union would succeed in coordinating ex ante and especially ex post policies, these measures would not be necessary with regard to banks within the EU. In case of non-EU banks, such policies would be feasible.

An important additional challenge in this scenario is capture. Large conglomerates are very well organised internationally and lobby politicians into lowering regulatory standards. In addition, large complex financial institutions have an information advantage over supervisors. Independence should therefore be combined with an institutional design that prevents forbearance and capture. Possible routes towards this goal are allocating oversight and intervention to independent entities. This may help to reduce regulatory forbearance as the intervention authority would not take into account any reputational concerns of the monitoring authority. Market-based comply-or-explain that trigger intervention by the supervisor also help to reduce regulatory forbearance. A regulator will have to intervene in some way when external indicators reach a certain level. Combined with a regular external visitation of a supervisor's activities (including those activities that are not public), this is a potent mechanism to reduce the adverse effects of regulatory capture.

Ex ante prudential supervision

In this scenario, banks' assets are relatively liquid and less opaque. Supervisors should therefore try to price risk and make optimal use of market information. However, due to the complexity of banks' balance sheets and banks' large size, pricing risk through risk-adjusted capital ratios

[31] Banco de España put dynamic provisions into place in July 2000, to cope with a sharp increase in credit risk on Spanish banks' balance sheets following a period of significant credit growth. The unweighted leverage ratio of Canadian banks has been restricted since the early 1980s. The regulatory measure of leverage in Canada is the ratio of total balance-sheet assets and certain off-balance-sheet items to total regulatory capital (adjusted net Tier 1 and Tier 2 capital). The off-balance-sheet items in this measure cover all direct contractual exposures to credit risk – including letters of credit and guarantees, transaction-related contingencies, trade-related contingencies, and sale and repurchase agreements.

may not be sufficient to reign in the risk appetite of these international conglomerates. In that case, more quantitative restrictions may be called for.

Because banks compete in a global market, competition for scarce talented bankers is fierce in this scenario. This may result in bonus schemes giving too much risk-taking incentives. To curb the effect of global competition for the limited number of top talented traders, supervisors should consider regulating bankers' performance incentive schemes.

In addition, prudential supervisors depend very much on foreign home supervisors for their information. This constitutes a risk, as supervisors tend to keep sensitive and confidential information to themselves. A way to reduce this problem is the recent initiative to create colleges of supervisors per bank, which include supervisors from all countries where a bank is active. This might help to share information more freely between these supervisors, placing the host supervisors on an equal footing.

Ex post crisis management

In this scenario, financial stability policies should focus on measures that reduce the consequences of the failure of large foreign banks, rather than seek to prevent them. Crisis management policies are difficult to implement if a bank resides in a foreign country. First, foreign supervisors will have the lead in conducting such policies, which places the local host supervisor in a dependent position. Second, when a bank is under distress, information becomes extremely sensitive, and it is very likely that the foreign home supervisors are not willing to share all information they possess about a bank. This increases the information disadvantage of local supervisors even further, in times when their need accurate information is highest. Third, there might be conflicts of interests between the local and foreign supervisors, for example because both have an interest in channelling funds to their jurisdiction. Within this context, local supervisors should make ex ante arrangements that give them the means to intervene in a local branch when a mother bank faces difficulties. In this regard, one could think of the possibility of separating a local branch from its foreign branches.

Another option to deal with large foreign banks is to reduce their systemic importance for the local financial system. This can be done by measures such as placing the payment system outside the bank, requiring banks to have a living will, and enhancing the possibilities for prompt corrective action by the local supervisor. The latter will be difficult to arrange in the case of a foreign bank.

Because many assets are tradable in this scenario, they have a clear collateral value, which facilitates the lender of last resort function. However, emergency liquidity assistance will normally also be arranged by the foreign central bank in the country where the bank resides. This implies that a local branch depends on the mother bank for liquidity assistance. Such a situation might not be optimal for preserving the operations of a local branch. Another option would be to give the local central bank a role in proving liquidity to a local branch, where local assets can be used as collateral.

5.4 Flat Finance

In Flat Finance, interconnectedness is the most important market failure and coordination is the most important government failure. Capture and commitment are significant issues, but less so than in competing conglomerates. International cooperation is the big challenge. Coordination is essential to tackle systemic risk,, but at the same time difficult due to banks' mobility.

Monitoring financial stability

In Flat Finance, internationally active and specialized banks are heavily interconnected through international financial markets and through their common exposures to macroeconomic developments in different countries. Within such a globally interconnected system, crises come from the outside. A problem somewhere in the macroeconomic or financial system can spread through contagion in an unpredictable manner. Therefore, it will be virtually impossible to take ex ante measures that prevent a crisis from spilling over into the national financial system.

