
Cross-Border Banking in Europe: Implications for Financial Stability and Macroeconomic Policies

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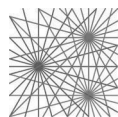
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Acronyms and abbreviations

BIS – Bank for International Settlements
BOP - balance of payments
CDOs – collateralised debt obligations
CEE – central and eastern Europe
CESE – central, eastern, and southern Europe
CGFS – Committee on the Global Financial System
CoCos – contingent convertibles
DSGE - dynamic stochastic general equilibrium
EBA – European Banking Authority
EBRD – European Bank for Reconstruction and Development
EC – European Commission
ECB – European Central Bank
EEA – European Economic Area
EFSF – European Financial Stability Facility
EIP – excessive imbalances procedure
EMU – Economic and Monetary Union
ESAs – European Supervisory Authorities
ESM – European Stability Mechanism
ESRB – European Systemic Risk Board
EU10 – Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia, Slovakia
EU15 – Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK
FDI – foreign direct investment
GDP – gross domestic product
IFS – international financial statistics
IMF – International Monetary Fund
M&A – merger and acquisition
MOU – memorandum of understanding
NMS – new member states
NMS12 – Bulgaria, Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Romania, Slovenia, Slovakia
OECD – Organisation for Economic Cooperation and Development
RBC – real business cycle
RBS – Royal Bank of Scotland
SEPA - Single Euro Payments Area
SIFIs – systemically important financial institutions
SIVs – structured investment vehicles
SME – small- and medium-size enterprises
TARP – Troubled Asset Relief Program
UK – United Kingdom of Great Britain and Northern Ireland
US – United States of America
VAR - vector autoregressive regression

Foreword

The European financial landscape has been transformed in the past twenty years. Since the passage of the Second Banking Directive and the Single Banking Licence in 1989, cross-border financial flows have grown dramatically, and the banking sector has consolidated through a wave of cross-border mergers and acquisitions.

There are many reasons to welcome this transformation, as the authors of this new Report remind us. Increased financial integration has allowed Europeans to hold more diversified portfolios. In central and eastern Europe, the entry of foreign banks transformed the banking sectors of the new member states; this not only accelerated the modernisation of their economies, but also helped cushion these economies from the worst effects of the global financial crisis.

Cross-border banking brings important benefits, but as with every silver lining there is a cloud. As the global financial crisis has revealed very clearly, financial integration in general, and cross-border banking in particular, accelerated the transmission of the crisis from its origins in US housing markets to wholesale financial markets around the world. The subsequent collapse of financial institutions in Europe as well as America revealed important deficiencies in the regulatory framework, which even now have not been fully addressed.

The Report begins by analysing the evolution of cross-border banking in Europe, and then explores the challenges it presents for regulatory policy. The authors conclude by proposing a set of ten changes to regulatory policy, designed to address the severe difficulties experienced by banks and their regulators during the past four years. Given continuing discord between regulators in the US and the EU, and the EU and its member states, these ten commandments may also be more honoured in the breach than in the observance. All the more reason for this Report, which points out so clearly the issues that politicians and regulators ignore at their (and our) peril.

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Stephen Yeo
Chief Executive Officer, CEPR
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Executive Summary

Understanding the role of banks in cross-border finance has become an urgent priority. Cross-border banks have played a central role in the dynamics of the global crisis of 2007-2009. First, European banks had a surprisingly large exposure to the US securitised asset markets, which arose to a significant extent through global banks acting either on the buying or selling side in these markets. Second, the breakdown in credit and asset markets was an international phenomenon, with cross-border linkages suffering disproportionately due to greater information problems *vis-à-vis* cross-border counterparties and the differences in regulatory regimes. Third, currency mismatches in funding became evident, with European banks suffering a dollar shortage that ultimately required resolution through a major currency swap initiative among the main central banks. Fourth, the provision of fiscal support for distressed banks was especially problematic in relation to cross-border activities. The rescue of multi-country banks, such as Dexia and Fortis, required the governments involved to devise *ad hoc*, ex-post burden-sharing agreements. In relation to emerging Europe, there were also fears that the policies of home-country governments might encourage parent banks to fail to support the operations of affiliates.

This report analyses key aspects of cross-border banking, takes a European focus and derives policy recommendations based on them.

Chapter 1 of the report first documents the evolution of cross-border banking in Europe in the two decades prior to the crisis. We then turn to the role cross-border banking played during the crisis of 2007-2009, with a key focus on whether cross-border activities have exacerbated the crisis or helped to mitigate it. We also analyse the regulatory response to cross-border problems in the crisis.

The expansion of cross-border banking in recent decades has taken new forms

The financial globalisation wave after the mid-1990s was the third such wave of globalisation in modern financial history. Unlike the previous two waves it involved significant foreign direct investment (FDI) in banking, in the form of bank expansion across borders, especially in commercial banking. While foreign bank participation significantly increased in both Sub-Saharan Africa and Latin America over the past 20 years, it has been only in the past 10 years or so that

2 Cross-Border Banking in Europe

cross-border mergers and acquisitions (M&A) have gained prominence in western Europe. Even more impressive has been the transformation of many banking systems in central and eastern Europe, which went from state-owned, mono-bank systems, to foreign-bank dominated systems within a period of 10 years.

The years leading up to the crisis also saw a trend towards the financing of banks in the wholesale market and on the global rather than national level, including in financial and off-shore centres. The Icelandic banks, for example, financed large parts of their investments in wholesale markets and turned to retail deposit collection only after the funding on these markets had turned prohibitively expensive. Foreign subsidiaries in central and eastern Europe also relied increasingly on interbank and wholesale markets rather than retail deposits for funding. On the asset side, a very large increase in the issuance of securitised assets left banks vulnerable to problems in these markets.

A result of the general trend towards globalisation and consolidation was that the five largest banking groups controlled more than 16% of global banking assets in 2008, which is more than double their market share in 1998. A small number of countries dominate cross-border banking. France, Germany, the UK, the US, Switzerland and the Netherlands account for about a half of cross-border banking assets, while 50% of cross-border banking liabilities are accounted for by the US, the UK, France, Germany, Japan and the Netherlands. The percentage of foreign assets in total assets for major banks in Europe is high: 82% for Deutsche Bank, 64% for Santander, 62% for UniCredit, 41% for BNP Paribas and 29% for Société Générale. These banks also have complex organisational structures – each has at least 100 majority-owned subsidiaries and more than half have over 500 subsidiaries.

Important differences between western Europe and central and eastern Europe

Cross-border flows within and out of western Europe – unlike in the US – were dominated by bank flows, reflecting the bank-based nature of finance in Europe. The introduction of the Single Banking License in 1989 through the Second Banking Directive was a decisive step towards a unified European financial market, which subsequently also led to a convergence in financial legislation and regulation across member countries. The introduction of the euro in 1999 eliminated currency risk and provided a further push for financial integration. In addition to cross-border lending, the increase in financial integration also came in the form of cross-border mergers and acquisitions. Among the most high-profile cases were the takeover of Erste Bank in Austria and Hypobank in Germany by the Italian bank Unicredito, the takeover of Abbey National in the UK by the Spanish bank Santander and the takeover of the Dutch ABN AMRO Bank in 2007 by Fortis (Belgium), Royal Bank of Scotland and Banco Santander.

There was also a tremendous growth in the number of branches and subsidiaries of banks of other EU countries: they grew from 557 in 2003 to 766 in 2009.

While western European countries have been both home and host of large cross-border banks, central and eastern Europe countries have been exclusively host of such banks. The ownership transformation of the banking system, from a state-owned, mono-bank system towards a privately owned, market-based financial system, was key to achieving macroeconomic stability in the late 1990s. The countries that finalised the ownership transformation process the fastest were also the first ones to successfully emerge out of the systemic banking crises of the 1990s. Foreign-owned banks provide 90% of the credit to non-bank residents in 'emerging' Europe compared to 30% in 'developed' Europe. The CEE countries probably benefited more from foreign bank entry in terms of higher growth than other parts of the emerging world.

Cross-border activities and the spread of the global crisis

In the spring of 2007, the crisis in the US subprime market erupted and quickly had repercussions throughout the world and especially in Europe. Had the subprime problems arisen in a financially autarkic world, the crisis would have spread only through real sector channels, by affecting exchange rates and trade flows. In a financially integrated world, however, where large shares of assets are traded on international markets, the contagion effects were more pronounced and more immediate. In reality, the crisis spread through many channels, most of them closely connected to cross-border financial and banking linkages. Among these channels, the liquidity channel was a critical one. It caused asset markets, drawn upon by all large global banks, to dry up.

The organisational form of cross-border banking mattered

These first-round contagion effects came through direct cross-border lending and not through local lending of cross-border subsidiaries, which might be one reason why the new EU member countries and other emerging countries felt the impact of the crisis at a later stage. Notably, banks without cross-border lending or borrowing links were also affected by the contagion effects, as the drying up of international markets also affected purely local markets. The three channels of contagion were thus through direct cross-border lending, local lending by subsidiaries of large multinational banks and lower access of local banks to international financing sources.

Retreat and consolidation in western Europe...but also expansion!

There was a dramatic decline in gross capital flows relative to pre-crisis levels, with the greatest contraction observed for banking flows. While western Europe experienced the largest reduction in cross-border flows, these flows have not recovered as rapidly, unlike in other regions of the world. There has been a substantial decline in cross-border mergers and acquisitions (M&A) activity in the euro area banking sector. One factor is that the financial crisis has induced many banks to focus on core activities and markets, with less emphasis on cross-border expansion. Since the onset of the crisis, much of the M&A focus has shifted towards the consolidation of domestic banking systems, in part at the behest of national governments. However, some strong, large banks have expanded overseas during the crisis, using capital raised by domestic disposals in order to acquire foreign targets at attractive prices.

The impact on central and eastern European countries was modest and probably mitigated by the presence of foreign banks

The crisis had all the ingredients for turning into a fully-fledged emerging market crisis for the CEE economies. Yet this did not happen. The CEE countries experienced a less severe reversal of capital flows than other regions of the emerging world. While there was thus a heavy reduction in cross-border lending, the effect was far away from that of a sudden stop, as observed in the typical emerging market crisis. This can be attributed to foreign bank presence through subsidiary structure. Specifically, many foreign banks were 'locked in' because their local subsidiaries had given long-term loans in the host countries that could not be recalled. This suggests that the impact of the crisis would have been even larger without foreign bank presence in the region.

Regulators and supervisors reacted inadequately due to a lack of an appropriate resolution framework

While central banks coordinated well to address the liquidity crisis in the international financial markets, regulators did not coordinate well when it came to dealing with failing financial institutions. We believe that the reason behind this is the biased incentives of regulators and the limited resolution options, which led to the inefficient resolution of large European banks. The increasing cross-border nature of banking was not accompanied by a regulatory framework at the supranational level and this gap became clear during the crisis. While monetary policy – and therefore, unofficially, the lender of last resort facilities – were unified within the euro area at the level of the ECB, no similar institutional arrangement existed on the regulatory level.

A primary problem was the absence of a proper resolution framework for banks, as exists in the US, Canada and several emerging markets, in most, if not all, European countries. The main deficiency of the current cross-border cooperation arrangements is that incentives of regulators are not taken into account. National regulators care first and foremost about domestic depositors, domestic borrowers, domestic owners and, ultimately, domestic taxpayers. The resulting conflicts have exacerbated the crisis at many crucial points – for example in the case of supervision and resolution of the Icelandic banking crisis, as well as in the conflict between Dutch and Belgian supervisors following the takeover of ABN AMRO by Fortis. Memorandums of understanding and colleges of supervisors did not address these incentive problems as they are not legally binding.

In sum, multinational banks have been the *face*, but not necessarily the *cause* of the crisis. Neither have the multinational banks exacerbated the crisis. In western Europe, it was rather regulatory failure to deal with large cross-border banks in an incentive-compatible and loss-minimising way that deepened the crisis, while there is increasing evidence that in the CEE countries foreign banks helped to mitigate the impact of the crisis rather than exacerbate it.

Chapter 2 discusses the repercussions of cross-border banking activities for financial stability. In this chapter we employ several new metrics that help in analysing whether cross-border banking in a country or region is resilient to shocks or not. Using these metrics we identify various important deficiencies in the current structure of cross-border EU banking flows.

Cross-border banking brings important stability benefits...

A key benefit of cross-border banking arises from its effects on risk diversification. The assets of cross-border banks will be less exposed to country-specific shocks. This reduces their likelihood of failure as well as the likelihood of them ending up in a situation where they are constrained in their lending. In addition, the presence of foreign banks in a country can also carry a stabilising force, since when domestic banks are hit by a shock, foreign banks can substitute for them in the lending market. Foreign banks may also be more efficient and foreign banks that enter developing markets tend to have more advanced risk-management systems. Spread of best practice may then benefit domestic banks as well, further enhancing stability.

...but also costs!

Foreign capital, however, is likely to be more mobile than domestic capital. In a crisis situation, foreign banks may simply decide to 'cut and run'. Another important destabilising force comes in the form of contagion: in the same way as cross-border banking insulates the domestic economy from domestic shocks,

it also exposes it to foreign shocks. The formation of cross-border banks will also tend to increase the complexity, the interconnectedness and the size of institutions. Cross-border banks are hence more likely to be systemically relevant banks. Their failure may thus impose significantly higher costs on economies than the failure of a purely domestic bank. In addition, international diversification tends to make previously domestic banks more similar. This can increase the likelihood of systemic crises – even if diversification has the potential to reduce isolated bank failures.

Cross-border banking that is neither excessive nor imbalanced is likely to be beneficial for stability

We believe that the stability benefits from cross-border banking outweigh the costs, as long as cross-border banking does not become excessive. This is because diversification benefits are undoubtedly large and the presence of contagion effects, which are usually seen as the most important disadvantage of cross-border banking, seems unlikely to outweigh these gains. Portfolio theory suggests that even though diversification into new assets gives rise to new exposures, overall risk is reduced. The debate has in the past sometimes unduly focused on the negative spillovers from cross-border banking rather than on its stabilising effects, which are naturally less visible. There is also evidence that points to the beneficial effects of cross-border banking, such as the experience of the CEE countries during the global crisis. Moderate – but not excessive – levels of cross-border banking are particularly desirable. This is because at lower levels of diversification, the benefits from more diversification are the highest. In addition, moderate exposure to foreign shocks is unlikely to cause severe instabilities in an economy.

A large part of the potential costs from cross-border banking can also be avoided, or at least mitigated. For example, for a given level of cross-border activities, the influence of foreign shocks can be minimised by having diversified foreign activities. In addition, the net benefits from the presence of foreign banks can be maximised when foreign banking takes the form of subsidiaries. There is consistent evidence that lending through local affiliates is generally more stable in times of crises than direct cross-border lending.

What is a desirable structure for cross-border banking flows?

A desirable structure for cross-border banking reaps maximum diversification gains while minimising stability costs. A crucial condition for this is that cross-border banking is *balanced*, *ie*, it does not create undue concentration in exposures. It is important to realise that there are two levels at which concentrated exposures may arise: at the level of an individual country or at the level of the EU. For example, if all banks in the EU invest heavily in the US, this will serve to diversify

their individual portfolios. However, it creates overexposure to the US at the system level, which may prove costly in times of crises.

The largest banking centres in Europe are well balanced but integration in the new member states is not

In this report we employ various metrics to assess the desirability of cross-border flows in the EU, both at the country and at the system level. For this we distinguish two dimensions: the structure of flows from other countries into a country's or region's banking system and the structure of flows from this banking system to abroad. In addition, we employ a metric that captures that it may be desirable in the long term for countries to have inflows that are balanced with outflows (in terms of size).

The metrics show that the countries with the largest banking centres, *ie*, the UK and Germany, are well diversified along all key dimensions. The structure of the cross-border banking flows in these countries is thus close to its optimal form. The other country with a large banking system, France, is coming close to these countries. But France ranks lower than the UK and Germany because it has a relatively low inflow of banking investment. The new member states (NMS) display low diversification as they are highly dependent on a few western European banks. They are thus vulnerable to contagion effects. This suggests that it may be useful for the NMS to diversify their inflows. What stands out as well is that the Nordic and Baltic regions are very interwoven and without much diversification. A few large banks dominate this region. Their banking systems, and thus their economies, are closely linked. Acknowledging this strong interdependence, the Nordic and Baltic authorities have recently implemented a burden-sharing scheme. In this way, the benefits and costs of an integrated banking system are better shared among the countries in the Nordic and Baltic regions.

Europe has overexposure to the US at the system-level!

Turning to the system-wide aspect of integration, our analysis shows that the EU banking system has a weak diversification of outward investment, with a strong bias to the US. This played an important role in the recent crisis, in which European banks incurred large losses due to problems originating in the US. The US and Japanese banking systems have a better external diversification. We recommend that the overexposure of the European banks to the US should be on the agenda of the new European Systemic Risk Board.

In sum, in Chapter 2 we argue that the benefits of cross-border banking – if cross-border banking takes place in an appropriate way – are likely to outweigh the stability costs. Regulators should focus on encouraging forms of cross-

border banking that are both balanced and not excessive, in order to avoid undue risk concentrations and dependencies, both at the country-level and the system-level. Our analysis shows that, in contrast to other regions, Europe has significant deficiencies in the structure of its banking system, which have probably exacerbated the crisis in Europe. Recognising these deficiencies at the system level should be a key focus for supervision.

Chapter 3 examines macroeconomic issues that arise in the context of cross-border banking. Prior to the crisis of 2007-2009 macroeconomists paid little attention to these issues. However, the increasing importance of cross-border banks – in terms of their sheer size but also in terms of their systemic interdependencies and hence the systemic risks they pose – highlights the need for taking banking into account when dealing with macroeconomic questions. In this chapter we also argue that there are various important sources of systemic risk, which require a macro-prudential approach to financial regulation.

The dominant paradigm for monetary policy ignores stability aspects... even though financial stability is an important prerequisite for effective monetary policy

The prevailing view prior to the crisis has been that the best way to conduct monetary policy is for central banks to adopt *inflation targeting*. Since the trade-off between unemployment and inflation emphasised by the Phillips curve is only a short-term one, policy makers should focus on keeping inflation at bay. Since governments tend to have a short-term orientation because of the election cycle, there is always the temptation to cut interest rates to boost the economy before an election even though there is no long-run gain and in the short run there is the cost of increased inflation. This provides a rationale for delegating monetary policy to an independent central bank and to give this bank clearly defined inflation-fighting objectives. However, an important necessary condition for inflation targeting to be viable is financial stability. Poor regulation and supervision of financial institutions may lead to large losses in the financial sector. This could, for example, prevent the raising of interest rates to fight inflation if the banks and other institutions are in a bad situation.

There is a need for a macro-prudential approach to regulation – especially in Europe

So far, financial regulation has been mostly based on a micro-prudential approach, where banks were regulated on an individual basis in most countries. The idea was that if individual banks are limited in the risks they take, there cannot be a problem in the financial system. No specific considerations were given to systemic risk, systemically important institutions or cross-border banks. Unfortunately, the recurrent occurrence of systemic financial crises has shown

that the micro approach is not sufficient. For financial stability to be achieved, macro-prudential policies need to be designed based on systemic risks.

The crisis has shown that the current system of regulation is particularly inadequate in the EU. First, micro-prudential regulation of banks has been unable to maintain financial stability, largely because it has not recognised the problem of systemic risk. As a result, many European countries have had to provide bailouts, particularly to cross-border banks, as previous chapters have documented. Second, rules to maintain fiscal discipline within the euro area have been ineffective because of the lack of proper enforcement mechanisms. Third, systemic risk arose in the private sector in countries such as Ireland and Spain. Before the crisis both had low debt-to-GDP ratios and were close to fiscal balance, so they were in full compliance with the Maastricht Treaty provisions. However, they have been among the hardest hit because of privately financed property bubbles.

Next in this chapter we identify various sources of systemic risk and macro-economic aspects that require regulatory attention.

Crises are often preceded by real estate bubbles

One key source of financial instability is common exposure to real estate bubbles. A main cause of the crisis of 2007-2009 was that there was a bubble in real estate in the US and in a number of other countries, such as Ireland and Spain. In all three countries house prices rose significantly and then dropped. When the bubble burst this created problems in the real economy, as construction was a large sector in all these countries, but particularly in Ireland and Spain. In addition, in the US many financial institutions experienced severe problems because the fall in property prices led to a collapse in the securitised mortgage market. The fact that these securities were held by many European banks meant that the crisis spread quickly from the US to Europe.