Since international financial markets play an important role in this scenario, financial stability monitoring should include the assessment of markets. The perimeter of financial regulation could be extended to non-bank financial institutions that are active in financial markets, such as hedge funds, investment banks, and money market funds. Because financial institutions can shift their activities to other countries or to other types of (non-regulated) entities, it is not the specific institution that matters, but the activity it is involved with.

Finally, the regulator can design financial instruments that complement their activities in monitoring financial stability. For example, they may force banks to issue contingent capital that converts into equity when certain systemic events occur. The market prices of these instruments may complement other indicators of systemic risk.

Reducing government failure

As banks can easily relocate their business, countries that increase prudential standards or become stricter in their implementation, might see some banks leaving. This will especially be the case for regulation that reduces bank profits, such as a banking tax or limits on banking activities. Although some rules, such as high capital or liquidity buffers, may also help banks in signalling their quality, there is large risk that supervisors are caught in a prisoners' dilemma. While everyone benefits from reducing systemic risk, unilateral deviation may be profitable, because a country that undercuts certain standards will become an attractive place for banks. To escape this dilemma, international cooperation is crucial. But for the same reason international cooperation is difficult to achieve.

In addition, many of the measures described in Competing Conglomerates are important as well, like using institutional design to reduce probability of capture, using market information to trigger intervention, making banks 'more local', or devise mechanisms to punish deviating countries.

Ex ante prudential supervision

If international cooperation is not successful in tightening banking standards, there are still measures that local authorities can take unilaterally. An important national policy measure can be reorganising the local DGS in such a way that it can cope with the many foreign banks active in the local market. For example, one may require foreign banks to provide some form of collateral proportional to the amount of local deposits. In addition, the national payment system and rules governing banks' conduct of business still fall within the realm of local regulators.

The interconnected nature of this scenario also implies that there are many spillover effects within the financial system. As individual banks tend not to take into account these negative spillover effects of their actions on other banks or markets, regulators should introduce systemic risk charges to try to compensate for such effects. Examples are fees related to the size or interconnectedness of a bank, or liquidity charges based on the maturity mismatch of a bank. Measures that reduce interconnectedness should also have priority in this scenario. The use of CCP clearing in derivatives markets is an obvious example. Because banks compete in a global market, competition for scarce talented bankers is fierce in this scenario. This may result in bonus schemes giving too much risk-taking incentives. Regulation of performance pay may then help to reduce risk.

In this scenario, financial markets play a large role in financing banks. Supervisors can use these active markets in their day-to-day monitoring. If supervisors would require banks to issue contingent capital, the price of these bonds could be an important monitoring instrument in addition to regular monitoring activities. In addition, market signals can also serve a useful role in disciplining supervisors, for example by obliging a supervisor to intervene when a certain market-based trigger reaches a pre-defined threshold. This will reduce the risk of forbearance.

Ex post crisis management

Because it is difficult to see a crisis coming in this scenario, and thus to prevent it, measures to manage a crisis are an important tool to reduce the fallout of such an event. Hence, prompt corrective action frameworks, lender of last resort facilities and measures to secure the functioning of fundamental banking functions, such as the payment system, should be enhanced.

A difficulty in doing so is that in this scenario the financial sector consists of both local and foreign banks. This implies that some measures, for example aimed at corrective action, will be less effective. This instrument will largely be in the hands of the foreign supervisor. Therefore, crisis management measures also require international cooperation, such as ex ante arrangements between the foreign home and the local host supervisors, on how to dismantle or to support a bank and on how to share the costs of doing so. Because home and host supervisors can have different interests, while the local supervisor has an information disadvantage, measures that ring fence or secure local operations might be an alternative route to reduce the negative effects of a failing foreign bank. In addition, the local government could consider

following its own policies as regards DGS for Dutch citizens, bank-specific bankruptcy laws, or safety of the payment system. These are local affairs.

The interconnected financial system is a challenge to crisis management. In this regard, it is especially important to understand how a certain rescue measure, such as reducing creditor rights, will affect other banks. The failure of Lehman Brothers is a good example, of how an interconnected firm posses risks to the stability of the system as a whole. Supervisors should be aware of such interconnections when deciding to take certain measures or not.

The reliance on markets for funding implies that the lender of last resort function of the central bank should be adapted to a situation where liquidity risks arise from both bank runs and a liquidity freeze in markets. Given the importance of markets, enhancing the financial infrastructure, for example, through the imposition of central counterparty clearing for OTC derivate trades, standardisation of contracts, and enhancing international payment and security settlement systems is certainly valuable. These are measures to reduce the risks associated with an interconnected system. In this scenario, policymakers also need to think about contingency tools to keep credit flowing to companies that depend on wholesale markets.