One explanation behind the emergence of this bubble is loose monetary policy, which contributed to excessive borrowing and thus led to the creation of the real estate bubble. The US Federal Reserve set very low interest rates during the period 2003-2004 in order to avoid a recession after the tech bubble burst in 2000 and the 9/11 terrorist attacks in 2001. At the time, US house prices were already rising quite fast. A competing explanation is that financial innovation in the form of mortgage contracts and securitisation played a crucial role in setting the stage for the crisis. The implications of financial innovation for monetary policy transmission were not understood by monetary policy makers. This failure, together with weak financial regulation and supervision, may have led to the crisis. Asset price bubbles can also be caused by rapid growth in credit. During the recent crisis, credit expanded rapidly in many countries due to the

presence of global imbalances. Several Asian countries have been accumulating large amounts of reserves since the late 1990s.

Although the cause of such bubbles remains controversial, it is clearly important that policies are adopted to try and prevent them from going forward and also to contain them.

Sovereign defaults pose a significant risk for the financial system

The Greek sovereign debt crisis in the spring of 2010, the subsequent Irish crisis in the fall and the more recent application for European support by Portugal have underlined the problem of sovereign default. This is a serious issue in its own right but is also a critical problem because of its effect on the stability of the banking system. If a sovereign country defaults, banks are likely to face a severe problem, particularly in the countries where the default occurs, but also in other countries, especially when these, like in Europe, are linked through a monetary union. Also, cross-border institutions, operating in a variety of countries and holding a variety of sovereign debt, are a potential source of propagation of sovereign default across countries.

Mispricing of assets was a major problem in the crisis and was exacerbated by mark-to-market accounting

During the crisis, securitised assets fell dramatically in value. Since many of these assets were held by cross-border banks the crisis spread quickly from the US to Europe. It is very likely that this fall at least partly reflects mispricing of assets and not only a drop in fundamental values. This is because for some asset classes, in particular AAA-rated tranches, the implied default rates were extraordinarily high. Mispricing was also indicated by the observed sharp increase in correlation among assets that are fundamentally only weakly linked, suggesting liquidity shortages leading to cash-in-the-market pricing. The deviation from fundamentals persisted during the crisis, presumably due to limits to arbitrage. Mispricing also clearly occurred in the 'flash-crash' of 6 May, 2010 during which markets fell sharply in a very short amount of time before (partially) recovering.

Given the adoption of mark-to-market accounting for banks in the European Union, mispricing of assets is an important systemic risk. This is particularly the case for cross-border banks, where many assets from a variety of countries may be held. An important issue is whether mark-to-market accounting should be suspended when there is apparent mispricing. For example, if the flash crash had occurred just before markets closed it could have resulted in insolvencies of banks, if mark-to-market accounting was to be strictly followed.

Mismatches in currencies can create significant problems but can be alleviated by currency swaps

An important source of systemic risk, particularly for cross-border banks, is currency mismatches. This was one of the major problems in the 1997 Asian Crisis. During the crisis of 2007-2009, a similar problem arose. Cross-border and other banks were lending in a low interest rate foreign currency and funded the loans in various ways. As the crisis progressed, the banks found the funding of these positions more and more difficult. This forced them to finance foreign denominated loans with domestic currency funding. Since longer maturities of domestic funding were also often unavailable, much of this funding was at short maturities, so the foreign currency mismatch was exacerbated by a maturity mismatch. The volatility in the foreign exchange markets meant these mismatches created a large amount of systemic risk for many banks, particularly cross-border banks. The solution to this problem was swaps between central banks. Such swaps represent a very important component of macro-prudential measures to deal with the problems raised with cross-border banking. These foreign exchange swaps made a considerable difference in easing the international aspects of the crisis, compared to 1997.

Contagion is a key concern for policy makers

Central banks often use the risk of contagion to justify intervention, especially when the financial institution in distress is big or occupies a key position in particular markets. This is the origin of the term 'too big to fail'. The recent crisis abounds with examples of this. For example, Bernanke (2008) argues that the takeover of Bear Stearns by J.P. Morgan arranged by the Federal Reserve Bank in March 2008 was justified by the likelihood that its failure would lead to a whole chain reaction where many other financial institutions would have gone bankrupt. There would have been contagion through the network of derivative contracts that Bear Stearns was part of.

Contagion can take place through various channels – such as through direct linkages among banks, common exposures, panic runs or through asset prices – and remains one of the most worrying concerns for policymakers. With the exception of Lehman Brothers, all the large financial institutions in distress have been saved during the crisis. Policymakers have acted upon the fear that the failure of a large financial institution would lead to a chain of failures through the financial system. This argument certainly has its justification in the importance of preserving a stable financial system. However, one also has to keep in mind that even when there is a realistic risk of contagion that justifies central bank or government intervention, this also involves costs that should be traded off against the costs deriving from contagion. These costs of intervention include the future moral hazard associated with increased risk-taking by financial institutions going forward.

In sum, in this chapter we will point out that focusing exclusively on inflation targeting is undesirable as it ignores financial stability risks. We will also argue that the existence of cross-border banks exacerbates system risks – and particularly so in Europe. Addressing these risks clearly requires a macroprudential approach to financial regulation.

Chapter 4 presents the policy implications of our analysis. We first argue that there is a need to tackle solutions to banking problems at the European – rather than the national – level. The financial crisis has taught us that we need new European institutions, such as the new European Supervisory Authorities (ESAs) and the European Systemic Risk Board (ESRB), and new approaches to provide appropriate solutions for monitoring and, if necessary, resolving European banks. The alternative is to require cross-border banks to organise themselves as a string of national standalone subsidiaries (foregoing the single market in the EU). In this case some loose coordination between national authorities may suffice. However, organisation as standalones foregoes substantial diversification and efficiency gains and is likely to result in substantially higher capital and liquidity buffers. In addition, due to the segmentation of banking markets, the cost of borrowing may start to rise in banking markets that are dominated by foreign standalone subsidiaries with higher capital and liquidity buffers. This report therefore emphasises the European solution, in order to maintain the efficiency gains of the single market in banking.

Recommendations

Based on our analysis in the previous chapters and taking a focus on the European approach, we make the following recommendations (see also Box 1 below). We organise the 10 recommendations along two dimensions: ‘policy dimension’ (macro-prudential, macroeconomic – fiscal and monetary -, and resolution policies); and ‘decision level’ (national, EU and global).

1. *Applying macro-prudential tools to prevent bubbles.* Different forms of macro-prudential regulation may be used to prevent bubbles. An example is limits on loan-to-value ratios that would be lowered as property prices increase at a faster pace. Next, Basel III introduces a countercyclical capital charge that increases when the economy is in upswing (credit growth to GDP is above trend) and decreases in the downswing. These tools are applied at the country level, as asset price bubbles tend to be country specific.
2. *Monitoring the national application of macro-prudential tools, exposure to cross-border banks and overall exposures of EU banking system.* As important as the application of macroprudential tools at the national level, is proper monitoring at the EU level. Institutions such as the ESRB and the ECB are critical in this context. Similarly, a careful analysis of the exposure to cross-border banks for each EU member – and the diversification of this exposure – is called for. Moreover, the

aggregate exposures of the EU banking system should be monitored by the ESRB and ECB.

3. *Risk-weights for sovereign debt.* Banking regulation should recognise that the debt of countries, including OECD countries, can be risky. One way to do this is to assign risk weightings and diversification requirements on sovereign debt. This could be done in the Basel Committee on Banking Supervision, consisting of central banks and supervisors.
4. *Mark-to-market rules to avoid mispricing of assets.* As long as markets are efficient, mark-to-market accounting dominates. However, if as during times of crisis they cease to be efficient, market prices do not provide a good guide for regulators and investors. When market prices and model-based prices diverge significantly (say by more than 2%), financial institutions should publish both. If regulators see many financial institutions independently publishing different valuations, they can deduce that financial markets may no longer be efficient and can act accordingly.
5. *Eliminating tax-deductibility of debt.* Minimum capital is needed to foster sound banking, but equity is perceived to be more costly than debt. One of the reasons why capital is privately more costly is that in many countries debt interest is tax deductible at the corporate level but dividends are not. The removal of tax deductibility would reduce the incentive to use debt rather than equity.
6. *Bankruptcy regime for countries.* A solution to the problem of sovereign default is a bankruptcy mechanism of some kind that would limit the need for a bail-out. This would remove a great deal of the uncertainty especially if the process could be expedited, as well as reduce moral hazard risks. One way that such a mechanism could work is for the country to declare it cannot fully meet its debt obligations, to be verified by a team from the IMF, ECB and the EC, which would then assist in designing the optimal repayment plan. A high priority for this element of the proposed European Stability Mechanism (ESM) is to establish this bankruptcy mechanism in a transparent and predictable fashion.
7. *Standing foreign exchange swap facilities.* Currency mismatches are an important feature of cross-border banking. In crisis times, shortages of certain currencies can and do happen. When central banks arrange foreign exchange swap facilities, they can provide the private banking sector with sufficient foreign currency to alleviate any shortages. Adjustments to mandate and legal regimes of the central banks involved might have to be made.
8. *Compatible bank resolution regimes including contingent capital.* Reform of bank resolution regimes at the national level is critical in order to avoid corner solutions such as costly and moral hazard-inducing bailouts, or lengthy and disruptive liquidations. In the aftermath of the crises, many countries are therefore in the process of introducing special resolution regimes to allow for orderly and swift resolution. These national regimes should be compatible in order to facilitate the resolution of cross-border banks. Next, shareholders and unsecured

debt holders should share in the losses to a larger extent than they currently do. Banks could therefore issue convertible debt that could be converted into equity in the event of a crisis. These so-called 'CoCos' have two main advantages. First, it is not necessary for banks to raise capital in difficult times as it would already be available. Second, contingent capital allows sharing losses with debt holders. This would also have a disciplinary role and would induce bank managers to behave more prudently.

9. *European-level deposit insurance and bank resolution framework.* The credibility of current deposit insurance arrangements based on the home-country principle for cross-border banks is in question. A European deposit insurance fund would address this lack of credibility. It would also reinforce the notion that cross-border banks should be resolved at the European level. While different institutional solutions are possible, a European-level framework for deposit insurance and bank resolution is critical in order to enable swift and effective intervention into failing cross-border banks, thereby reducing uncertainty and strengthening market discipline. Depending on the choice of resolution authority (supervisor or central bank), the new European Banking Authority (EBA) or the European Central Bank (ECB) can be given this central power in the college of resolution authorities.
10. *Resolution framework on bank group level with ex ante burden-sharing agreements.* Resolution plans for cross-border banks should be developed to allow for an orderly winding down of (parts of) a large systemic financial institution. As large financial institutions have multiple legal entities, interconnected through intercompany loans, it is most cost effective to resolve a failing bank at the group level. In this context, ex ante burden-sharing arrangements should be agreed upon to overcome coordination failure between governments in the moment of failure and ineffective ad hoc solutions. By agreeing ex ante on a burden-sharing key, authorities are only faced with the decision to intervene or not. In that way, authorities can reach the first-best solution. While burden-sharing should be applied at the global level, it can only be enforced with a proper legal basis. That can be provided at the EU level, or at the regional level. A first example, albeit legally non-binding, is the Nordic Baltic scheme.

Matrix of policy recommendations for cross-border banks

	Macro-prudential	Monetary – Fiscal	Resolution framework
National	1. Applying macro-prudential tools to prevent bubbles	5. Eliminate tax deductibility of debt	8. Compatible bank resolution regimes, including contingent capital
EU	2. Monitoring the national application of macro-prudential tools, exposure to cross-border banks and overall exposures of EU banking system	6. Bankruptcy regime for countries	9. European-level deposit insurance fund and resolution framework
Global	3. Risk weights for sovereign debt 4. Mark-to-market rules to avoid mispricing of assets	7. Standing foreign exchange swap facilities	10. Resolution framework on bank group level with <i>ex ante</i> burden-sharing agreements

1. Cross-Border Banking in Europe: From Boom to Bust

The aim of this first chapter is to document the role of banks in cross-border finance in Europe over the past twenty years, during the period leading up to the crisis and during the recent crisis. We will document trends, gauge determinants of the rise of cross-border banking and assess the role of cross-border banking during the crisis. This will set the stage for the in-depth discussions in Chapters 2 and 3 on the relationship between cross-border banks and financial stability and the macroeconomic aspects of cross-border banking, respectively.

Understanding the role of banks in cross-border finance has become an urgent research priority since the onset of the global crisis, as cross-border banking-related problems have played a central role. First, the scale of exposure of European markets to the US securitised assets markets was surprisingly large. Second, the breakdown in credit and asset markets was an international phenomenon, with cross-border financial trades suffering disproportionately due to the greater information problems *vis-à-vis* cross-border counterparties and the differences in regulatory regimes. Third, currency mismatches in funding became evident, with European banks suffering a dollar shortage that ultimately required resolution through a major currency swap initiative among the main central banks (see McGuire and von Peter, 2009, Obstfeld, Shambaugh and Taylor, 2009). Fourth, the provision of fiscal support for distressed banks was especially problematic in relation to cross-border activities. The rescue of multi-country banks such as Dexia and Fortis required the governments involved to devise *ad hoc, ex post* burden-sharing agreements (see Pisani-Ferry and Sapir, 2010, amongst others). In relation to emerging Europe, there were fears that the policies of home-country governments might encourage parent banks to fail to support the operations of affiliates.

In addition to the cross-border operations of internationally active banking groups, cross-border banking also encompasses the cross-border financial activities of purely domestically-focused banks. Such banks may acquire foreign assets and/or fund domestic lending through foreign liabilities. Indeed, this latter channel played a major role in increasing systemic vulnerabilities, since the shift to cross-border wholesale funding was a major driver of credit growth in the European periphery during the pre-crisis period. In turn, the scale of the recession and the fiscal crisis are especially severe in those countries that experienced such credit

booms during the pre-crisis period (see Lane and Milesi-Ferretti, 2011, Benetrix and Lane, 2010).

More generally, the national nature of bank rescue operations has meant that there has been a reconsideration of the benefits and costs of cross-border banking. In one direction, there is a perception that cross-border operations contributed disproportionately to bank losses, due to a lack of understanding of foreign markets in some cases. A pull back from cross-border banking has also been the consequence of European Commission rulings on the provision of state aid, which has required the disposal of international affiliates in a number of cases.¹

However, in the other direction, there is also a recognition that the acute banking crises in several countries were, in part, the result of over-concentrated bank operations. If banking systems had been more diversified, then regional property crashes might have been more easily absorbed. From this perspective, an important policy lesson to draw from the crisis is to build a European-level regulatory system that will better support the emergence of a stable European banking system that includes a major role for European-wide major banking groups – as we will lay out in more detail in the concluding policy chapter.

The structure of this chapter is as follows. We will first document the rise of cross-border banking in the period leading up to the crisis and discuss its nature and determinants. We will then discuss whether cross-border banking had a mitigating or exacerbating effect during the crisis. In both cases, we will include separate discussions on the old EU member states and the new EU member states of central and eastern Europe. Finally, we will discuss the regulatory response and its interaction with the increasingly international character of banking.

1.1 The growth of cross-border banking – trends and determinants

Banks take a central role in cross-border capital flows as, in most countries around the world, banks acquire foreign assets in addition to domestic assets. These foreign assets include loans to foreign entities and holdings of foreign bonds and other instruments. Equally, on the liability side, banks raise external funding. Such foreign liabilities include deposits of non-residents and the sale of bonds and other securities to foreign investors. In relation to both foreign assets and foreign liabilities, foreign banks are a key counter party to domestic banks but non-bank foreign entities are also important. For multi-country banking groups, a substantial fraction of cross-border capital flows is between domestic and foreign affiliates (inter-office flows).

¹ For a more detailed discussion, see Beck, Coyle, Dewatripont, Freixas and Seabright (2010).

In addition to these cross-border flows, banks also have international exposures through other channels. Domestically, they may make foreign-currency loans and obtain foreign currency deposits from domestic residents. Through their foreign affiliates, they may have local currency claims and liabilities in their foreign operations. While these positions are not cross-border, these affect the parent banking group through the value of these operations.

Taking a historical perspective, we can see the financial globalisation wave after the mid-1990s as the third such wave of globalisation in modern financial history, with the first of the two previous waves in the 19th century when European investors invested in emerging markets, such as the US, and the second starting in the 1960s, mainly based on financial transactions between banks in industrialised countries (Committee on the Global Financial System, 2010a). The two previous waves, however, did not involve significant foreign direct investment (FDI) in banking, in the form of bank expansion across borders, especially not in commercial banking, but rather bank lending and bond issues. The first two waves thus saw an internationalisation of banking, not necessarily a 'multi-nationalisation' of banking, where banks establish subsidiaries outside their home country.²

While foreign bank participation significantly increased in both Sub-Saharan Africa and Latin America over the past 20 years, it has been only in the past 10 years or so that cross-border mergers and acquisitions (M&A) have gained prominence in western Europe. Even more impressive has been the transformation of many banking systems in central and eastern Europe, which went from state-owned, mono-bank systems to foreign-bank dominated systems within a period of 10 years. This trend towards multinational rather than international banking has important implications for stability, as funds lent through local subsidiaries and branches often have a longer maturity and can be considered more stable than cross-border lending (see Schnabl, 2010). The internal capital market within global banks can smooth liquidity shocks and complement funding from external sources (see Goldberg, 2009 for a survey and Cetorelli and Goldberg, 2011 for evidence during the current crisis). Also, complying with regulatory requirements of the host country on subsidiaries imposes certain restrictions on multinational banks in terms of withdrawing liquidity, unlike in the case of direct cross-border lending.

At the same time, a lengthening of the intermediation chain could be observed, including a move away from the originate-and-hold to the originate-and-distribute model. There was an increase in securitisation of loans to move them off-balance-sheet, often into special or structured investment vehicles (SIVs) and sale of derivatives on these assets, such as in the form of collateralised debt

² In the international approach, the parent bank is the source of funds for its overseas affiliates (either directly or through its offices in major international banking centres, such as London), while in the multinational approach, the local affiliate is mostly funded through local positions, raising funds from the residents of the country in which it is resident.

obligations (CDOs). One could see this as financial innovation, as it allowed risk diversification and new investment opportunities. On the other hand, this lengthening of the intermediation chain increased the opacity of bank lending and, given that often 100% of claims on the securitised loans were sold, the elimination of incentives on the originating lender's side to screen and monitor properly. Further, while several of these vehicles were off-balance-sheet without legal obligation by the underwriting bank, reputational obligations forced banks to take these vehicles back on their balance sheets, with negative consequences for their solvency and liquidity positions. Finally, the securitisation often served purposes of regulatory arbitrage by turning at least a share of sub-prime, if not junk, assets into AAA securities, for which no capital charge was needed. This phenomenon had an important cross-border dimension to it, as many banks in Europe and around the developed and developing world, bought securities based on US subprime mortgage loans.

The years leading up to the crisis also saw a trend towards the financing of banks in the wholesale market and at the global rather than national level, including in financial and off-shore centres (see Demirguc-Kunt and Huizinga, 2010a). During 2003-2007, money-market funding of EU banks increased from 11.8% of total liabilities to 16%, while short-term interbank funding rose from 0.1% to 2.9%. On the asset side, the 129% increase in the issuance of securitised assets left banks vulnerable to declines in these markets. The Icelandic banks, for example, financed large parts of their investments in the wholesale market and turned to retail deposit collection only after the funding on these markets had turned prohibitively expensive. Foreign subsidiaries in CEE also relied increasingly on interbank and wholesale markets rather than retail deposits for funding (see Aydin, 2008). These different funding trends implied a shortening of the average maturity on banks' liability side and therefore increased rollover risk. While good for risk diversification, with ultimately positive repercussions for banks' clients, this has also increased the vulnerability of banks to contagion shocks.

The trend towards a lengthening of the intermediation chain and towards global funding went hand-in-hand with a trend towards larger and more international financial institutions to exploit scale economies, with banks especially in western Europe looking for merger and acquisition possibilities beyond national borders. This resulted in many financial systems in the new CEE member states being dominated by western European banks and significant cross-border entry even within the EU15 zone. In terms of the organisation of the international banking system, Claessens, Herring and Schoenmaker (2010) highlight the central role of the largest multi-country banking groups in cross-border bank flows. Following Haldane (2009), these authors point out that the five largest banking groups controlled more than 16% of global banking assets in 2008, which is more than double their market share in 1998. In relation to foreign direct investment in the banking sector, large banks can exploit scale economies by operating in multiple national markets. Goldberg (2007) and De Blas and Russ (2008) provide evidence

that FDI in the financial sector reduces lending rates through an increase in competition and an improvement in cost efficiencies.

The consolidation trend has resulted in a small number of 'systemically important financial institutions' (SIFIs), most of them with a large share of cross-border activity. Claessens, Herring and Schoenmaker (2010) report data on thirty (SIFIs), for which, – as a group, foreign activities account for 53% of assets, 56% of income (before taxes) and 68% of subsidiaries. Moreover, the European banks on this list were far more internationalised than the North American or Asian institutions, with significant cross-border activities not only within Europe but also in other regions.