5.5 Summary

Table 5.1 summarizes the challenges faced by policymakers in our four scenarios.

Table 5.1 Policy challenges

	Monitoring financial stability	Reducing government failure	Ex ante prudential supervision	Ex post crisis management
II	* Focus on local risks, correlated exposures, information spillovers * Monitor different types of financial institutions * Market information as indicator of trust	* Transparent reporting by regulator (see FDIC)	* Complement incentive regulation with simple indicators that trigger close scrutiny * Guarantee independent board	* PCA works well * Facilitate crisis funding for SMEs
BB	* Focus on local risks, correlated exposures, information spillovers * Use information other local banks * Market information as indicator of trust	* Split monitoring and intervention * Arrange external visitation * Prevent long-term relation between regulator and banks	* Use simple indicators that trigger close scrutiny * Guarantee independent board * Put more emphasis on quantitative restrictions	* Adapt PCA to large national banks * Facilitate crisis funding for SMEs
CC	* International monitoring of macro and micro exposure important * Focus on information spillovers * Design markets to generate information on systemic risk	* Use institutional design to reduce probability of capture (see Big Banks) * Use market information to trigger intervention * Act unilaterally * Make banks 'more local' * Devise mechanisms to punish deviating countries	* Price systemic risk, * Complement pricing with quantitative restrictions. * Use market discipline * Regulate incentive schemes	* Adapt PCA to large international banks * Isolate crucial banking functions from crisis * LOLR to prevent liquidity-draining runs * Introduce contingent capital * Introduce bank-specific bankruptcy law
FF	* International monitoring of macro and micro exposure important * Focus on interconnectedness * Focus on activities instead of institutions * Design markets to generate information on systemic risk	* Use institutional design to reduce probability of capture (see Big Banks) * Use market information to trigger intervention * Act unilaterally * Make banks 'more local' * Devise mechanisms to punish deviating countries	* Price systemic risk * Use market discipline * Regulate incentive schemes	* Adapt PCA to large international banks * Isolate crucial banking functions from crisis * LOLR to prevent liquidity-draining runs * Introduce contingent capital * Introduce bank-specific bankruptcy law

6 Conclusion

We have presented four scenarios for the future of finance. Our scenarios differ in two dimensions. First, to what extent soft information lies at the core of banks' business model. Second, to what extent scope economies exist between different banking activities. By combining these two dimensions, we have obtained four scenarios: Isolated Islands, Big Banks, Competing Conglomerates, and Flat Finance.

The focus of our study is on the challenges faced by policymakers in reducing systemic risk. Important determinants of these challenges are: the extent of international coordination feasible, the information gap between the regulator and banks, the possibility for market discipline to complement regulation, the ability to identify risks to financial stability at an early stage, the potential for regulatory capture, and the size of bank. From the challenges discussed in section 5, we think that policymakers should draw several lessons.

Improved financial infrastructure helps

Strengthening financial infrastructure helps in reducing systemic risk. One example is the use of central counter party clearing in international OTC markets. But changes in financial infrastructure at the national level can also reduce risks. An important issue is how to secure the continuity of (retail) payment services when a bank defaults. This requires that a bank's payment system is isolated in case of the bank's failure or that a public system is ready to step in. In this way, the payment system is treated more like a utility and local control over it is ensured, even if most banks are foreign.

Countries may not succeed in coordinating policy

In Isolated Islands and Big Banks, international coordination is called for only on specific issues such as deposit guarantee schemes, or the identification of macroeconomic threats. International policy coordination becomes more important in the Competing Conglomerates and Flat Finance scenarios, where the banking system is more international and banks are footloose. In that case, however, reaching international agreement on tough regulation for banks will also be more difficult because individual countries will be able to attract banks by loosening regulatory standards ("light touch" regulation) relative to others. In the presence of such free rider effects, international coordination will not result in sufficiently strict regulation of systemic risk.

Under such circumstances, countries should consider unilateral policies. One can think of regulation that enhances transparency or that provides governments with proper crisis management tools. An example is the unilateral implementation of bank-specific bankruptcy law that allows the government to expropriate shareholders and put systemic risk above the interests of the banks' financiers.

The potential to coordinate differs between policy initiatives. Some initiatives, such as regulation of credit rating agencies or regulating OTC markets, are relatively easy to realise because such agencies are located mainly in one country (the US) or because the gains from providing a loose regime are limited. Other issues, such as the regulation of performance pay, the deflating of potentially disrupting asset bubbles, the convergence of accounting standards, the realisation of burden sharing rules, or the implementation of a unified systemic risk tax, are subject to free-rider effects that make successful coordination more difficult.