A small number of countries dominate cross-border banking. France, Germany, the UK, the US, Switzerland and the Netherlands accounted for 47% of cross-border banking assets in the second quarter of 2009. On the liability side, the US, the UK, France, Germany, Japan and the Netherlands accounted for 50% of cross-border banking liabilities. However, countries followed different approaches, as pointed out by McCauley, McGuire and von Peter. (2010). The US, Spain and Switzerland follow the multi-national model, with subsidiaries and local host country funding, whereas Japanese, French and German banks follow the international model, with more centralised funding (see also CGFS 2010b). Under a centralised model, foreign affiliates rely more on intra-group funding from the parent bank or other affiliates. In related fashion, the local affiliate is more autonomous in its funding strategy under a decentralised model. While the multinational Spanish banks are highly decentralised, Swiss, Canadian and US banks rely on extensive intragroup funding. In terms of geography, the parent bank is the main source of funds for Japanese affiliates, whereas German and French banks have a wider spread of liabilities.

In relation to individual institutions in Europe, the percentage of foreign assets in total assets for major banks is high: 82 % for Deutsche Bank, 64% for Santander, 62% for UniCredit, 41% for BNP Paribas and 29% for Societe Generale (Table 1.1. of Claessens, Herring and Schoenmaker, 2010). These SIFIs have complex organisational structures – each has at least 100 majority-owned subsidiaries and more than half have over 500 subsidiaries.

As is shown by CGFS (2010a), the growth in international banking activity should be viewed as complementary to the rapid expansion in international financial markets. Banks are centrally important in the acquisition of foreign securities and the issuance of foreign securities. In the other direction, financial markets rely on banks to provide liquidity, credit lines and other services to market participants.

1.1.1 Western Europe – euro and cross-border banking

As discussed above, the European Union and especially the euro area, have seen a significant increase in cross-border financial activity over the 10 years before the global crisis (see also Barnes, Lane and Radziwill, 2010). To a large extent, this has been part of a larger trend towards disintermediation and globalisation of financial markets, fostered by financial liberalisation, domestic financial development and new technological possibilities. However, there were also several Europe-specific factors that provided a further boost to intra-European integration.

Unlike the US, cross-border flows within and out of western Europe have been dominated by bank flows, reflecting the bank-based nature of finance in Europe, in spite of the trends towards financial markets discussed above. The introduction of the Single Banking License in 1989 through the Second Banking Directive was a decisive step towards a unified European financial market, which subsequently also led to a convergence in financial legislation and regulation across member countries. The introduction of the euro in 1999 eliminated currency risk and provided a further push for financial integration. Both the elimination of currency risk and the legal and regulatory convergence can explain the marked increase in cross-border financial activity in the euro area by 40% (see Kalemli-Ozcan, Papaioannou and Peydró, 2009).³ Interestingly, the increase in trade activities – though highly correlated with financial integration – cannot explain the euro's impact on cross-border financial activities. The harmonisation of market infrastructure, such as a uniform cross-border wholesale payment system (TARGET) has certainly also contributed, and even if only through lower transaction costs.⁴ Spiegel (2009b) shows that the relative increase in bilateral bank claims involving euro area members can be attributed to three different channels: (a) a 'borrower' effect, by which euro membership increases creditworthiness, such that euro members increase borrowing from all sources; (b) a 'creditor' effect that increases the attractiveness of a member country's banks as financial intermediaries, with euro members increasing lending to all destinations; and (c) a 'pair-wise' effect such that joint membership of the euro increases the quality of intermediation when both lender and borrower are in the monetary union, so that the increase in cross-border bank transactions is focused on pairs of countries that are both members of the euro. He finds that the pair-wise effect is the dominant factor in the data. Moreover, there is some evidence of an interaction effect, by which the pair-wise effect is strongest for those country pairs that also have high levels of bilateral trade, such that the single currency reinforces bilateral links in which information flows are high.

3 This effect is relative to the overall increase in cross-border financial activity, *ie*, comparing a 'treatment group' (euro members) to a 'control group' (non-euro EU members) before and after the introduction of the euro. This effect is consistent with research showing that fixed exchange rates are positively associated with cross-border banking flows (see Herrmann and Mihaljek, 2010).

4 In earlier studies, Blank and Buch (2007) estimate a gravity model for cross-border bank assets and liabilities. These authors find a significantly positive euro effect on the distribution of bank assets, with a weaker estimate obtained for bank liabilities. Coeurdacier and Martin (2007) also find a positive euro effect on bilateral bank lending among the member countries, in addition to increased lending by banks from outside the euro area to entities in the member countries.

The effect of the euro has been even stronger for some of the peripheral countries of the euro area. Spiegel (2009a) shows that the sources of external financing for Portuguese and Greek banks radically shifted with the advent of EMU, with these banks traditionally reliant on dollar debt but subsequently able to raise funds from counterparts elsewhere in the euro area.

In spite of the increased cross-border flows, the retail banking market remains quite fragmented, with non-trivial differences in lending and deposit rates for households and firms across the euro area. There has been little convergence in retail interest rates to small businesses and households. Moreover, Trichet (2008) reports that the extent of cross-border lending to non-bank entities is quite small, constituting less than 6% of total loans to non-banks. While this share has grown from an average of about 3% in the early years of EMU, the rate of increase is very slow. At one level, this fragmentation is not too surprising, in view of the importance of local information in assessing small-business and consumer loans and differences in national legal systems in the enforcement of repayment and foreclosure procedures. In relation to retail payments, ongoing high charges for cross-border payments have limited the tangible benefits of a single currency for bank customers. However, the launch of the Single Euro Payments Area (SEPA) should help in providing a low-cost unified payments system that does not discriminate between intra-national and cross-national payments within the euro area.

Even if retail banking remains fragmented, the banking sector has been a central driver of financial integration, through cross-border interbank loans and deposits and the area-wide market in which banks are major cross-border purchasers of securities issued by other banks. The scale of cross-border interbank lending and borrowing within the euro area far exceeds the levels *vis-à-vis* non-banks. This has transformed the balance sheets of banks in the euro area. Cross-border interbank loans between euro area banks have grown from 15.5% of total interbank loans in 1997, to 23.5% in 2008, while the holdings by euro area banks of the debt securities issued by banks in other euro area countries grew from a 12.1% share in 1997, to 31.3% in 2008. The expansion of cross-border activity has also included other EU countries, with the shares of interbank loans and debt securities between the euro area and the rest of the EU growing from 10.3% and 1.4%, respectively, in 1997, to 18.6% and 11% in 2008.

Bank-related positions have also been of increasing importance in the overall balance of payments (see McCauley, McGuire and von Peter, 2010). In the case of Belgium, Switzerland and the UK, the cross-border positions of banks accounted for 40–60% of each country's external liabilities at end-2007, and for a quarter or more in the case of France, Italy and the Netherlands. Furthermore, the offices

of foreign banks alone accounted for about a tenth of the external liabilities of Belgium, Italy, Spain, Switzerland and the US.⁵

Table 1.1 shows that for most countries, there was a rapid expansion in the gross scale of the external position of the banking system during the 2002-2007 pre-crisis period, while there has been a noticeable decline in many cases since the crisis began. Here, we exploit the locational banking data compiled by the Bank for International Settlements (BIS). As discussed in Box 1.1, the locational data are gathered on the same basis as BOP data, including all resident entities as domestic (whether the entity is domestically owned or foreign owned). Equally, it treats all non-resident entities as foreign (including the foreign affiliates of domestically-owned enterprises). As such, the locational data includes intra-bank positions in addition to arm's length positions.

It is important to emphasise that the bulk of cross-border bank positions are *vis-à-vis* banks elsewhere. To illustrate this point, Table 1.2 shows the external assets and liabilities of the domestic non-bank sector *vis-à-vis* foreign banks. With the exception of major financial centres, these positions are relatively small compared to the total positions (including bank-to-bank positions) reported in Table 1.1.

In terms of geographical distribution, Figure 1.1 shows that 75% of the assets of euro area banks are domestic. In relation to the cross-border component, assets in other parts of the euro area account for about 7.5% of total assets, while assets in non-euro countries of the EU represent about 11% of total assets. However, non-EU assets are only about 7% of total assets. This confirms that the international focus of euro area banks is heavily concentrated within Europe.

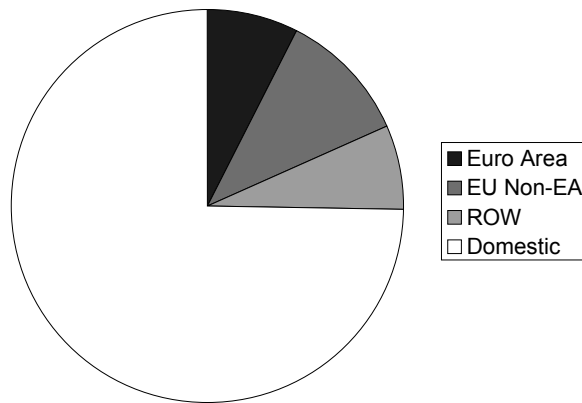
5 The role of foreign-owned banks complicates the interpretation of the international balance sheet since the profits/losses of foreign-owned banks ultimately accrue to the foreign owners and do not pose the same kind of fiscal risk to the domestic government as is the case with the balance sheets of domestically-owned banks.

Table 1.1 External assets and liabilities of domestic banking system

	Assets			Liabilities		
	2002	2007	2009	2002	2007	2009
UK	155.7	244.4	248.9	169.2	260.9	274.3
Austria	56.9	130.2	120.4	49.3	87.4	72.3
Belgium	163.8	253.0	179.0	141.5	211.3	139.8
Denmark	37.2	71.7	62.6	53.3	110.6	105.5
France	56.4	108.3	96.3	60.4	108.0	89.6
Germany	68.4	107.0	93.4	58.0	59.9	51.3
Italy	19.7	30.6	28.2	24.6	44.4	40.5
Luxembourg	2625.5	2078.7	1745.8	1975.5	1426.6	1209.6
Netherlands	99.9	170.1	132.9	97.7	184.2	155.2
Norway	8.8	21.2	28.4	24.4	44.7	55.3
Sweden	30.6	74.4	85.0	47.4	89.0	112.9
Switzerland	288.9	354.6	183.6	254.6	321.0	180.4
Finland	35.6	41.3	57.7	29.1	48.9	74.7
Greece		40.0	72.5		46.4	48.7
Ireland	193.4	395.9	401.7	186.1	442.8	397.7
Portugal	48.4	62.2	70.7	89.3	108.2	89.2
Cyprus			474.8			428.4

Note: Authors' calculations based on Table 2A of BIS Banking Statistics. Ratios are relative to GDP.

Figure 1.1 European distribution of bank assets



Note: Geographical composition of the assets of Euro Area MFIs.

Source: Authors' calculations based on ECB data.

Table 1.2 Cross-border positions *vis-à-vis* nonbanks

	Assets			Liabilities		
	2002	2007	2009	2002	2007	2009
Austria	5	6.6	6.0	6.7	8.4	7.8
Belgium	18	16.2	18.0	11.6	16.8	20.0
France	5	6.8	7.1	6.5	9.8	10.5
Germany	8	9.9	9.8	5.9	7.5	8.4
Italy	4	2.8	3.0	2.5	2.8	2.3
Luxembourg	221	388.8	354.5	169.8	400.9	376.5
Netherlands	29	34.4	33.5	19.3	37.8	38.2
Finland	3	4.5	6.4	8.4	8.5	9.8
Greece	12	5.4	3.7	14.2	7.9	8.4
Ireland	39	79.6	106.7	33.7	88.8	103.3
Malta	32	133.7	158.1	33.6	93.8	120.6
Portugal	14	8.4	7.2	9.8	11.9	10.6
Spain	6	3.7	2.9	5.3	7.4	7.6
Cyprus	43	89.5	80.8	49.3	132.5	121.5
Slovakia	2	1.7	1.6	5.5	7.2	8.2
Slovenia	2.1	2.4	2.5	9.1	19.0	22.8

Note: External assets of domestic non-banking sector held in foreign banks; external liabilities of domestic non-banking sector owed to foreign banks. Ratios are relative to GDP.

Source: Authors' calculations based on Table 6A of BIS Banking Statistics.

In addition to cross-border lending, the increase in financial integration also came in the form of cross-border mergers and acquisitions. While western European banks had previously looked outside the region for acquisitions in Africa, Latin America and – after the start of the transition process – in central and eastern Europe, the past decade also saw an increasing amount of cross-border mergers and acquisitions within western Europe. Among the most high-profile cases were the takeover of Erste Bank in Austria and Hypobank in Germany by the Italian bank Unicredito and the takeover of the UK Abbey National by the Spanish Santander. One of the last big acquisitions was that of the Dutch ABN AMRO Bank in 2007 by Fortis (Belgium), Royal Bank of Scotland and Banco Santander, which resulted in the split of ABN AMRO into three parts. Already seen as having paid too high a price, both Fortis and RBS were among the first large European banks to be affected by the crisis in 2008. The increased financial integration within EU15 thus led to larger and more multi-country banks.

According to the *EU Banking Structures* reports published by the European Central Bank, the number of branches of banks from other EU countries grew from 557 in 2003 to 766 in 2009. This represents 79% of all branches of foreign banks

operating in EU countries (in 2009, there were 206 branches from banks located in non-EU countries). The EU branches had assets in 2009 of €3.2 trillion, while the non-EU branches had assets of €1.8 trillion.

The value of assets held by subsidiaries is even greater. In 2009, EU subsidiaries held €5 trillion in assets, while subsidiaries of non-EU banks held €1 trillion in assets. (The number of EU subsidiaries in 2009 was 495 and there were 284 subsidiaries of non-EU banks.). While this growth went hand in hand with a general growth in banking (the balance sheets of European banks grew rapidly during the 2002-2007 period from €25.3 trillion in 2002 to €42.1 trillion in 2007), it is striking that the assets of subsidiaries and branches grew even more rapidly, from €3.95 trillion to €8.5 trillion in 2007. The upside dynamics, however, were repeated during the downturn. While total bank assets and subsidiary assets were quite flat between 2007 and 2009, the assets of cross-border branches fell markedly from €3.8 trillion to €3.2 trillion.

As already discussed above, the increase in banking in general and in cross-border, more specifically, went hand in hand with a consolidation trend. As reported by the European Commission (2008) and the European Central Bank (2007), in 2005 there were 46 EU banking groups (out of a total of 8,000 banks) that held 68% of total EU banking assets. Of these, 16 major banks held at least 25% of their assets in other EU countries and were present in at least 25% of other EU countries. These major banks have been important drivers of enhanced financial integration at the EU level.

However, consistent with the evidence provided by Aviat, de Santis and Coeurdacier (2009), there is no evidence of a euro effect in cross-border mergers and acquisitions in the banking sector. Rather, cross-border banking consolidation can be explained by regional factors and global strategies followed by some of the largest banking groups. This also lines up with the data reported by the European Central Bank (2008) which show that cross-border mergers and acquisitions that involve euro area banks are evenly split between intra-union and extra-union deals. This study also finds that the propensity to engage in cross-border deals is increasing in the ownership share of foreign institutional investors, such that there is an interesting complementarity between portfolio integration and integration in the banking sector.

It is important, however, to distinguish two dimensions in the creation of larger, more international banks; the pure size dimension and the cross-border dimension. Both dimensions create problems, as we will discuss further below, but they have different regulatory implications. First, the consolidation process might create a tendency for financial institutions to invest into too similar portfolios (see Wagner, 2010a). This can be the result of both domestic and international consolidation. Through the cross-border dimension of financial markets and of the consolidation process, however, shocks can be propagated more rapidly across countries. Second, on the regulatory and supervisory level,

consolidation creates the problem of more and larger too-systemically-important-to-fail institutions and the cross-border aspect creates complications and biases in the supervision and, even more so, in the resolution process (as we will discuss below). As shown by Carbó -Valvedere, Kane and Rodriguez (2009), cross-border mergers increased the leverage of the merged banks and implied higher safety net subsidies.⁶ In addition and often related to such mergers, there was regulatory competition, with several countries turning a blind eye as banks took on more and more risk, often with the political objective of creating ‘national champions’ that thus enjoyed the status of too-big-to-fail institutions. However, there is an important additional element that comes from cross-border activities compared to domestic consolidation, and that is that many European banks grew beyond the size of their home economies and this turned them into too-big-to-save banks, such as the Icelandic banks (see Demirguc-Kunt and Huizinga, 2010b).⁷

While many of these trends – global imbalances, increased financial engineering and reliance on markets, and elimination of currency risk – helped lay the seed for the subsequent crisis, there were also country-specific situations, such as that of the Landesbanken in Germany that – due to EU rulings – stood to lose their AAA ratings and had incentives to increase investment in risky securities to thus increase profitability.

The increasing interconnectedness of western European banking systems increased the contagion risk significantly, as documented by Degryse, Elahi and Penas (2010). Bank failures in one country can wipe out a large share of cross-border liabilities and therefore undermine capital and ultimately banking assets in other countries. In this context, it is important to look beyond first-round effects and consider subsequent contagion rounds. However, it is not only exposures by themselves that have increased contagion risk over the past decade, but also decreasing capitalisation that made banks more sensitive to contagion, as the threshold loss that would endanger a bank’s survival falls.

There are also indirect ways in which cross-border banking can foster a bubble and financial sector imbalances, such as through herding effects of internationally active fund managers. Through increased competition and hunt for yield, banks throughout the world started investing in riskier and riskier assets, ending up with similar risk profiles, as shown by De Nicoló and Kwast (2002), who find that correlations of the stock returns of large US financial conglomerates increased between 1988 and 1999. Similarly, Acharya and Schnabl (2010) show that the major global banks took the same risks in asset-backed commercial paper and therefore faced similar problems rolling over during the crisis in 2008.

6 The safety net subsidy is defined as the difference between the actual deposit insurance premium paid by banks and the “fair” insurance premium implied by the option model.

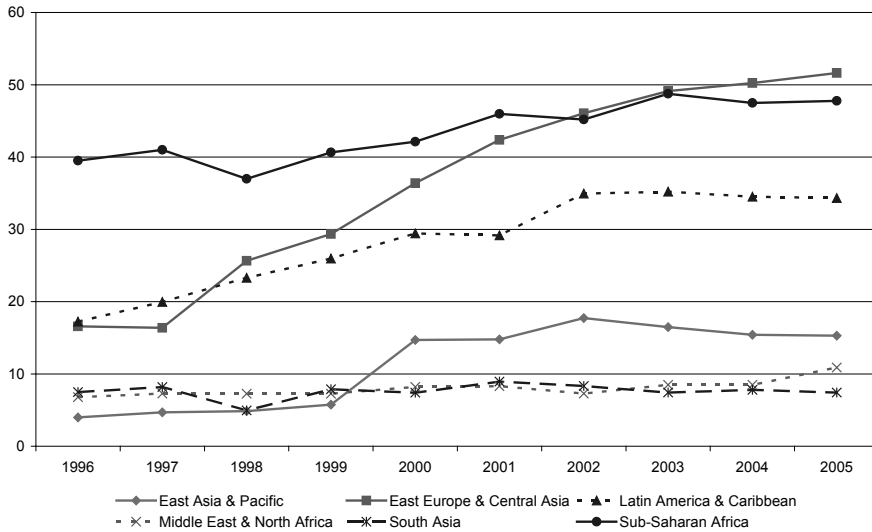
7 Right before the crisis, the total assets of Icelandic banks reached 865% of GDP (Benediktsdottir, Danielsson and Zoega 2011).

In summary, the interaction of conducive global conditions, trends in financial markets and the establishment of the euro fostered an enormous increase in cross-border activity within the EU15, both in the form of cross-border lending and in the form of cross-border mergers and acquisitions. This integration has had positive repercussions for economic development within Europe, but made the region increasingly vulnerable to credit shocks.

1.1.2 Foreign banks in CEE – a driving factor in financial deepening and boom

Cross-border banking in the new EU countries had a very different face and role than in western Europe. Critically, while western European countries have been both home and host of large cross-border banks, central and eastern European countries have been exclusively the host of such banks. The ownership transformation of the banking system, from a state-owned mono-bank system towards a privately owned market-based financial system, was key to achieving macroeconomic stability in the late 1990s. Successful transformation – mostly into a foreign-bank dominated banking system – served as a disciplining tool to break the links between banks and incumbent, formerly state-owned enterprises and thus the cycle of non-performing loans, bank recapitalisation and inflation. The countries that finalised the ownership transformation process the fastest were also the first ones to successfully emerge out of the systemic banking crises of the 1990s.

Comparing ownership patterns in 1997 and 2005 across transition economies shows the enormous transformation banking sectors across the region have gone through (Figure 1.2). In 1997, eight transition economies still had predominantly government-owned banking systems, while 11 had banking markets dominated by domestic privately-owned banks. There were only five countries with predominantly foreign-owned banks, notably Bulgaria, Estonia, Hungary, Macedonia, and the Slovak Republic. Two thirds of countries in 2005 had banking systems dominated by foreign banks, with only four countries retaining predominantly government-owned banking systems and six having banking systems dominated by domestic private banks. With the notable exception of Slovenia, where domestic private banks constitute the largest component of the banking market, all new EU countries and Croatia are dominated by foreign banks. In 2005 the ratio of foreign-owned assets in total banking assets reached over 80% in Bosnia, Lithuania, Croatia and the Slovak Republic and almost 100% in Estonia and Hungary. Foreign-owned banks provide 90% of the credit to non-bank residents in emerging Europe compared to 30% in developed Europe (CGFS 2010a). Taking another metric, CGFS (2010a) reports that emerging Europe obtains more than 80% of its bank borrowing from banks headquartered overseas. In contrast, the foreign share is less than 20% in emerging Asia. In relation to advanced economies, the foreign bank share is around 25% for the EU and the US (but less than 5% for Japan).

Figure 1.2 Foreign bank participation across regions of the developing world

Source: Cull and Martinez Peria (2011)

While part of a global trend towards internationalisation in banking, this rapid increase in foreign bank penetration in many of the transition economies is unique. What were the effects of this rapid ownership transformation? The evidence points to positive effects on financial deepening, efficiency and outreach, but also to the build up of a bubble, especially related to consumer credit. The evidence on the effect of foreign bank entry on the efficiency, breadth and stability of banking systems in transition economies has been overwhelmingly positive, contrary to ambiguous predictions by theory and experience from other regions.⁸ Foreign banks entered mostly with long-term strategic goals and had a stabilising impact on their host countries' financial systems and economies (see Haselmann, 2006). Their entry helped to increase the growth of both small and large enterprises, especially in industries that are more dependent on external finance (see Giannetti and Ongena, 2008). While foreign firms initially focused on large and foreign-owned enterprises, improvements in the contractual and information framework pushed them towards the SME segment of the lending market (see de Haas and Naaborg, 2005). Foreign banks did not necessarily cut lending relationships with existing customers when taking over domestic institutions and there seems to have been a positive spillover effect on overall access to external finance by all enterprises, even if foreign-owned banks did not lend to them themselves (see Giannetti and Ongena, 2008). Foreign-owned banks are both more efficient than domestic banks – both government and privately-owned – and offer better services (see Bonin, Hasan, and Wachtel, 2005a, b). Privatisation has brought the highest benefit where banks were privatised early

⁸ See Cull and Martinez Peria (2011) for a recent literature survey.

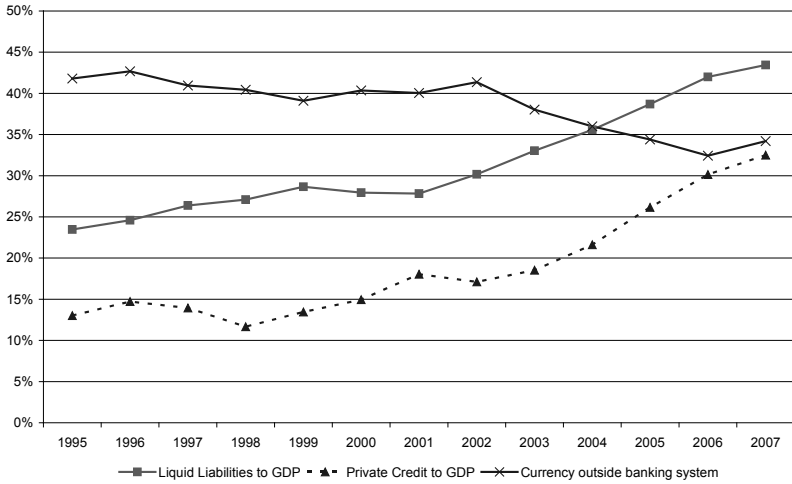
on and to foreign strategic owners. The role of strategic investors seems to be a critical one; by bringing in new technology and skills from their home countries, foreign banks had an overall positive impact on their host economies' financial systems.

But perhaps the most important impact of foreign bank entry was on cutting entrenched relationships between politically connected enterprises and the banking system. Giannetti and Ongena (2009) show that firms that have ownership links to domestic banks or the government actually suffer from foreign bank entry in terms of lower growth, while stronger and younger firms benefit from foreign bank entry. This is perhaps the clearest micro-level evidence on how foreign bank entry helped break the vicious cycle of financial and monetary fragility discussed above. Foreign bank entry was thus a critical element of the disciplining framework that countries in central Europe put in place in the mid- to late-1990s and set them on a path to financial deepening. Overall, the CEE countries benefited more from foreign bank entry in terms of higher growth than other parts of the emerging world (see Friedrich, Schnabel and Zettelmeyer, 2010).

Given the positive impact of foreign bank entry on efficiency and outreach, it is not surprising that many central European countries experienced rapid financial deepening after 2000, closely related to foreign bank participation (Figure 1.3). One interesting development, however, was the rapid increase in household credit after 2000 (Figure 1.4), though from a very low level, and the high loan-deposit ratios (often above one), pointing to part of the loan book being financed with non-deposit sources, often external funding in euros or other foreign currencies. Both demand- and supply-side factors can explain the high share of lending in foreign currency; on the demand side because of interest-rate differentials between local and foreign currency loans, on the supply side because of funding structure (see Bakker and Gulde, 2010). In 2008, the share of foreign currency debt in total debt ranged from less than 20% in the Czech Republic to over 47% in Lithuania. Obvious (at least *ex ante*) arbitrage possibilities were exploited by banks and households, taking out Swiss Franc or euro mortgages at lower interest rates than local currency mortgages, betting on the seemingly unavoidable long-term appreciation of local currencies, following the Balassa-Samuelson hypothesis. This trend towards both foreign-currency loans in many countries thus took the character of carry trades for consumers and producers of non-tradables. While the offer of mortgages in euros and Swiss Francs was for a long time seen as innovation, allowing households to directly benefit from these seemingly riskless arbitrage possibilities, this also exposed them to extremely high vulnerability. While large shares of this lending was done through foreign banks headquartered in western and northern Europe, and thus seemingly more stable than if it had been portfolio flows from financial institutions, it also exposed these economies to credit shocks transmitted from the home countries of these financial institutions. Notwithstanding the rapidly increasing house prices and rapid growth that most CEE countries – and especially the EU10

countries – experienced, there were increasing signs of household and enterprise over-indebtedness and a general overheating (see Sirtaine and Skannelos, 2007). We will return to several of these topics in Chapter 3 below, when we discuss the macroeconomic aspects of cross-border banking.

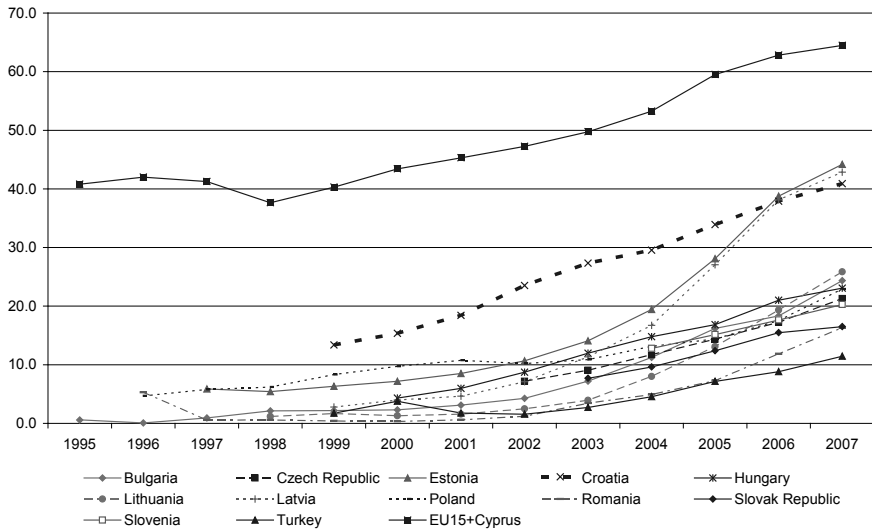
Figure 1.3 Financial deepening across the transition economies



Notes: Private Credit to GDP equals claims on nonfinancial private sector by deposit money banks and other financial institutions relative to GDP. Liquid Liabilities to GDP equals liquid liabilities of the financial system (currency plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries) divided by GDP. Currency outside banking system equals currency outside banking system relative to base money.

Source: Beck, Demirguc-Kunt and Levine (2010).

Figure 1.4 Household credit to GDP across transition economies

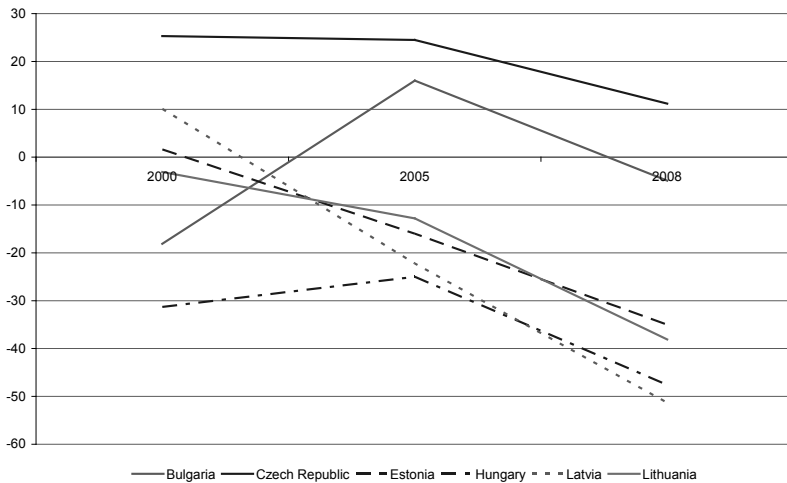


Source: Beck, Kibuuka and Tiongson (2010)

In spite of this trend towards foreign currency loans and deposits, some countries have also managed to reduce their exposure to foreign currency debt, such as Bulgaria, where the share of foreign currency debt almost halved between 2000 and 2008. Other attempts to slow credit growth, however, were less successful, such as increases in reserve requirements in Bulgaria, Latvia and Romania and increases in capital requirements (see Bakker and Gulde, 2010). While this rapid credit growth thus pointed to increasing vulnerability, there was also a countervailing effect: the high share of mortgage lending and thus for longer maturities effectively locked in the foreign banks who could not withdraw liquidity easily. This can also explain why liquidity was first withdrawn from countries where less of such an engagement had taken place during the boom period. Lending through local subsidiaries rather than directly provided a stabilising element as the CEE countries went into the crisis, as we will discuss below.

By 2007, many countries in central Europe showed the classical macroeconomic imbalances in 2007 that had been observed earlier in the lead-up to banking and currency crises (see Berglöf *et al*, 2009, Sirtaine and Skamnelos, 2007). This included a private sector deficit and lack of savings, which could be interpreted as an overshooting in dis-savings after the transition. Also countries showed different net asset positions (see Mihaljek, 2009), ranging from positive ratios in the Czech Republic to -51% in Latvia. However, almost all new EU countries saw a significant deterioration in their net foreign currency asset position between 2000 and 2008 (Figure 1.5).

Figure 1.5 Net foreign currency asset as share of GDP



Note: Net foreign currency assets as share of GDP

Source: Mihaljek (2009)

In summary, cross-border banking helped CEE countries, especially the new EU members, deepen their financial systems. Financial liberalisation, however, also resulted in a lending boom and helped build up imbalances. What for a long time seemed like a convergence process towards western European levels of financial development, turned out to be partly a bubble. While there were well justified concerns that the next financial crisis would start in this region, it was an exogenous shock from further west that caused disarray.

1.2 Cross-border banking flows during the crisis

A lot has been written about the crisis, so here we focus mainly on the role of cross-border banking in the propagation of the crisis from the US. As in the previous section, we will first make some general points, then discuss cross-border contagion in the EU15 zone before turning to the CEE, especially the new member countries, exploring how their experience has been different from emerging countries in the 1980s and 90s that suffered severe currency and banking crises.

In the spring of 2007, the crisis in the US subprime market erupted and quickly had repercussions throughout the world, especially in Europe. One of the first banks to be unable to refinance its asset-backed commercial papers in Europe was a small niche lender, IKB, in Germany, followed by several Landesbanken in Germany, a first sign of the cross-border exposures that had deepened over the previous years and a sign of worse to come.

The crisis spread through different channels, some of them closely linked to cross-border financial and banking linkages.⁹ What started small – the subprime segment even in the US at the height of the boom was after all a small segment – quickly grew into a global crisis. While before the crisis the fear had been that a bank failure would lead to contagion through the interbank market – and for this case the central banks had the necessary tools ready – it was mostly asset markets, drawn upon by all large global banks, that dried up. The downward price pressure and subsequent illiquidity in the asset market has several explanations, one linked to the search for liquidity and another to compensate for shrinking solvency. The need to hold a certain level of liquidity can result in a backward-bending supply curve, *ie*, banks offering more rather than fewer assets as prices sink. Mark-to-market pricing exacerbated this trend as it led to a downward spiral in sales, leading to price reductions and then to further sales, on an accelerated schedule. Further, mounting losses and thus solvency problems forced banks to deleverage, putting further pressure on asset prices. As prices dropped, banks were forced to sell an even larger share of their assets, leading to the same phenomenon of backward-bending supply curves.

⁹ For the following, see Brunnermeier (2009) for a good non-technical description.

Had these problems arisen in a completely financially autarkic world, the crisis would have spread through real sector channels, by affecting exchange rates and trade flows. In a financially integrated world, however, where large shares of assets are traded on international markets, the contagion effects were more immediate. These first-round contagion effects, however, came through direct cross-border lending and not through local lending of cross-border subsidiaries, which might be one reason why the new EU member countries and other emerging countries felt the impact of the crisis at a later stage, as we will discuss below. Even banks without cross-border lending or borrowing links were affected by the contagion effects, as the drying up of international markets affected purely local markets as well. The three channels of contagion were thus through direct cross-border lending, local lending by subsidiaries of large multinational banks and lower access of local banks to international financing sources (see Cetorelli and Goldberg, 2011).

The crisis in the subprime mortgage segment thus served more as a trigger than anything else. As mentioned above, the securitisation of subprime mortgage loans and their multiple repackaging into special or structured investment vehicles (SIV) had increased complexity and ultimately opacity. In addition, the reliance on safety-net subsidies and Ponzi expectations contributed to the crisis, though exacerbated by international linkages, as the bursting of the bubble would demand internationally coordinated bailouts.

There was a dramatic decline in gross capital flows relative to pre-crisis levels, with the greatest contraction observed for banking flows (see Milesi-Ferretti and Tille, 2011). Across advanced economies, the decline in gross bank flows was greatest for those countries with the largest initial gross banking positions and those countries with the most negative net position in external bank assets. Similarly, CGFS (2001a) reports that the international balance sheets of banks contracted by 12% between the peak of March 2008 and the end of 2009. Most of this decline related to a reduction in interbank claims and was concentrated in advanced-country assets, with claims on countries in the euro area falling especially quickly during 2009. In contrast, the local lending in the local currency of foreign jurisdictions was resilient, especially in emerging markets (CGFS 2010b).

It is important to appreciate that the international exposures of a banking system do not necessarily coincide with the aggregate net external position of a country. In particular, Acharya and Schnabl (2010) show that there is no correlation between a country's current account position and the losses suffered by large commercial banks in the asset-backed commercial paper market during 2007-2009. Accordingly, the geography of the financial crisis was driven more by the geography of bank flows than by the distribution of current account balances.

1.2.1 Western Europe – contagion and bungled regulatory response

While western Europe had been at the centre of the increase in cross-border lending during the boom years, it also experienced the largest reduction in cross-border flows (see Cetorelli and Goldberg, 2011). Unlike in other regions of the world, these flows have also not recovered as rapidly, which could be related to the still looming sovereign debt crisis in several euro area countries and – partly related to this – continuing uncertainty about European banks' solvency position.

The effect of the crisis on the financial sector and real economy, however, varied across countries in a manner consistent with the degree of financial integration (see Kalemli-Ozcan, Papaioannou and Perri, 2010). Using bilateral cross-border flow data for European countries and the US, Kalemli-Ozcan, Papaioannou and Perri show that higher financial linkages imply lower synchronisation of economic activity during the 30 years leading up to the current crisis. During the current crisis, however, this relationship is muted, with a countervailing effect of cross-border effects strengthening the synchronisation of economic activity. It is interesting to note, however, that the overall effect of financial integration is still a negative one, *ie*, the effect of risk diversification dominates even during the current crisis. Countries that were more exposed to the US, and several off-shore centres that served as conduits for investments in the US, were more likely to experience synchronised economic activity during the crisis, suggesting that it was indeed a credit shock stemming from the US rather than a simultaneous productivity shock to all countries. Using a global VAR model for the G7 countries, Helbling *et al* (2010) confirm the important role of credit shocks during the recent crisis, more so than in previous recessions, stemming especially from the US.

These aggregate findings are confirmed at the bank level. Looking at retail lending across different savings banks in Germany, Puri, Rocholl and Steffen (2010) find that savings banks were more likely to reduce lending if they owned Landesbanken that in turn had invested in the US market and therefore been hit with losses after the onset of the crisis – which is an effect, however, that is less strong for borrowers with longer lending relationships. This variation in the degree to which different banks were affected also played out on a cross-country basis across Europe and was partly related to the degree to which regulators had allowed banks capital arbitrage possibilities through holding derivatives. It also showed the non-sustainability of certain business models – such as that of the Icelandic banks – while at the same time clearly pointing to the herding effects that had incentivised many banks to take similar positions in financial markets.

There was a shift in the funding strategies of banks as a result of the crisis (see ECB, 2009b). The seizure of wholesale money markets and interbank markets induced banks to seek more stable sources of funding, with increased competition for deposits. In relation to bond finance, net issuance by banks has declined and maturities have shortened. Moreover, banks have turned to the euro system as

a source of liquidity, in view of the disappearance of private sources of liquidity. To access liquidity, banks have also increased strategic reserves of eligible assets.

Cassola and Huetl (2010) provide further evidence of the disintegration of the euro area money market, showing that a two-tier market structure developed after the onset of the turmoil in August 2007, with only large money-centre banks active in the cross-border money market and other banks just relying on domestic counterparties. After the collapse of Lehman Brothers in September 2009, the situation further deteriorated with even cross-border trade among the money-centre banks also drying up.

The increase in home bias in the money market is also evident in the data for euro area countries reported in ECB (2009). This survey shows that the share of home counterparties in the unsecured money market rose from 32.5% to 34.3% between 2008 and 2009. Similarly, the home share in the collateral-based money market rose from 31.8% to 34.8%. (The rest of the euro area is the dominant foreign counterparty, especially in the collateral-based segment.) However, the evidence in ECB (2010c) is that there was a partial recovery in cross-border money market trade during 2010, together with the gradual normalisation of the interbank market.

Similarly, ECB (2010b) highlights that there has been a substantial decline in cross-border M&A activity in the euro area banking sector. One factor is that the financial crisis has induced many banks to focus on core activities and markets, with less emphasis on cross-border expansion. In part, this has been driven by forced divestments of non-core foreign assets on the part of distressed banks, often as a condition for state aid. However, European Commission (2010) highlights that the main sellers have been banks free of any restructuring requirements.

Since the onset of the crisis, much of the M&A focus has shifted towards the consolidation of domestic banking systems, in part at the behest of national governments. However, European Commission (2010) also highlights that some strong, large banks have expanded overseas during the crisis, using capital raised by domestic disposals in order to acquire foreign targets at attractive prices. These include major French banks (BNP Paribas, Crédit Agricole, Natixis), Deutsche Bank of Germany and Intesa Sanpaolo of Italy.

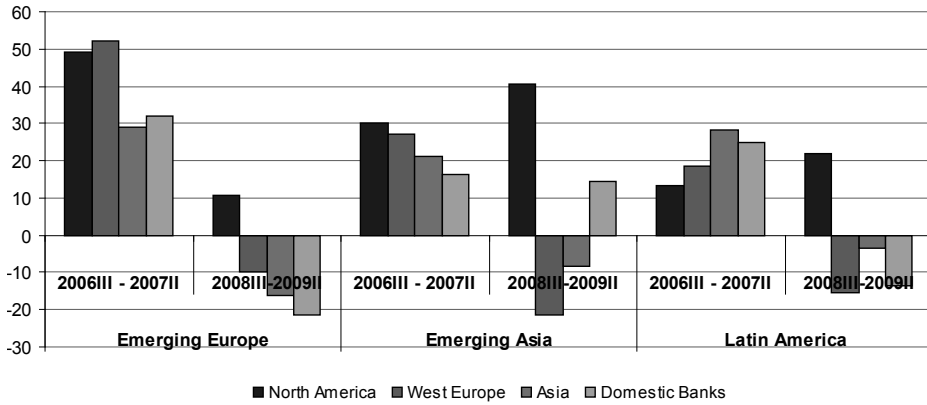
While we have so far discussed liquidity and solvency issues relating to bank-bank relationships, the current crisis has also seen several retail bank runs, such as Northern Rock in the UK and the run on Icelandic banks. The chase for yield did not only exist on the bank, but also on the depositor level and, combined with aggressive marketing by financial institutions, this led to significant cross-border holdings of deposits – significant not necessarily in volume, but rather in the share and segments of the population that were affected. In Germany, the Lehman Brothers papers were marketed as safe investment, which led to a number of disappointments after its failure. More importantly, the depositor

panics and retail bank runs after the failure of the Icelandic banking system not only illustrated the global and interconnected nature of the crisis, but also had critical repercussions for the supervisory and even political response to the crisis, as the use of anti-terrorism legislation in the UK to justify freezing of Icelandic assets showed. As we will argue further below, however, it was not necessarily the cross-border nature of banking itself that should be blamed, but rather the lack of regulation in catching up with the cross-border nature of banking.