Policies should be designed to deal with government failure

Another lesson is that fighting government failure should play a crucial role in devising policies to deal with future financial crises. Not surprisingly, policymakers often take this lesson lightly. Reducing government failures such as forbearance by supervisors, gambling for resurrection by regulators or regulatory capture is important in reducing market failures. The risk of government failures is high when the banking sector is concentrated, when the complexity of banks is high, and when banks can credibly threat to relocate (some) of their activities. Hence, in scenarios where banks are big (Big Banks and Competing Conglomerates) or when financial products are complex (Competing Conglomerates and Flat Finance), policymakers should put greater weight on preventing government failures.

A measure to reduce the risk of forbearance is to introduce regular audit by an external third party. A more far-reaching option would be to separate bank supervision and intervention, but this requires that both decision bodies should have access to the same, often confidential information. More in general, if different regulatory bodies perform different tasks, they can monitor each other to some extent and thereby reduce regulatory capture. As an example, new legislation in the UK introduced a Special Resolution Regime that allows banks to be sold to private parties, nationalised, or put into receivership. The responsibility for deciding whether the regime applies rests with one government agency, the Financial Services Authority. The responsibility for the subsequent procedure, however, rests with other government agencies (the Bank of England or the Treasury, depending on the choice of procedure).

Another measure could be to strengthen markets in a way that helps to generate information on bank risk, and to incorporate such market-based information in supervision. In this way, society will be less reliant on the benevolence and omnipotence of the supervisor as anchor for stability. In scenarios such as Competing Conglomerates and Flat Finance, where markets play a dominate role in financing the economy, there is scope to use the disciplining function of markets, not only to discipline financial intermediaries, but also to trigger the regulator. If financial markets function well, because participants are well informed and know they cannot transfer credit risk to governments, market information can be used to discipline regulators. Prompt corrective action measures could be coupled to different levels of indicators of a bank's credit or liquidity risk. For example, a supervisor could be obliged to perform a stress test when a bank's CDS spreads hits some pre-defined level, or to couple.

Furthermore, measures that reduce the size or the complexity of banks (such as systemic risk charges related to bank's size or complexity), or measures that restrict bank's activities (such as the Volcker Rule) can also reduce government failures. Such arrangements can not only help to manage a crisis, but also to change expectations and thus the risk-taking behaviour of banks.

Ex post measures may be more effective than ex ante regulation

Preventing shocks to the banking system is more likely to be successful when the banking system is locally oriented, as is the case in the Isolated Islands and Big Banks scenarios. As potential threats to the banking sector stem from within the local economy or the local financial system itself, there is a relatively large chance that local supervisory authorities can identify such threats at an early stage. Hence, measures that reduce these risks are also more likely to be effective. An example cap the loan-to-value ratio for new mortgages, which reduces the probability of defaults and mitigates asset bubbles.

Such preventive policies are less effective if the banking system is international and thus the domain of potential threats is much larger. While bank supervisors can in principle use the balance sheets of domestic banks to identify exposures, and hence to analyse potential threats, this is a much harder task when exposures are international. Can we expect the Dutch supervisors to make a reliable estimate of potential losses for a bank stemming from its exposure to the US commercial real estate market, to car loans in Brazil, or to some NY-based hedge fund? Clearly, these are much more challenging tasks than monitoring exposures to the local economy. Therefore, prevention is likely to be less effective in this more international setting and makers should anticipate unexpected shocks to the banking system. This requires a stronger focus on ex post measure, such as PCA, reaching ex ante international agreements on crisis resolution and contingency planning.

Governments should prepare to cope with big foreign banks

Bank supervision, crisis resolution and monitoring financial stability will change profoundly when the banking systems consists predominantly of large foreign banks. In several scenarios, Dutch regulators and politicians should prepare themselves for the foreign takeover of Dutch banks, both large and small. Here the central question is how to keep grip on the local financial system once it is in foreign hands.

One approach is to require foreign banks to become more local, by establishing local subsidiaries, through ring-fencing of assets, and by managing liquidity and capital requirements on a local basis. This would the grip of local authorities on such banks. Still, an effective PCA mechanism will be difficult to implement if the most probable cause of bankruptcy is the default of a foreign mother bank.

Another approach is to make international arrangements with the foreign authorities in the country where the mother bank resides. In that case, one can strive for a coordinated PCA framework and make arrangements on burden sharing. If this works, it is the optimal strategy,

but it also carries risks. The foreign supervisor will be better informed and may not always share the most sensitive information with local authorities, especially not when a bank is in trouble and different countries' interests may differ. Hence, the local supervisors need to be able to trust the ex ante arrangements with foreign supervisors.

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