1.2.2 Foreign banks in CEE – worsening the hangover or alleviating the pain?

As pointed out by many observers, although the crisis had all the ingredients to turn into a fully-fledged emerging market crisis for the CEE economies, with sudden stops in capital flows, exchange rate collapses and banking crises, this did not happen. Yes, there was macroeconomic turmoil with rapid reductions in private sector credit, exchange rate pressure and depreciations, but there was no repeat of the East Asian crisis, with massive currency depreciations and banking and corporate debt crises. The CEE countries even experienced a less severe reversal of capital flows than other regions of the emerging world (see Herrmann and Mihaljek, 2010). The question is: was this because of, or in spite of, the strong role of cross-border banks in the region? Bank linkages have emerged as the most robust predictor of contagion from advanced to emerging countries (IMF, 2009), which would point to an exacerbating role, while experience from the 1990s and 2000s, especially in the transition economies, points to a mitigating impact. As shown by Berglöf *et al* (2009) and Mihaljek (2009), during the first year of the crisis, consistent with the experience of other emerging and developing economies, the CEE countries seemed to diverge from the advanced economies, while starting in the autumn of 2008 (after the failure of Lehman Brothers), the countries were hit hard. Starting with the third quarter of 2008, international banks heavily reduced their credit lines to their subsidiaries and other banks in CEE countries, especially to those with high liquidity. Parent banks drew on available liquidity from their subsidiaries, even and especially in countries with strong fundamentals, such as the Czech Republic. While cross-border lending to the non-bank sector also decreased, it did so to a lower extent than cross-border lending to banks. The western European banks, however, withdrew less liquidity from the CEE countries than from other regions of the emerging world (Figure 1.6). Further, McCauley, McGuire and von Peter (2010) find that local lending by subsidiaries of large international banks was more stable than cross-border lending.

Figure 1.6 Cross-border flows, % change by source and destination region



Notes: This graph indicated the growth of foreign claims (cross-border and foreign exchange claims by local subsidiaries) over the periods 2006, 3rd quarter to 2007, 2nd quarter, and 2008, 3rd quarter to 2009, 2nd quarter, from three advanced to three emerging regions, plus growth in loans by domestic banks in the respective emerging region

Source: Cetorelli and Goldberg (2009), Table 3.

While there was thus a heavy reduction in cross-border lending, the effect was far away from that of a sudden stop, as was observed in the typical emerging market crisis (see Mihaljek, 2009), which can be attributed to foreign bank presence through subsidiary structure. Specifically, many foreign banks were ‘locked in’ because their local subsidiaries had given long-term loans in the host countries, which could not be recalled. This also explains why Berglöf *et al* (2009) find that higher foreign bank ownership was associated with lower reversal in cross-border lending in the 4th quarter of 2008. This relationship also holds once they control for fundamentals that can explain both foreign bank presence and foreign bank share. On the other hand, de Haas and van Horen (2011) find that foreign bank subsidiaries reduced their lending earlier and faster than domestic banks, whereas state banks were a relatively stable credit source. Berglöf *et al* (2009) also find that the output drop during the crisis was smaller in countries with a higher share of foreign banks. This suggests that the impact of the crisis would have been even larger without foreign bank presence in the region and that the same foreign banks that helped create the macroeconomic imbalances and over-indebtedness also helped reduce the impact of the resulting fragility.

Other reasons for avoiding a fully-fledged banking and currency crisis might be political. Berglöf *et al* (2009) argue that EU membership has helped significantly, both in terms of political support as well as confidence. In some cases, such as Hungary, Latvia and Romania, there was direct fiscal support from the EU. This support might also explain why cross-country comparisons find that foreign bank presence helped reduce capital outflows in emerging Europe, but not in other parts of the emerging world. Political commitment to the EU might also have prevented these countries from taking extreme measures, as for example, in the case of Argentina 2001. This is confirmed by Herrmann and Mihaljek (2010)

who show in a larger cross-country sample that the somewhat sounder banking systems and stronger financial integration with advanced economies has helped mitigate the impact of the recent crisis on cross-border flows. In addition, fixed exchange rate regimes (in spite of their shortcomings, such as the need for larger adjustments) have contributed to the lower reduction in cross-border flows in CEE countries relative to other regions of the world, although the output adjustment was often larger, consistent with models of sticky prices.

These findings of a mitigating impact of foreign bank penetration on the cross-border flow level, however, are somewhat contradicted by firm-level evidence. Popov and Udell (2010) looked at micro-data to assess the interaction of cross-border bank presence and firms' access to external funding. Comparing 2005 and 2008 firm-level survey data, they show that firms were relatively more financially constrained in 2008 in locations with a higher presence of financially distressed banks, an effect that is stronger where financially distressed foreign banks are more dominant than financially distressed domestic banks. Given that the second survey was done in early 2008, this seems to suggest that real sector impact reached CEE countries relatively early. It is important to stress that these findings do not necessarily contradict the results on cross-border flows, as it could be that subsidiaries of foreign banks started to tighten credit conditions at a much earlier stage and in response to earlier over-leveraging rather than in immediate response to the crisis. Similarly, Takats (2010) also finds that the decline in the financial health of parent banks induced a contraction in cross-border bank lending to emerging market economies during the global crisis.

1.3 The challenges of supervisors in the light of cross-border failures

Policymakers reacted quickly to the contagion risk and the drying up of international financial markets after the Lehman Brother shocks. Central banks provided enormous amounts of liquidity, foreign exchange swap facilities and even functioned as 'purchaser of last resort' in many asset markets. Soon, it became clear, however, that many financial institutions did not only face liquidity but also solvency problems. Quickly a gap became apparent. While central banks coordinated well during the crisis to address the liquidity crisis in the international financial markets, regulators did not coordinate well when it came to dealing with failing financial institutions. Why this gap? Was it purely a lack of preparation or experience to deal with such situations? In the following, we will argue that it was rather biased incentives of regulators and limited resolution options that led to the inefficient resolution of large European banks. The increasing cross-border nature of banking was not accompanied by a regulatory framework on the supranational level and this gap became clear during the crisis. While monetary policy and therefore unofficially the lender of

last resort facilities were unified within the euro area at the level of the ECB, no similar institutional arrangement existed on the regulatory level.

A first, and primarily domestic problem, however, was the absence of a proper resolution framework for banks, as exists in the US, Canada and several emerging markets, in most, if not all, European countries. Specifically, regulators had the option of either closing banks and liquidating them through the regular corporate insolvency process or bailing them out through recapitalisation or guarantees.¹⁰ The first option of closing and liquidating a bank through the regular insolvency process carries the risk of bank runs, contagion and – in the case of commercial banks – destroying lending relationships and thus proprietary information. The repercussions of closing Lehman Brothers and sending it into liquidation have not only made clear these risks, but have also ensured a subsequent policy bias against using this option across the globe. The second option of bailout does not only carry moral hazard risk, but also draws on fiscal resources – at least in the case of large banks – and thus requires approval of finance ministers or even legislatures. Options to avoid the moral hazard by intervening at an earlier stage (before the bank hits the zero equity mark) through a prompt corrective action regime and by allowing for merger and acquisition, or purchase and assumption of part of the failing bank in order to avoid the losses stemming from a liquidation, were not available. It is important to note, however, that whilst these options existed in the US for commercial banks, they did not exist for non-commercial bank financial institutions, including Lehman Brothers and AIG.

The negative effects of the lack of a proper failure resolution framework were exacerbated by the lack of a proper coordination framework at the European level, which Mervyn King confirmed with the statement that “banks are global in life, but national in death.” While regulatory cooperation had been prepared with memorandums of understanding and EU regulations, these turned out to be just paper. Colleges of supervisors exchanged information, but the ultimate decision to intervene and resolve a bank stayed with the lead supervisor, who in many cases during the current crisis had to involve the minister of finance, as resolution required fiscal resources. Further, resolution frameworks have not been consistent across borders and compatible with each other, so that the legal foundations for a cross-border resolution were not in place. This became clear on the weekend in mid-September 2008, when attempts to sell Lehman Brothers to Barclays could not be agreed upon, given the different legal frameworks for such a transaction in the US and the UK.

The main deficiency of the current cooperation arrangement is that incentives of regulators are not taken into account. Specifically, national regulators care first and foremost about domestic depositors, domestic borrowers, domestic owners and, ultimately, domestic taxpayers. Ultimately, they are accountable to national governments and voters. This also has implications for supervisory focus. Western

¹⁰ For a conceptual discussion on the trade-off in bank resolution options, see Beck (2010); for cross-border aspects see the recent Geneva report (Claessens, Herring and Schoenmaker 2010).

European supervisors focused mainly on the health of the parent banks and less on the health and imbalances of their subsidiaries in central and eastern Europe. To understand the bias that cross-border activities create in national regulators' decision-making process, let us briefly discuss a stylised model (see Beck, Todorov and Wagner, 2010, for a more detailed discussion).

To understand the incentive problems of national supervisors, we analyse the case of a bank that uses deposits and equity to invest in a two-period project in period 0, with an uncertain outcome. In period 2, the project yields a positive net return with a certain probability, or fails completely. The probability of success and failures will become known only in the intermediate period when the regulator can decide to intervene and recover the face value of the investment and thus compensate both depositors and equity (minus resolution costs). A regulator maximising the return to domestic stakeholders, including depositors and equity holders, will maximise the expected return to the bank's project, taking into account success probability and the return in case of success. The decision process changes, however, when the bank finances itself with foreign deposits and equity and invests at least part of its resources abroad. As shown by Beck, Todorov, and Wagner (2010d), the domestic regulator will be more reluctant to intervene the higher the share of foreign deposits and assets and more likely to intervene the higher the share of foreign equity. A higher asset and deposit share outside the area of supervisory responsibility externalises part of the failure costs, while a higher share of foreign equity reduces the incentives to allow the bank to continue, as the benefits are reaped outside the area of supervisory responsibility.

Can memorandums of understanding and colleges of supervisors overcome this incentive problem? As the recent crisis has shown this is unlikely. Memorandums of understanding are legally not binding documents. Even if colleges of supervisors are supposed to exchange information, only the exchange of hard information can be legally enforced. Finally, in spite of all the cooperation, it is the home supervisor that decides whether to intervene or not.

Bank interventions in the recent crisis have clearly shown the incentive conflicts of supervisors and the limited usefulness of current cooperation arrangements. Take the example of Icelandic banks, which are domestically owned but with large shares of foreign deposits and assets. It was not until very late that the Icelandic supervisors acknowledged the dire situation of several of their banks. The situation was exacerbated by the fact that the Icelandic banks were collecting many of their foreign deposits through branches rather than subsidiaries, over which host country supervisors do not have any control. Even in the case of subsidiaries, however, which are under the responsibility of host country supervisors, banks can shift resources relatively fast between parent bank and subsidiary. In addition to distorted incentives, lack of supervisory experience and limited fiscal resources also contributed to the delay in intervention. Ultimately, the Icelandic banks turned out to be too-big-to-save.

Take the example of Fortis bank, where intervention was also relatively late. The conflict between Belgian and Dutch supervisors following the takeover of ABN AMRO by Fortis, about who would be lead supervisor of Fortis, made cooperation during the subsequent crisis in 2008 difficult. Initial coordinated recapitalisation failed to calm the markets, which resulted in each national government taking their own actions, ultimately not only nationalising the resolution of the individual bank pieces in Belgium, Luxembourg and Netherlands, but nationalising the banks themselves. Even today, there are still disputes between the Belgian and Dutch governments about burden-sharing according to the initial joint intervention. While cooperation between supervisors at the initial stages seemed to work according to the book, it was ultimately at the resolution stage that cooperation broke down. Ultimately, these examples also underline the 'financial trilemma', ie, the impossibility of achieving financial integration, financial stability and national sovereignty (see Claessens, Herring and Schoenmaker, 2010; Schoenmaker, 2011).

While crisis resolution decisions were therefore taken at the national level, these decisions had the risk of being anti-competitive and of ultimately undermining the single European financial market.¹¹ First, blanket liability guarantees, going beyond existing deposit insurance schemes, as, for example, unilaterally imposed by Germany, can have important moral hazard risks and implications for competition across countries of the European Union. Second, recapitalisation of banks can have negative repercussions for competition, both by distorting aggregate banking activity in inefficient ways and by distorting the allocation of activity across banks, to the extent that some banks receive more aid than others. An additional concern was that national governments would insist on using such bailout resources only for domestic constituencies, ultimately forcing these banks to cut liquidity and capital support for foreign subsidiaries.¹²

Given that state aid programmes have to be approved by the Directorate General for Competition at the European Commission, this institution played an important role in the recapitalisation and restructuring process within the EU. While it initially waived the pre-approval requirement for state aid programmes for financial institutions during the crisis, given the urgency of the situation, it later imposed conditions on the institutions that had received or were receiving state aid, in order to mitigate the potential anti-competitive bias. Such conditions included prohibition of price leadership and the forced divestment of subsidiaries and units.

There was a concern among the CEE countries that the deleveraging process of the western European banks would have negative repercussions for their banking systems, as they are almost exclusively host but not home countries of these large cross-border banks. In the context of the EU approval process of national

11 For the following, see a detailed discussion in Beck Coyle, Dewatripont, Freixas and Seabright (2010).

12 De Haas and van Horen (2011) find evidence for this fear in a sample of syndicated lending by the largest international banks.

restructuring and recapitalisation plans in 2009, there were discussions that some of the large European institutions had to shed subsidiaries in central and eastern Europe as a condition for receiving state aid.

The Vienna Initiative, also known as the European Bank Coordination Initiative, for multinational banks in central and eastern Europe, has played an important role in this context and might have prevented the worst from happening in this region. In the autumn of 2008, there was increasing concern, both amongst policy makers and banks themselves, that there would be a stampede towards the exit in the CEE region, which might have led to a meltdown of the financial systems of these countries and balance of payment crises. Starting in late 2008, the IMF, EBRD, EC and others, initiated a series of meetings in Vienna to prevent exactly this from happening. A large number of banks made specific rollover and recapitalisation commitments.¹³ De Haas and van Horen (2011) show that foreign banks that took part in the Vienna Initiative were somewhat more stable lenders than banks that did not participate in the initiative. This also shows the benefit of private-public partnerships and the role of international financial institutions as coordination mechanisms.

The recognition that the resolution of large European banks had failed led to two reform trends: at the national level, efforts are underway in several countries to reform the bank resolution framework. Further, there are global discussions on the resolution of large banks, including living wills and contingent capital. We will return to these discussions in the concluding policy chapter.

1.4 Conclusions

This chapter offered a critical review of the role of cross-border banking in the recent boom period ending in the global crisis starting in 2007. The interaction of technology, financial innovation, global macroeconomic imbalances resulting in a liquidity glut, and globalisation can explain the boom of the early 21st century. Multinational banks have been the face, but not necessarily the cause of the crisis and nor have they exacerbated it. In western Europe, it was rather regulatory failure to deal with large cross-border banks in an incentive-compatible and loss-minimising way that deepened the crisis, while there is increasing evidence that in the CEE countries foreign banks helped mitigate the impact of the crisis rather than exacerbated it. To a large extent, the experience from previous boom and bust periods has been repeated – financial liberalisation without the necessary regulatory framework.

¹³ See Cetorelli and Goldberg (2011) for details.

Box 1.1 Measuring International Bank Positions

There are different approaches to measuring the international position of a country's banking system. One approach is to adhere to the principles of balance-of-payments accounting and calculate the share of a country's external assets and liabilities that are attributable to the banking sector. (The other sectors are households, corporates and the government.) This approach has the advantage of ensuring comparability with the aggregate international investment position. However, not all countries provide a comprehensive sectoral allocation of external assets and liabilities, such that these data are limited.

A second approach is to make use of the international banking statistics of the BIS. The BIS collects data from a set of reporting countries. Each reporting country provides data on the external assets and liabilities of its banking system. An advantage of the BIS data is that it provides details of the sectoral (banks versus non-banks) and geographic identities of counterparties. In addition, the consolidated dataset nets out intra-bank transactions, which better captures the exposures of national banking systems.

One limitation of the BIS banking data is that it does not provide details on the domestic assets and liabilities of banks. A second limitation is that not all relevant countries are BIS reporters. However, we still know some information about non-reporters since these countries are 'counterparties' to the BIS reporters and so their positions can be partially backed out of the data.

A third approach is to exploit data on the aggregate balance sheets of national banking systems, which are available from Eurostat and the ECB. This provides additional insights, since it enables us to scale cross-border positions relative to the total assets and liabilities of banks.

Since these datasets are not perfectly coordinated, there is not a 'unified' international banking dataset that is perfectly internally consistent. Accordingly, the 'composite' approach we follow offers a wide-ranging perspective, even if it must draw on a range of sources.

2. Cross-Border Banking and Financial Stability

Having documented the trends in cross-border banking and discussed its role during the recent crisis, in this chapter we offer a general discussion on its stability implications. We first argue that cross-border banking brings about various benefits and costs for financial stability. Based on this, we draw conclusions for the desirability of cross-border banking in the EU, and derive implications for its optimal form. We also discuss reasons that may lead the banking system to choose a different level of cross-border integration than is desirable from the perspective of society. Finally, we derive metrics that allow quantifying whether cross-border banking in a country (or region) takes a desirable form and apply these metrics to the EU countries. Our results suggest that the countries with the largest banking centres, *ie*, the UK and Germany, are well diversified. By contrast, the new member states (NMS) are highly dependent on a few western European banks and thus vulnerable to contagion effects. The Nordic and Baltic regions are also much interwoven without a lot of diversification. At the system-wide level, the EU banking system is weakly diversified, with an overexposure to the US and an underexposure to Japan and China.

2.1 Benefits of cross-border banking

A key benefit of cross-border banking arises from its effects on risk diversification. It is widely known from portfolio theory (see Markowitz, 1952) that an investor can reduce the risk in his portfolio by holding a combination of assets instead of investing in a single one alone. Cross-border banking allows for similar diversification gains. When a domestic bank invests abroad (for example, by extending credit to borrowers in other countries or by acquiring foreign banks), it becomes less exposed to domestic shocks.¹⁴ This reduces the variance of its asset portfolio. Lower asset volatility, in turn, should reduce the likelihood of bank failures in the domestic economy.

Setting aside bank failures, diversification effects from cross-border banking can also reduce the volatility of domestic lending. This is because a lower risk

¹⁴ At the same time, it of course also becomes more exposed to foreign shocks, an issue to which we will return later.

exposure of domestic banks reduces the likelihood that these banks come into situations in which they have to cut back lending. In addition, in the same way as banks can reap cross-border diversification benefits on the asset side, they can reap benefits on the liability side. For example, a bank that has established significant depositor bases in other countries will be less affected by a domestic depositor panic.

While the benefits discussed so far arise from the cross-border activities of domestic banks, activities of foreign banks in the domestic economy bring about diversification effects as well. First of all, the presence of foreign banks allows domestic firms to have multiple lending relationships with domestic and foreign banks. When domestic banks are lending-constrained, firms can substitute domestic lending with finance from foreign banks. And in case they do not already have a relationship with a foreign bank, they may switch to a foreign bank that is present in the domestic market following a shock to the credit capacity of domestic banks.¹⁵ In addition, even if individual firms cannot obtain more financing from foreign banks following a domestic shock, there are still benefits. This is because lending to domestic firms overall will be less volatile as only the domestically financed firms are affected.

On top of diversification gains that arise because cross-border banking reduces the risk of bank failures and stabilises lending, cross-border banking can contribute to a better sharing of an economy's risks with other countries. The repercussion of cross-border banking for the synchronisation of real economy variables, such as GDP, investment and consumption, over time can be shown theoretically using the international version of the real business cycle model, which typically works with two countries (see Baxter and Crucini, 1995; Neumeyer and Perri, 2005). A positive productivity shock in one but not the other country will lead to an increase in lending in the affected country independent of domestic resources available through increased cross-border lending to this country.¹⁶

In principle, such risk sharing could also be achieved by investors, at least with respect to tradable securities. However, it is a surprising feature of international finance that even though nowadays there are apparently few important

15 Goldberg, Dages and Kinney (2000) show that credit granted by foreign banks in Argentina and Mexico during the 1990s was more stable than credit granted by locally-owned banks. De Haas and van Lelyveld (2005) find that during crises domestic banks contract their credit base, while foreign greenfield banks do not. Navaretti et al (2010) find that retail and corporate lending of banks' foreign affiliates has been stable and even increasing in Europe between 2007 and 2009. At the global level, De Haas and van Lelyveld (2010) show that foreign multinational banks, in contrast to domestic banks, may not have to reduce lending because they have access to the internal capital market.

16 This implies that there should be a lower correlation between deposits and loans (ie, resources and their use) in countries with a higher share of cross-border banks, which is confirmed by empirical work (Navaretti et al, 2010). This is also consistent with empirical work that shows that cross-border banks in central and eastern Europe have reacted more to host than home country shocks. Aydin (2008), for example, shows that credit growth by foreign banks in CEE is procyclical with host, but not home country conditions, while de Haas and Lelyveld (2010) show that subsidiaries of large multinational banks can grow their loan book independent of host country shocks, unlike local banks. There is countervailing evidence however; de Haas and Lelyveld (2005) show that foreign banks adjust lending in the host countries according to the conditions in the home rather than host countries.

impediments to international risk sharing, there is a significant lack of such risk sharing. For example, it is well known that investors' portfolios exhibit a large bias towards holding domestic securities (see French and Poterba, 1991).¹⁷ The gains that are foregone by this lack of risk sharing are typically estimated to be large. These gains arise, first, because lower consumption variability benefits households due to risk aversion (see van Wincoop, 1999, for example, who estimates these gains to be in the range of 1.1% – 3.5% of permanent consumption). Second, they also arise because lower risk exposure allows for specialisation in higher-return activities (eg, see Obstfeld, 1994).

Another potentially important stability benefit of cross-border banking is due to the interaction of competition and stability. Foreign entry in the domestic market will tend to increase competition in the domestic banking market. This effect will be particularly pronounced if the domestic market was previously highly concentrated or if domestic banks were operating inefficiently (as is often the case in developing countries). One strand of the extant literature on the nexus between competition and stability¹⁸ maintains that competition is beneficial for stability by mitigating agency problems at the level of the borrower (eg, see Boyd and De Nicoló, 2005). Higher competition among banks lowers lending rates and thus raises the profits for borrowers. This, in turn, reduces risk-shifting incentives for borrowers and lowers borrower risk.¹⁹ This effect, however, might depend on foreign banks entering as greenfield rather than through the acquisition of domestic banks. Borrower risk may also decline because a higher profitability directly lowers the likelihood of defaults.

While foreign bank entry can affect competition through an increase in the number of players in the market, additional effects may arise because foreign banks may also be more efficient (for example, foreign banks that enter developing markets may have more advanced risk management systems). Competition may then force domestic banks to become more efficient as well, hence further enhancing stability. Competition effects aside, the presence of foreign banks may also be beneficial once a crisis happens because it allows domestic depositors to do their 'flight to quality' at home (see Clarke *et al*, 2000). In addition, foreign banks can assist in the recovery from a crisis by purchasing assets (see Tschoegl, 2004, Cull and Martinez Peria, 2011).

17 Excellent surveys of the substantial literature on the international risk sharing puzzle (and the related home bias in portfolio investment) are contained in Stulz (1994) and Lewis (1999).

18 For an overview over this literature see the survey by Carletti and Hartmann (2002).

19 Boyd, De Nicoló and Jalal (2007) provide evidence consistent with this channel.

2.2 Costs of cross-border banking

Cross-border banking undoubtedly brings about many important benefits for financial stability. However, there are also various potential dangers for financial stability arising from cross-border banking.

First of all, foreign capital is likely to be more mobile than domestic capital. Following a negative event that reduces the attractiveness of investment in the domestic economy, foreign banks may decide to 'cut and run'. The ability of domestic banks to redeploy their capital quickly outside the country, by contrast, is limited. The extent to which foreign capital is more sensitive than domestic capital crucially depends on which form cross-border banking takes. In particular, foreign banks are less likely to cut and run if they have established their presence in the form of a subsidiary (due to the presence of significant fixed costs). This is confirmed by studies showing that lending by subsidiaries is more stable than direct cross-border lending (eg, see Peek and Rosengren, 2000, de Haas and van Lelyveld, 2004, McCauley, McGuire and von Peter, 2010, Schnabl, 2010).

Another important cost comes in the form of contagion: in the same way as cross-border banking insulates the domestic economy from domestic shocks, it also exposes it to foreign shocks. A credit shock to one economy, for example, can be propagated more easily to the other economy if both countries are financially integrated, as can be shown again by the international version of the RBC literature (see Kalemli-Ozcan, Papaioannou and Perri, 2011). Unlike a productivity shock, a credit shock is propagated to other countries, independent of domestic fundamentals, via financial linkages. Specifically, a shock to the capital base of parent banks will result in lower cross-border flows to their subsidiaries and lower direct lending to other banks. In the context of the current crisis, the subprime crisis in the US first undermined the equity position of banks in the US, and then, through contagion effects, as simulated by Degryse, Elahi and Penas (2010), affected negatively equity positions of banks around the globe. As discussed above, the presence of foreign banks in emerging markets contributed to the transmission of the crisis of 2007-2009 to these markets, both through a reduction in direct lending and through internal capital markets (see Cetorelli and Goldberg, 2011).

Contagion can arise through various channels.²⁰ In its simplest forms it arises from direct exposures.²¹ Domestic banks may encounter losses on their foreign operations, which may then have negative implications for their (domestic) lending. An example of this is the German Landesbanken: during the crisis of

20 There is some debate in the academic literature on how contagion should be defined. For the purpose of this report we adopt a broad view on contagion. For a survey of various channels of contagion, see Allen, Babus, and Carletti (2009).

21 Various studies have modeled contagion from direct exposures (usually interbank); see, for example, Allen and Gale (2000b) and Freixas, Parigi and Rochet (2000).

2007-2009 savings banks linked to Landesbanken with higher subprime exposures cut back lending more than their peers (see Puri, Rocholl and Steffen, 2010).

Another form of contagion, and one which significantly contributed to the global spread of the subprime crisis, arises through asset prices. Following a negative shock in their country, banks may have to sell assets. This depresses prices and negatively affects banks from other countries that have invested in these assets. In fact, asset price contagion has become a powerful mechanism through which initially local shocks can be transmitted in an internationally integrated financial system to a worldwide level.

Contagion may also be of an informational nature. The failure of institutions in a country typically carries news about the performance of the country's assets. This, in turn, will cause debtors at other banks that have invested in this country to update their beliefs about the health of their banks and may result in runs at these banks as well (eg, see Chari and Jagannathan, 1988, Flannery, 1996, Aghion, Bolton, Dewatripont, 2000, and Dasgupta, 2004).

Contagion-like effects can also arise due to coordination problems. As the crisis of 2007-2009 has highlighted, the financial system is plagued by various coordination problems. The textbook case of coordination failures is the one faced by depositors and can lead to a run on an otherwise solvent bank (eg, see Diamond and Dybvig, 1983).²² Similar coordination failures arise in wholesale financing (see Huang and Ratnovski, 2009), interbank markets (eg, see Freixas, Parigi and Rochet, 2000, or Rochet and Vives, 2004) and cross-border banking (eg, see Schoemaker and Oosterloo, 2005). Global 'contagion' through coordination problems played a significant role in the crisis. For example, the breakdown of cross-border interbank markets is often attributed to coordination problems. Globally active banks were hurt by this breakdown even when the source of the breakdown was unrelated to the fundamentals of these banks. Similar contagion occurred due to the breakdown of global securitisation markets.

It is important to note that the existence of contagion or spillovers from cross-border banking itself does not undermine the rationale for financial integration. It is true that it exposes the domestic financial system to shocks from abroad. However, at the same time it also insulates it from domestic shocks. Standard portfolio diversification considerations suggest that the net effect is positive and hence, overall, fluctuations are reduced. To see this more clearly consider the case of a domestic bank investing a share of its assets abroad. This case can be likened to the one of an investor who diversifies his portfolio. Surely, an internationally diversified asset portfolio will be exposed to foreign risks, but its overall volatility will be lower than the one of a purely domestic portfolio.

²² Because a bank may not be able to liquidate its portfolio at the full value, a run itself can make the bank insolvent, which in turn may make it individually rational for depositors to run on the bank.

Contagion effects themselves therefore should not invalidate the rationale for cross-border banking. This is an insight that is often ignored in the policy debate. It is quite common to interpret the existence of negative spillovers (such as observed in the crisis) as to imply that cross-border banking is undesirable. This clearly ignores the positive stabilising effects of cross-border banking that are less visible than (negative) contagion: when foreign banks hold a part of the domestic loan portfolio, domestic banks will be less affected following domestic shocks, hence stabilising the domestic economy. To put this into perspective with the recent crisis, the effect of US subprime defaults on the US economy were surely large. However, they would have probably been much larger had not a significant part of the subprime exposures been held outside the US. Diversification ensured that the effects were more evenly felt in various countries around the world, rather than concentrated in the US.²³

The negative effects from contagion only have the potential to outweigh the positive stabilising effects in the presence of some mechanisms that propagate either the magnitude or the costs of spillovers (as otherwise the considerations of standard portfolio theory apply). Such propagation mechanisms can be due to coordination problems (such as suggested by the global games literature, eg, see Goldstein and Pauzner, 2004, Dasgupta, 2004, and Goodhart and Schoenmaker, 2009), because of deficiencies in cross-border resolution (eg, see Claessens, Herring and Schoenmaker, 2010), spillbacks from risk transfer (see Allen and Carletti, 2006) and higher costs of systemic crisis (see Wagner, 2010a). However, the results of the literature are still inconclusive and derived in rather specific contexts. It is therefore less clear how important these mechanisms are and whether they can overturn the general desirability of cross-border banking and integration due to diversification gains. More research in this area is needed.

While we have previously pointed out that cross-border banking can have positive effects for stability by fostering competition in the lending market, the channel going through competition can also go the other way around. A key argument in this respect is the franchise value hypothesis (see, among others, Keeley, 1990; Allen and Gale, 2000a; Hellman, Murdock and Stiglitz, 2000; and Repullo, 2004). Its basic idea is that when banks compete more intensely for deposits, deposit rates rise and lending rates fall. This leads to an erosion of their franchise value. Banks have then less to lose from a default and their incentives to take on risk increase. Thus, essentially the same mechanism that operates at the firm-level and is stability enhancing, also operates at the bank-level and is detrimental to stability.

Chapter 1 outlined how cross-border banking affected the resolution of financial crises. While crisis resolution is important for *ex post* efficiency, it also has stability

²³ The diversification effects arising due to cross-border banking, however, can be detrimental if banks lose focus. Acharya, Hasan and Schnabl (2006) provide evidence that banks who diversify their loan portfolio (not specifically on the international level) lose focus in the operations. This reduces the return on their portfolio but can also increase their risk.

implications *ex ante*. For example, an uncertain and opaque resolution mechanism for international banks may increase uncertainty *ex ante*, which can exacerbate coordination problems and increase banking fragility (eg, see Claessens, Herring and Schoenmaker, 2010). In addition, there are also arguments that a cross-border bank may be treated more leniently by regulation and supervision, as discussed above (see Beck, Todorov and Wagner, 2010). This can undermine bank stability by intensifying risk-taking problems at banks. Cross-border banks are also harder to supervise, as for efficient supervision supervisors need to have access to information on banks' foreign operations.

The formation of cross-border banks will also tend to increase the complexity, the interconnectedness and the size of institutions. This means that cross-border banks are more likely to be systemically relevant banks. Their failure may thus impose significantly higher costs on economies than the failure of a purely domestic bank. Cross-border banks may also increase systemic risk by increasing similarities among institutions. This is because international diversification exposes banks in different countries to the same shocks. Even though in an internationalised banking system there may be fewer individual bank failures (since banks will be better diversified), this may result in more joint failures of banks (see Wagner, 2010a).

2.3 Implications for stability-enhancing cross-border banking

In this section we discuss whether any general lessons can be drawn about whether or not cross-border banking is stability enhancing. In addition, we also explore implications for the extent of cross-border banking, as well as its optimal form. In doing so, we focus on the stability perspective arising from cross-border banking. It should be noted that there is potentially a trade-off between stability and efficiency. For example, while diversification due to cross-border activities may be stability enhancing, it may also mean a loss of specialisation for banks. This may reduce focus (and lead to less efficient monitoring and screening) but also increase the costs of banks' activities; for example, if there are additional costs of operating in various regions.

We have argued that cross-border banking brings about important stability benefits, perhaps most prominently in the form of diversification for banks and risk sharing in the economy, but also has potential costs. We hypothesise that the benefits from cross-border banking outweigh the costs, as long as cross-border banking does not become excessive. This is for various reasons.

First, diversification benefits are undoubtedly large. The presence of contagion effects by themselves, which are usually seen as perhaps the most important disadvantage of cross-border banking, seems unlikely to outweigh these gains: standard portfolio theory suggests that even though diversification into new

assets gives rise to new exposures, overall risk is reduced. The policy debate has probably unduly focused on the negative spillovers from cross-border banking rather than on its stabilising effects, which are naturally less visible. There is also evidence that points us in the direction of beneficial effects of cross-border banking that are dominating. Demirgüç-Kunt, Levine and Min (1998) present data that suggests that an increased participation of foreign banks tends to lower the probability of a banking crisis. Levine (1999) finds that there is a negative correlation between the foreign share of bank assets and the probability of crisis. Morgan and Strahan (2003) show that deregulation has lowered the volatility of lending in the US (however, the international evidence in their paper is mixed). Claessens (2006) finds that, by enhancing risk-sharing, foreign bank activities in a particular country reduce the likelihood of a financial crisis and lead to less procyclical lending in this country.

Second, the (marginal) benefits of cross-border banking are likely to be large for low levels of cross-border banking, while the costs are probably small. Figure 2.1 shows the effect of diversification on portfolio variance.

We can see that for low levels of diversification, the marginal gains (in terms of reducing portfolio variance) are the largest. As the extent of diversification increases, the additional gains become smaller and smaller. Close to full diversification, the variance reduction achieved by diversification becomes vanishingly small. At the same time, low levels of cross-border banking are likely to cause small costs, such as from contagion or systemic crisis. For example, a small exposure to foreign shocks is unlikely to cause failures in the domestic economy. Rather it is likely that the costs from the latter are increasing (or at least non-decreasing) in the amount of integration. There may also be some threshold level at which marginal costs are increasing. This may be because a certain minimum exposure to foreign shocks may be needed to cause damage to the domestic banking system.

Figure 2.1 Declining benefits from diversification

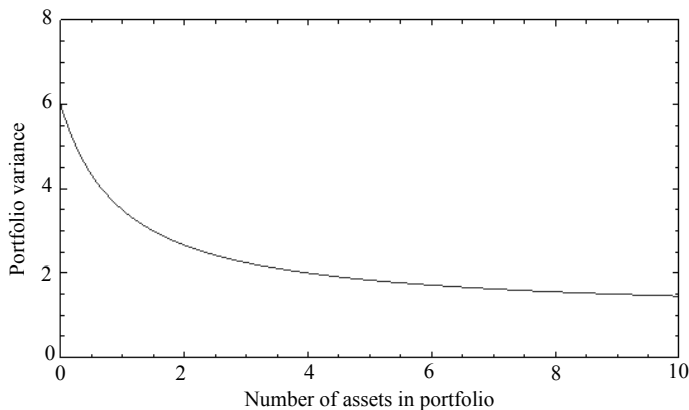
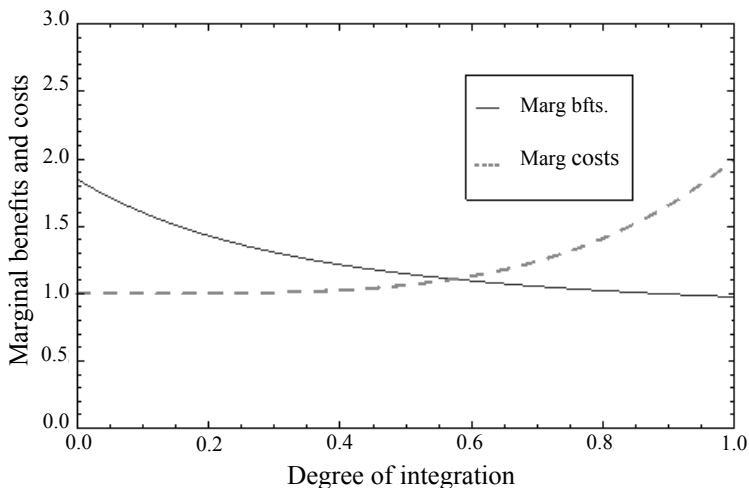


Figure 2.2 shows the marginal benefits and costs of cross-border banking. The optimal degree of integration is given by the point at which the marginal costs equal the marginal benefits. Due to the fact that we have declining marginal benefits but constant or increasing marginal costs, this degree is likely to be interior. In other words, some degree of integration is beneficial but an excessive degree is not.^{24, 25}

Third, a large part of the potential costs from cross-border banking can be avoided, or at least mitigated. For example, for a given level of cross-border activities, the influence of foreign shocks can be minimised by having diversified foreign activities. Of course, if a country's banking system invests mainly in a single other country, problems in that other country can have large effects on the domestic economy. However, if the foreign activities are well diversified, foreign shocks will be less important.²⁶ In addition, the net benefits from the presence of foreign banks can be maximised when foreign banking takes the form of subsidiaries. As discussed earlier, lending through subsidiaries is generally more stable in times of crises than direct cross-border lending.

Figure 2.2 Optimal level of cross-border banking



²⁴ Theoretical research modeling various aspects of the costs and benefits comes to similar conclusions; see Goldstein and Pauzner (2004), Dasgupta (2004) and Wagner (2010a).

²⁵ The case for an interior degree is less clear for small countries and in asymmetric settings. For example, when there are fixed costs of setting up a sophisticated (domestic) banking system, it may be worthwhile (in particular from an efficiency perspective) for a small economy to be largely financed by foreign banks (consider, for example, New Zealand which has mainly foreign-owned banks). However, such a country will be very exposed to foreign shocks and hence probably not optimally diversified from a stability-perspective.

²⁶ Consistent with this, Allen and Gale (2000b) show that contagion effects are minimised in an interconnected network structure, which can be interpreted as a diversified cross-border exposure.

Fourth, various costs of cross-border banking are not specific to the cross-border dimension. For example, cross-border banking may bring about stability costs by increasing size, complexity and interconnectedness of institutions. However, an institution that expands domestically may cause similar stability problems arising, for example, from its greater size as it expands abroad. The problems are thus not cross-border activities *per se*. In fact, for a given size (complexity, interconnectedness) it may be preferable to have a higher degree of cross-border activities due to the diversification benefits this brings about.²⁷

We therefore believe that a healthy amount of cross-border banking is likely to be beneficial for stability. However, it is important that cross-border banking takes forms that minimise its costs while reaping maximum benefits (later in this chapter we develop metrics that allow quantifying whether cross-border integration in a certain country or region takes place in ways to maximise effectiveness). In addition, cross-border banking may become undesirable if it exceeds a certain degree. This degree may depend on various factors. For example, a country that has a business cycle that is less synchronised with the ones of other countries has a larger diversification potential. Its optimal degree of integration is hence likely to be larger.²⁸

Amongst other things, this would suggest that optimal cross-border banking integration inside Europe should be smaller, as the European countries are a relatively homogenous group of countries compared to the rest of the world. However, this ignores the important fact that within the euro area the exchange rate is missing as a shock absorber. Shocks that are not EMU-wide create disparities among countries that can only be absorbed by price adjustments in the respective countries. This is a process that takes time and is generally considered to be relatively costly. This suggests that the optimal level of integration within the EU might well be higher. Within the EU there is also a higher potential to coordinate actions in order to limit any adverse issues arising from cross-border banking (such as the more complicated resolution of cross-border bank failures and regulatory 'races to the bottom'). Again, this suggests lower costs of integration in the EU and hence also a higher optimal degree of integration.

Does cross-border banking have to be regulated? To the extent that financial institutions themselves fully internalise the social costs and benefits of cross-border banking, standard economic theory suggests that there is no need to regulate their cross-border activities. In fact, in the absence of any externalities from cross-border banking, financial institutions themselves are likely to find the right degree of integration (eg, see Kahn and Santos, 2010). In this case, there is

27 A bank's expansion within a country can also result in contagion as economic conditions within a country are more correlated than between countries (eg, Slijkerman, 2007). Interestingly (and in contrast to cross-border banking), one rarely hears policy-makers lamenting contagion within a country.

28 From Figure 2.2 it is easy to see that an increase in the marginal benefits (a shift of MB upwards) increases the optimal degree of integration.

no compelling reason for policy makers to worry about cross-border banking and its stability implications.

However, cross-border banking is likely to be associated with significant externalities (eg, see Schoenmaker and Oosterloo, 2005). In particular, cross-border banking increases the similarities of banks in different countries and raises their interconnectedness. This can increase the risk of systemic failures even though individual bank failures become less likely due to diversification benefits (see Kahn and Santos, 2010, Allen, Babus and Carletti, 2010, Wagner, 2010a). Externalities from bank failures are usually associated with systemic failures (for a survey of systemic externalities, see Wagner, 2010b). Hence it is likely that unregulated banks will choose an extent of integration that is too large from an efficiency perspective.

The lack of an effective cross-border framework for resolving systemically important banks exacerbates the challenge for crisis management. Authorities dealing with failing banks typically have a national focus and do not incorporate cross-border externalities in their decision making (see Schoenmaker, 2011). Who is in charge and how losses are allocated affects incentives and behaviour long before difficulties arise. Claessens, Herring and Schoenmaker (2010) therefore argue to focus on the endgame in financial regulation. We first need to solve cross-border crisis resolution. After that we need to strengthen cross-border financial supervision.

2.4 Measuring the balance of cross-border banking

We have previously discussed the costs and benefits of cross-border banking from a financial stability perspective. We have in particular argued that cross-border banking that attempts to reap maximum gains from cross-border banking, but minimise its costs, is probably beneficial for financial stability. In this section, we measure the balance of cross-border banking, focusing on the asset side. Schoenmaker and Wagner (2011) propose various ways for how one can measure whether cross-border banking takes place in such a way, which they call balanced cross-border banking (for reasons that will become obvious later).²⁹ Afterwards, we apply these measures to EU countries.

It is important to realise that there are two levels at which one can judge whether cross-border banking is balanced: at the level of an individual country or at the level of the EU (or the world).³⁰ The following simple example demonstrates the differences between both. Suppose various banks from different countries start to invest in country A. From the viewpoint of each individual bank this

²⁹ This section draws on their measures for balanced cross-border banking.

³⁰ There is a third level, the level of balancedness/diversification within a country, which is, however, not the focus of our analysis.

may amount to beneficial diversification (if initial exposure to A is not large). However, if many banks invest in A, the set of countries may collectively become vulnerable to shocks from A (another issue is that at the same time A will also become dependent on other countries).³¹

2.4.1 Balanced cross-border banking from the viewpoint of individual countries

From the viewpoint of an individual country, cross-border banking maximises its net stability benefits if it achieves high diversification gains without creating undue systemic risk or regulatory distortions (such as from a race-to-the-bottom that results in overly lenient regulation – see Acharya, 2003). For an individual country, cross-border banking can take place in two directions. First, banks of the country may (directly or indirectly) hold claims to the assets of other countries. Second, banks from other countries may invest in assets of the country in question. We call the first type of cross-border banking ‘outward’ (cross-border) banking and the second type ‘inward’ cross-border banking.

As we have argued earlier, each direction of cross-border banking can deliver potential diversification benefits for a country. Outward investment means that domestic banks will not only be exposed to domestic shocks but also to foreign shocks through their foreign asset claims. Inward investment, if it takes the form of lending, implies that some domestic firms will be financed by foreign banks. This suggests that domestic lending will be less sensitive to shocks that affect domestic banks.

Each direction of integration in isolation can therefore bring about benefits. What about the combination of inward and outward integration? Are the benefits from one form of integration dependent upon the extent of integration in the other form? On some level, one may expect both directions to be substitutes. For example, if the banks of a country are heavily invested abroad, domestic lending will become less dependent on domestic shocks. This, in turn, will alleviate the need for further risk sharing, such as that coming from inward integration. However, outward (asset) investment only insulates domestic banks against shocks that come from the asset side. All other shocks, such as funding shocks, will still affect them to the full extent. Thus, the degree of substitution may effectively be limited among both forms of integration.

To the contrary, there are also plausible arguments why both forms of integration may be complements, or, in other words, that a mismatch between the two forms of integration may induce costs. Either form of integration potentially brings about diversification benefits of different sorts. For example, while inward diversification also insulates against funding shocks, outward diversification

³¹ For more extensive discussions on differences between individual and systemic risk, see Acharya (2009), Acharya and Yorulmazer (2007, 2008), Wagner (2010a), Brunnermeier *et al* (2009, page 25).

mainly relates to asset shocks. And since the marginal gains from diversification are declining, it is better to have a little of both sorts of diversification rather than a larger amount of one sort of diversification. A mismatch of inward and outward investment may also exacerbate the influence of exchange rate movements on the country's consolidated banking system. In addition, a mismatch of both types of investment is likely to bring about greater political costs. A country that mainly faces outward integration, for example, may have an interest in a more lenient banking regulation, as the costs of banking instability will to a large part be felt outside the country. In addition to developing indices for each dimension of integration we will therefore also propose an index for whether integration is harmonised along both dimensions.

Following Schoenmaker and Wagner (2011), we introduce the following notation. We denote with a_i the total (domestic plus foreign) assets of the consolidated banking sector of country i . In addition, we denote with $f_{i,j}$ the total assets banks from country i have in country j . In order to save on notation in what follows, we define $f_{i,i}$ to be zero.

Our first two indices are measures of the total level of cross-border banking of a country. As previously discussed, diversification benefits are rapidly declining while the costs of integration are constant or even increasing. Thus there may be an optimal interior degree of integration that balances the costs and benefits of integration. The first measure is a simple measure of outward integration of a country. This measure scales total outward assets of a country by the total assets of its banking system. In particular, we define an *index of outward integration* of country i as follows:

$$Out_i = \frac{\sum_{k,k \neq i} f_{i,k}}{a_i} \quad (1)$$

This index is between zero and one and is increasing in the extent of integration. Similarly, we can define an index of inward integration. For this it is natural to scale again by total banking assets of the country. We obtain for the *index of inward integration* of country i :

$$In_i = \frac{\sum_{k \neq i} f_{k,i}}{a_i} \quad (2)$$

From these indices we define in turn the *integration balance* of country i as follows:

$$Bal_i = 1 - \frac{|Out_i - In_i|}{Out_i + In_i}. \quad (3)$$

This index will be one if integration is perfectly balanced along its directions ($Out_i = In_i$) and will be zero if integration only takes place along one dimension (consider, for example, $In_i = 0$ and $Out_i > 0$).

While these measures concern the *extent* of cross-border banking, the next measures concern its *effectiveness* for a given extent. Naturally, integration will be more effective if it maximises the benefits from diversification. For example, for a given level of outward investment, stability benefits are enhanced if this investment is appropriately spread among countries, so as to minimise variance and contagion effects.

How should a country's investment be optimally allocated among other countries? While optimal portfolio allocation problems are obviously complex, portfolio theory suggests a simple approximation to the allocation problem. Recall that the CAPM stipulates that each investor holds a share in the market portfolio, that is, a share in the universe of all assets. We can approximate a country's share in the market portfolio by the assets of its banking sector (this obviously ignores differences in correlations across countries). Thus, the ratio of outward investment of country i in country j to country i 's total outward investment should ideally be equal to the ratio of country j 's assets to the combined assets of all other countries than country i . An index of the effectiveness of diversification in outward integration can thus be constructed by looking at how close on average a country's outward investment portfolio share in another country is to the other country's weight in the world. An index of *diversification in outward investment* of country i is thus given by:

$$Div_i^{Out} = 1 - \frac{1}{2} \sum_{j, j \neq i} \left| \frac{f_{i,j}}{\sum_{k, k \neq i} f_{i,k}} - \frac{a_j}{\sum_{k, k \neq i} a_k} \right|. \quad (4)$$

Note that

$$\frac{f_{i,j}}{\sum_{k, k \neq i} f_{i,k}}$$

is the share of the outward investment of country i that goes to country j and that

$$\frac{a_j}{\sum_{k, k \neq i} a_k}$$

is the share of country j assets in world assets (excluding country i). The term

$$\left| \frac{f_{i,j}}{\sum_{k, k \neq i} f_{i,k}} - \frac{a_j}{\sum_{k, k \neq i} a_k} \right|$$

thus gives us the deviation of the actual allocation of country i assets to country j from the ideal one. The index will be one if diversification is perfect and zero if investments are spread in the lumpiest fashion.³²

A similar index can also be constructed for inward investment. Diversification in inward investment matters because domestic firms are then financed by banks from different countries. This makes it less likely that many of these firms experience credit supply shocks at the same time, thus stabilising domestic lending. The index of *diversification in inward investment* of country i can thus be written as:

$$Div_i^{In} = 1 - \frac{1}{2} \sum_{j, j \neq i} \left| \frac{f_{j,i}}{\sum_{k, k \neq i} f_{k,i}} - \frac{a_j}{\sum_{k, k \neq i} a_k} \right| \quad (5)$$

So far, we have constructed three indices to assess the different dimensions of cross-border banking. It is also interesting to assess the overall quality of cross-border banking. For this we take the average of the indices (balance, outward and inward diversification). Thus, we calculate an *overall index of integration* of country i as:

$$Over_i = \frac{1}{3} (Bal_i + Div_i^{Out} + Div_i^{In}) \quad (6)$$

Again this index will be one if integration is perfect and zero if integration is very poor.

2.4.2 Systemic balance of integration

We now turn to the systemic aspect of integration. Even though individual and systemic integration are obviously connected, these concepts are not the same. We have previously already given an example for this. Another example is the following. Suppose that each EU country's outward investment is very undiversified (in the extreme: it goes to only one other non-EU country). Each individual country's diversification will thus be very low. However, if each of these countries specialises in its investment in different countries (outside the EU), the EU as a whole may be well diversified. It is thus important to distinguish between both levels of integration.

32 The benchmark for our asset allocation are the country's asset weights. While this benchmark relates to the idea of optimal diversification, an alternative way to quantify integration is to study how close a country's asset holdings of another country are to the country's trade-weights. However, while trade-connections seem a natural benchmark for allocating assets, this will not necessarily measure whether a country's portfolio is well diversified. In fact, diversification gains might be lower when investing in countries with which one has a lot of trade. This is because trade itself already acts as a risk-sharing device.

Starting with outward integration, we consider cross-border banking of the EU to be balanced if the combined assets of EU countries are appropriately spread among all the other non-EU countries. For this *external* diversification we can simply apply the same argument that we previously considered at the level of the country on the EU level. This leads to the following index of *systemwide external outward diversification* in the EU:

$$Divex_{EU}^{Out} = 1 - \frac{1}{2} \sum_{j, j \in \{EU\}} \left| \frac{f_{EU, j}}{\sum_{k, k \in \{EU\}} f_{EU, k}} - \frac{a_j}{\sum_{k, k \in \{EU\}} a_k} \right|, \quad (7)$$

where we have denoted with $f_{EU, j} = \sum_{k, k \in \{EU\}} f_{k, j}$ total outward investment of EU in country j . Note that equation (7) is identical to (4) if one replaces EU with country i . Analogously we can also define the index of *systemwide external inward diversification* in the EU:

$$Divex_{EU}^{In} = 1 - \frac{1}{2} \sum_{j, j \in \{EU\}} \left| \frac{f_{j, EU}}{\sum_{k, k \in \{EU\}} f_{k, EU}} - \frac{a_j}{\sum_{k, k \in \{EU\}} a_k} \right|, \quad (8)$$

where $f_{j, EU} = \sum_{k, k \in \{EU\}} f_{j, k}$.

Indices (7) and (8) address the question of how the EU is diversified *vis-à-vis* other, non-EU, countries. An equally interesting question is also how the EU is diversified *internally* within its borders. For this we can consider the total foreign assets of the EU and look whether they are appropriately distributed within the EU. We obtain for the outward and inward indices of the EU:

$$Divin_{EU}^{Out} = 1 - \frac{1}{2} \sum_{j, j \in \{EU\}} \left| \frac{f_{EU, j}}{\sum_{k, k \in \{EU\}} f_{EU, k}} - \frac{a_j}{\sum_{k, k \in \{EU\}} a_k} \right| \quad (9)$$

$$Divin_{EU}^{In} = 1 - \frac{1}{2} \sum_{j, j \in \{EU\}} \left| \frac{f_{j, EU}}{\sum_{k, k \in \{EU\}} f_{k, EU}} - \frac{a_j}{\sum_{k, k \in \{EU\}} a_k} \right| \quad (10)$$

The first index will be the larger the closer, on average, the share of outward investment of an EU country in total outward EU investment is to the country's asset share in the EU. Similarly, the second index will be increasing in the proximity of the share of inward investment of an EU country (relative to total EU inward investment) to the country's EU asset share.

2.5 Empirical results

In this section we characterise integration in the EU using the indices in the previous section. Schoenmaker and Wagner (2011) report evidence on these indices for the EU.³³ Finally, we address the policy implications of the results. If certain regions are less balanced, additional policy measures may be needed to foster financial stability.

2.5.1 Data

The data employed in this chapter are drawn from a number of public sources. Cross-border claims are taken from the consolidated banking statistics of the Bank for International Settlements (BIS). The consolidated banking statistics provide details of cross-border claims of 30 major international banking centres to more than 200 individual debtor countries. The EU is well covered with 13 countries. These are the EU15 countries, excluding Finland and Luxembourg. The latter two, as well as the new member states (NMS12) do not have any large banks that do sizeable business abroad.³⁴ The outflows are therefore set at zero for these countries. On the receiving side, all EU countries are included in the debtor countries. We therefore have a full set of inflow data. The consolidated cross-border claims are available on a bilateral basis, either on an immediate borrower, or an ultimate risk basis (see Box 1.1 for a discussion). Our choice fell on the former, since they cover a significantly longer time horizon. That allows us to collect data for each pair of countries.³⁵

Total assets of the consolidated banking sector of each EU country are taken from the European Central Bank (ECB). There are some missing data on total assets for the early 2000s for some of the NMS, prior to their accessions in 2004 and 2007. The missing data are filled in from national sources. The cross-border claims and total assets enable us to calculate the indices for individual countries. For the system-wide indices, we also need data from non-EU countries. The BIS cross-border claims are collected on a global scale. Total assets are taken from the International Financial Statistics (IFS), collected by the International Monetary Fund (IMF). The data are on a quarterly basis and cover the period from 2000Q1 to 2010Q1, in the case of the ECB, and 2001Q4 to 2009Q4, in the case of the IFS database.

33 This section draws on their empirical study on balanced cross-border banking.

34 Finland dropped out in 2004, when the head office of its largest bank moved to Stockholm as part of the Nordea Group.

35 A disadvantage of the consolidated BIS data is that they also contain local claims that are denominated in a foreign currency. However, at least for the larger countries in the EU, this issue should be less important.

Table 2.1 Summary statistics of indices

Indices	Mean	Median	Standard deviation		Minimum	Maximum	Sample size
			Time-series	Cross-sectional			
Out	0.09	0.00	0.03	0.14	0.00	0.62	1,107
In	0.35	0.25	0.08	0.24	0.05	1.26	1,107
Bal	0.32	0.00	0.09	0.37	0.00	1.00	1,107
Div ^{Out}	0.67	0.70	0.07	0.14	0.24	0.88	510
Div ^{In}	0.54	0.56	0.06	0.17	0.09	0.85	1,107
Over	0.43	0.35	0.05	0.24	0.04	0.85	1,107

Source: Schoenmaker and Wagner (2011)

Table 2.1 provides the summary statistics of the indices of the individual EU countries. A detailed description of the indices is provided in the next subsection. The mean of the outflows is lower than that of the inflows. Moreover, the median of the outflows is zero, reflecting the fact that many countries, in particular the NMS12, do not have outflows. The integration balance for these countries is then also zero. The outward diversification appears to be stronger than the inward diversification. We also look at the standard deviation in the sample. It shows that the variation over time is far less than the variation in the cross-section of countries.

Turning to the development over time, we calculate the time series of each index for EU15 and NMS12. We apply a weighted average – with a country's total assets as weight – to reflect the economic impact of the group of countries as a whole. Figure 2.3 illustrates a decline in the outflows after the start of the financial crisis (2008Q2), but the outflows remain above the pre-accession levels (2004). Figure 2.4 indicates that the inflows of the NMS12 are increasing over time and remain more or less flat during the financial crisis episode (2008-2009). For the EU15 the inflows are relatively low (10% to 20%) and stable over time. Interestingly, the balance of integration for the EU 15 improves from 0.6 to 0.7 (Figure 2.5) over the time period. The outward diversification is at a high level (about 0.7 in Figure 2.6), but shows a small decline over the sample period. Figure 2.7 indicates that the inward diversification remains flat over time, both for the EU15 and NMS12. Finally, Figure 2.8 also suggests that the overall integration is not changing much over the ten-year period.

Figure 2.3 Outflows

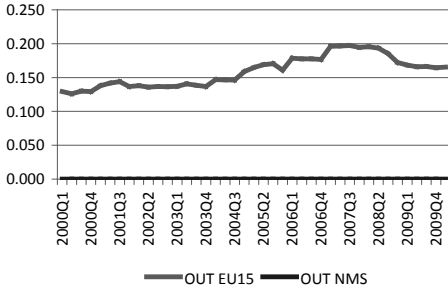


Figure 2.4 Inflows

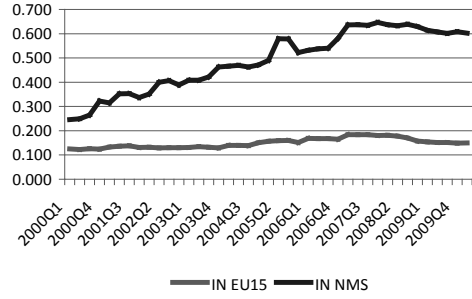


Figure 2.5 Balances

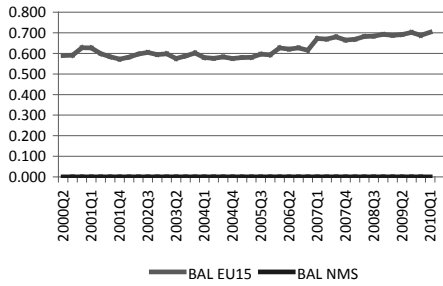


Figure 2.6 Outward diversification

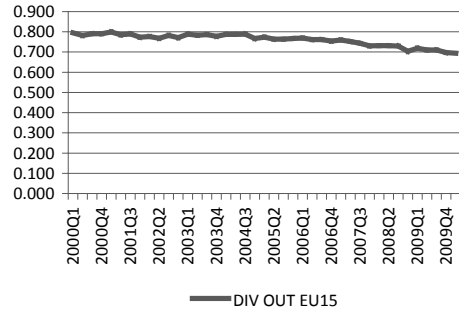


Figure 2.7 Inward diversification

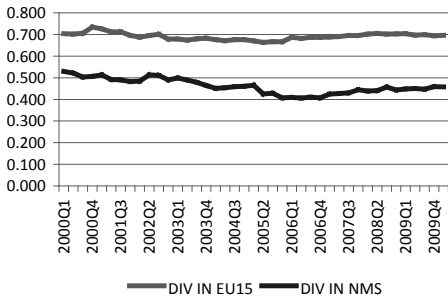


Figure 2.8 Overall integration

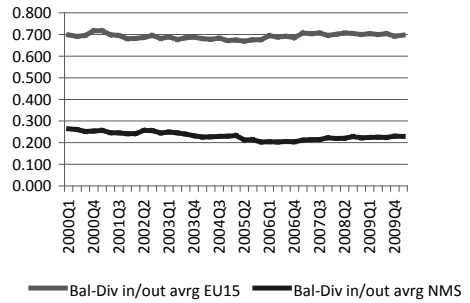


Table 2.2 Indices of individual countries

Country	Abbreviation	Out	In	Bal	Div ^{Out}	Div ^{In}	Over
Austria	AT	0.27	0.19	0.82	0.48	0.49	0.60
Belgium	BE	0.21	0.31	0.82	0.60	0.43	0.62
Bulgaria	BG	0.00	0.73	0.00	n.a.	0.31	0.16
Cyprus	CY	0.00	0.20	0.00	n.a.	0.57	0.28
Czech Republic	CZ	0.00	0.74	0.00	n.a.	0.42	0.21
Denmark	DK	0.14	0.17	0.89	0.49	0.45	0.61
Estonia	EE	0.00	0.90	0.00	n.a.	0.10	0.05
Finland	FI	0.00	0.32	0.00	n.a.	0.30	0.15
France	FR	0.21	0.07	0.51	0.73	0.74	0.66
Germany	DE	0.20	0.11	0.73	0.81	0.71	0.75
Greece	EL	0.15	0.25	0.76	0.36	0.62	0.58
Hungary	HU	0.00	0.70	0.00	n.a.	0.45	0.22
Ireland	IE	0.17	0.26	0.80	0.65	0.69	0.71
Italy	IT	0.14	0.18	0.88	0.52	0.66	0.69
Latvia	LV	0.00	0.58	0.00	n.a.	0.25	0.12
Lithuania	LT	0.00	0.72	0.00	n.a.	0.22	0.11
Luxembourg	LU	0.00	0.29	0.00	n.a.	0.69	0.34
Malta	MT	0.00	0.13	0.00	n.a.	0.50	0.25
Netherlands	NL	0.30	0.17	0.74	0.80	0.79	0.78
Poland	PL	0.00	0.59	0.00	n.a.	0.57	0.29
Portugal	PT	0.17	0.31	0.70	0.49	0.67	0.62
Romania	RO	0.00	0.90	0.00	n.a.	0.37	0.18
Slovakia	SK	0.00	0.85	0.00	n.a.	0.29	0.15
Slovenia	SI	0.00	0.48	0.00	n.a.	0.42	0.21
Spain	ES	0.14	0.16	0.94	0.55	0.73	0.74
Sweden	SE	0.33	0.11	0.50	0.38	0.58	0.48
UK	UK	0.09	0.14	0.75	0.80	0.75	0.76
Average EU		0.09	0.39	0.36	0.59	0.51	0.42
Average EU15		0.17	0.20	0.66	0.59	0.62	0.61
Average NMS12		0.00	0.63	0.00	n.a.	0.37	0.19

Note: The indices are calculated for the first quarter of 2010. The averages are unweighted.

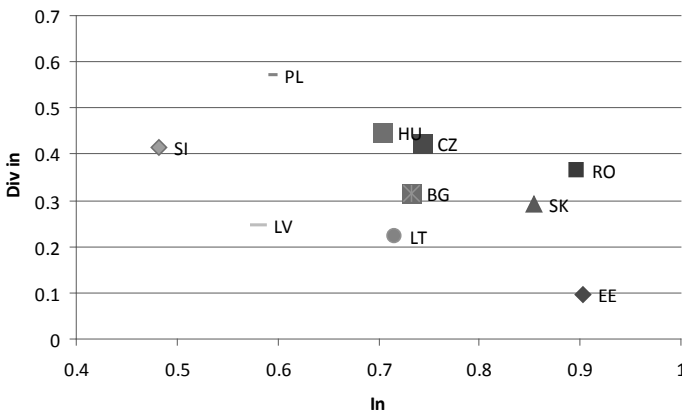
Source: Schoenmaker and Wagner (2011).

2.5.2 Individual country indices of integration

Table 2.2 shows the indices for the individual countries. The un-weighted³⁶ average outflow for the EU is 0.09, while the average inflow is 0.39. This can be explained by the fact that the countries with larger banking systems (EU15) have a higher outflow than the countries with smaller banking systems (NMS12). The picture for the inflow is exactly the opposite, with very high inflows for the NMS. The integration balance is at 0.36, which is well below its maximum level. The diversification indices are at 0.59 and 0.51 respectively, which is about half of their maximum level. The overall index of integration is also below its potential (0.42).

Figure 2.9 focuses on the group of countries with high inflows (index larger than 0.4). These are obviously the NMS. The inward diversification is low for the NMS (0.37). In particular, integration in the Baltic region is very lumpy (countries in this region are at the bottom in Figure 2.9), which is due to their dependence on Scandinavian banks and, in particular, Swedish ones. The NMS are thus very vulnerable to foreign shocks.

Figure 2.9 Countries with high banking inflows



Note: This figure plots the countries with high inflows (>0.4).

Moving to the old member states, Belgium, Finland and Portugal have relatively high inflows at about 0.3. Finland is most vulnerable due to its low inward diversification at 0.3, which can be explained by the fact that the largest bank in Finland is headquartered in Sweden.

Low inflows make a country more susceptible to domestic shocks. With an index of 0.07, France is the only country with an inflow below 10%. That means that

³⁶ We now use un-weighted averages across countries, as we wish to explore the in- and outflows at the country level.

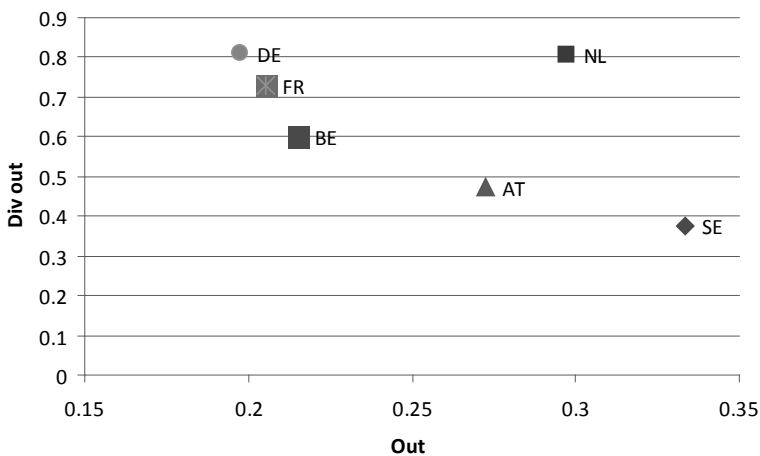
when the French banking system is hit by a domestic shock, foreign banks have very little capacity to replace a potential drop in lending to French business and consumers.

Next, we look at the countries with high outflows. If these outflows are well diversified, a country is less exposed to a foreign shock in a particular country or region. Figure 2.10 shows the countries with an outflow index of larger than 0.20. The figure indicates that Austria, the Netherlands and Sweden have particularly high outflows (well above 0.25), while Belgium, France and Germany have high, but more modest, outflows (between 0.20 and 0.25).

The Netherlands, France and Germany appear to have well-diversified outflows (above 0.70), while Austria and Belgium are in the medium range (0.48 and 0.60). Sweden is a problem country with a high and undiversified outflow at 0.38, which can be explained by the fact that the Swedish banks have a strong regional focus in Scandinavia and the Baltic region. Any shock in this region would have a big impact on the Swedish banking system. Another country with an even lower degree of outward diversification is Greece, at 0.36. The Greek banks restrict their foreign operations mainly to Bulgaria, Romania, Turkey and Cyprus.

Finally, we identify the group of countries that seem to have the 'best' cross-border banking in terms of our indices: countries which have balanced in- and outflows that are also well diversified. Four categories are distinguished: (1) well balanced integration ranging from 0.75 to 1.00; (2) weakly balanced integration ranging from 0.50 to 0.74; (3) unbalanced integration ranging from 0.25 to 0.49; and (4) very unbalanced integration ranging from 0.00 to 0.24.

Figure 2.10 Countries with high banking outflows



Note: This figure plots the countries with high outflows (>0.20).

Table 2.3 indicates that Germany, the Netherlands and the UK are well integrated. The overall index of integration is at least 0.75. Moreover, all three underlying indices, Bal, Div^{Out} and Div^{In}, are above 0.70. Spain is close to this category, but has a lower outward diversification at 0.55 due to its relatively high presence in the UK (Santander). Most other western European countries are in the weakly balanced category. Two of the Scandinavian countries, Sweden and Finland, are in the lower categories of (very) unbalanced integration. As expected, the NMS are unbalanced, because of their dependence on inflows and lack of outflows. The largest NMS (Poland) and the most advanced NMS (Cyprus and Malta) are in the unbalanced category. The other NMS are very unbalanced, with the Baltic region forming the extreme end of the distribution.

Table 2.3 Categories of overall integration

Well balanced		Weakly balanced		Unbalanced		Very unbalanced	
Country	Overall	Country	Overall	Country	Overall	Country	Overall
Netherlands	0.78	Spain	0.74	Sweden	0.48	Hungary	0.22
UK	0.76	Ireland	0.71	Luxembourg	0.34	Czech Rep.	0.21
Germany	0.75	Italy	0.69	Poland	0.29	Slovenia	0.21
		France	0.66	Cyprus	0.28	Romania	0.18
		Portugal	0.62	Malta	0.25	Bulgaria	0.16
		Belgium	0.62			Finland	0.15
		Denmark	0.61			Slovakia	0.15
		Austria	0.60			Latvia	0.12
		Greece	0.58			Lithuania	0.11
						Estonia	0.05

Note: The overall index is the arithmetic average of the balance, outward and inward diversification indices. Four categories are distinguished: well balanced 0.75-1; weakly balanced 0.50-0.74; unbalanced 0.25-0.49; and very unbalanced 0-0.24. Source: Schoenmaker and Wagner (2011).

2.4.3 Systemic Indices of Integration

Figure 2.11 depicts the index of external diversification of the EU. For comparison, the figure also includes the calculated index for the US and the Japanese banking system. The results are remarkable. The outward diversification of the EU banking system is low, at 0.65. This is due to an overexposure to the US. This can be seen by looking at Figure 2.12, which contrasts the actual percentage of outflows of the EU *vis-à-vis* a non-EU country or region, relative to the naïve optimal portfolio allocation, where assets are allocated proportional to the size of the country/region (denoted with 'CAPM' in the figure). It can be seen that the allocation to the US is much larger than justified by the size of the US. This overexposure is partly due to the fact that European banks favour a large presence in New York and Chicago. Moreover, some of the larger EU banks have acquired regional banks in the US. At the same time, European banks have very little cross-border claims on Japan and China. As a result, Japan and China are underweighted in

the EU portfolio. The US and Japan show a more balanced picture of external diversification at about 0.7. Moving to inward diversification, Figure 2.11 shows that it is, by and large, a mirror image of the outward diversification. In particular, Europe has a better inward diversification than the US and Japan.

Figure 2.13 depicts the internal diversification of the EU over time. It can be seen that foreign claims are generally evenly spread among the banks from the different EU countries, as the respective index is high. In addition, the presence of foreign banks in the EU is also evenly spread, *ie*, inward diversification is high. The time series behaviour also shows that both dimensions of internal diversification have been increasing over time. This growth has only halted (and in the case of outwards diversification it even has been reversed) in the years of the crisis.

Figure 2.11 External diversification of the EU, Japan and US

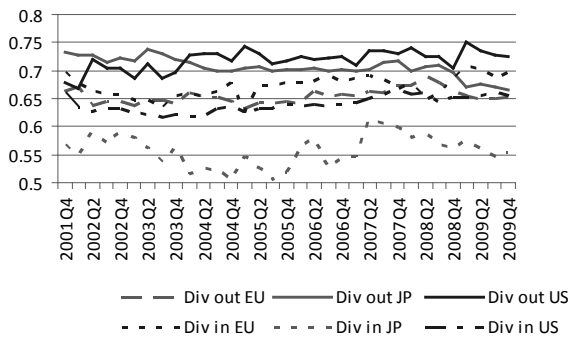


Figure 2.12 Outflows of the EU banking system

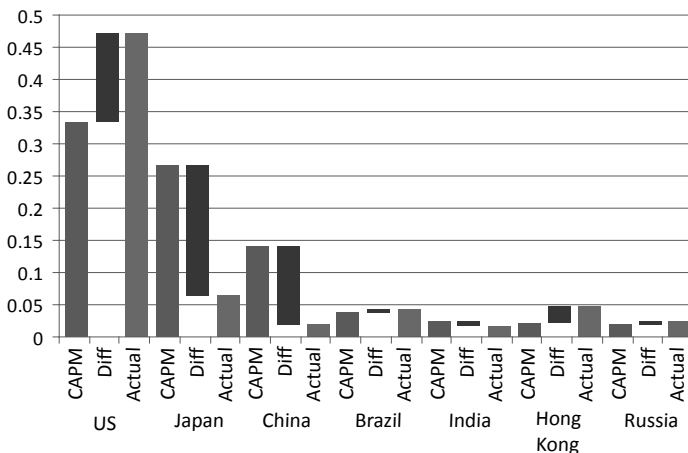
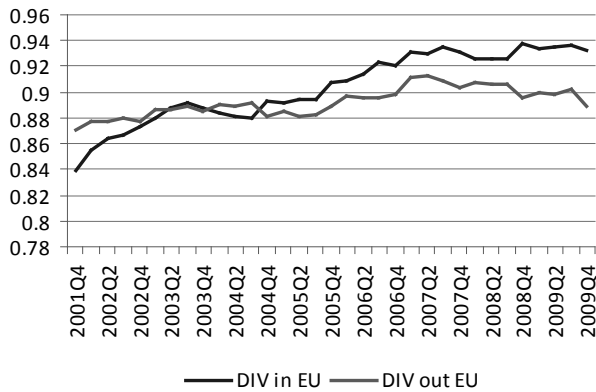


Figure 2.13 Internal diversification of the EU

2.6 Conclusions

Cross-border banking brings about many important benefits, perhaps most prominently in the form of diversification for banks and risk sharing in the economy, but also has potential costs. We have argued that the benefits from cross-border banking probably outweigh the costs if cross-border banking takes place in an advantageous way and as long as cross-border banking does not become excessive. Many of the costs from cross-border banking can in fact be avoided. For example, diversification in a country's cross-border operations (both in the inward and outward dimension) can reduce the potential costs of spillovers from other countries. As another example, establishing foreign operations through subsidiaries, rather than direct cross-border lending, can reduce the volatility of foreign lending. We have also argued that contagion effects – often seen as a main argument against cross-border banking – alone are unlikely to outweigh the diversification gains that can be reaped through cross-border banking. Excessive levels of cross-border banking, however, may be detrimental. This is because at high levels of integration, diversification gains from further cross-border banking are lowered. At the same time, the stability costs of integration are likely to be increasing.

We thus argue that, from the perspective of financial stability, it is not so much a question of whether cross-border banking is desirable or undesirable *per se*. It is more important to ensure that cross-border banking takes place in a way that maximizes its benefits while keeping costs at bay. In this chapter we have developed various metrics that help in evaluating whether integration in a country or region takes place in such a way. These metrics also help to identify the dimension(s) along which the country's (or region's) cross-border banking can be improved.

Applying these metrics to the EU countries, we have found that the countries with the largest banking centers, UK and Germany, are well diversified. The other country with a large banking system, France, is coming close to these countries. But France is ranking lower than the UK and Germany because it has a relatively low inflow, indicating protectionist features. The New Member States (NMS) are highly dependent on a few western European banks (low diversification) and thus vulnerable to contagion effects. Given the dependence on western Europe, it may be useful for the NMS to diversify their inflows. Finally, the Nordic and Baltic region is very interwoven without much diversification. A few large banks dominate this region. Their banking systems, and thus their economies, are fully linked. Acknowledging this strong interdependence, the Nordic and Baltic authorities have recently implemented a burden sharing scheme. In this way, the benefits and costs of an integrated banking system are fully shared by all countries in the Nordic Baltic region.

We have also studied aspects of system-wide integration in the EU. It appears that the EU banking system has a weak outward diversification with a strong bias to the US. This played an important role in the recent crisis, in which European banks incurred large losses from defaults originating in the US. The US and Japanese banking system have better external diversification. We recommend that the overexposure of the European banks to the US should be on the agenda of the new European Systemic Risk Board.

3. Macroeconomic Aspects of Cross-Border Banking

In the previous chapters we have considered the development of cross-border banking leading up to the crisis and its role during the crisis. We also offered a more general discussion on the relationship between cross-border banking and financial stability and derived an index capturing the benefits and costs of cross-border banking for individual countries as well as for country groups, such as the EU. In this chapter we focus on broader, macroeconomic aspects of cross-border banking. In recent years, up until the crisis, macroeconomists did not pay much attention to banks, whether they were cross-border or domestic banks. We start in Section 3.1 with a discussion of the inflation-targeting framework that has been the standard approach to monetary policy in the euro area and the other countries in the European Economic Area (EEA). As we shall see, the absence of any explicit consideration of banks in this framework meant that central bankers and other policymakers missed the build-up of various kinds of systemic risk in the financial system. This has been damaging to all kinds of banks in Europe, but particularly large systemically important cross-border banks.

In Section 3.2 we consider the different types of systemic risk. On the asset side of banks' balance sheets, common exposure to real estate bubbles led to problems in the banking systems in Ireland and a number of other countries. The possibility of sovereign default in countries such as Greece and Ireland has also created a problem of systemic risk in European banks. A third type of systemic risk is due to the mispricing of assets. This has been a particular problem for those banks holding a large amount of securitised assets that have originated in the US. Systemic risk has also arisen on the liability side of the balance sheet. Currency mismatches were a significant problem, particularly for cross-border banks. Maturity mismatch and liquidity risk were also sources of systemic risk. In the final part of the section, we consider how panic-based and fundamental runs, as well as contagion, allow these systemic risks to trigger financial crises. Finally, Section 3.3 presents our conclusions.

3.1 Inflation targeting

In recent years the conventional view in the macroeconomics literature has been that the best way to conduct monetary policy is for central banks to adopt inflation targeting.³⁷ Before the consensus on the desirability of inflation targeting developed, there was a widespread belief that there was a trade-off between unemployment and inflation. As the Phillips curve illustrated, by lowering interest rates it was possible to stimulate the economy and lower unemployment, but at the expense of higher inflation.

Phelps (1967) and Friedman (1968) argued instead that there was a natural rate of unemployment that the economy reverted to in the long run no matter what the rate of inflation. Lucas (1972, 1973, 1976) and Sargent and Wallace (1975) ushered in the rational expectations revolution by showing that there was no long run trade-off, only a short-term one. Once it became accepted that monetary policy cannot affect the unemployment rate in the long run, the next step was to realise that monetary policy should be focused on controlling inflation. After the high inflation era of the 1970s and 1980s, the inefficiencies of inflation were well appreciated and this led to the desire to lower inflation rates substantially.

Kydland and Prescott (1977), Calvo (1978), and Barro and Gordon (1983) pointed out that because there is a short-term trade-off between unemployment and inflation, there is a time-inconsistency problem. Governments tend to have a short-term orientation because of the election cycle. As a result there is always the temptation to cut interest rates in order to boost the economy before an election, even though there is no long run gain and in the short run there is the cost of increased inflation.

These contributions provide the intellectual foundations of inflation targeting. The practical implementation involves a number of measures. The first is establishing fiscal stability. If governments run large fiscal deficits and build up significant amounts of debt, there will be a temptation to inflate away the value of this debt. If, on the contrary, governments are fiscally responsible, price stability is feasible. This is the idea behind the Growth and Stability Pact in the 1992 Maastricht Treaty. According to this, countries in the euro area must limit budget deficits to 3% of GDP and national debt to less than 60% of GDP. These kinds of *ex ante* rules will only have an effect if they are enforced. This means that penalties should be imposed on countries violating the rules. Unfortunately, this was not the case in the euro area, where many of the countries that signed the treaty, such as France and Germany, flouted these rules without being punished. The recent problems with Greece, where accounting mis-statements were used to hide the true situation, are another example of how difficult it is to impose fiscal discipline without proper enforcement mechanisms.

³⁷ Giavazzi and Mishkin (2007) give an excellent account of this. This section draws on their account of inflation targeting.

The second necessary condition for inflation targeting to be viable is financial stability. Poor regulation and supervision of financial institutions may lead to large losses in the financial sector. This could, for example, prevent the raising of interest rates to fight inflation if the banks and other institutions are in a bad situation. So far, financial regulation has been mostly based on a microprudential approach, where banks were regulated on an individual basis in most countries. The idea was that if individual banks are limited in the risks they take, there cannot be a problem in the financial system. No specific considerations were given to systemic risk, systemically important institutions or cross-border banks. The regulation of the latter was tackled with memorandums of understanding. As already discussed in Chapter 1, these work in good states of the world but not in bad states, when protectionism and local preferences drive policies. Unfortunately, the recurrent occurrence of systemic financial crises has shown that the micro approach is not sufficient. For financial stability to be achieved, macro-prudential policies need to be designed based on systemic risks. These policies are considered further in the next chapter.

The third necessary measure is central bank independence in order to overcome the time-inconsistency problem, as suggested by Rogoff (1985). By delegating the running of monetary policy to an independent central bank charged with maintaining low inflation, it is possible to prevent a boom-bust cycle. The particular mandates of central banks may differ, depending on whether they are required to just fight inflation, like the European Central Bank, or whether in addition they are required to maintain full employment, like the Federal Reserve. In either case, however, central banks should avoid using interest rate policy to accommodate political needs such as elections.

In order for inflation targeting to be implemented, a target consumer price inflation rate is chosen. This can be done by the central bank itself or by the government. The target inflation rate acts as a nominal anchor for the economy and the independent central bank has to ensure that this target is implemented. It does this by making medium-term forecasts. If inflation looks to be too high, the central bank will raise interest rates, while if it is seen as too low it will cut rates.

In practice, many factors are taken into account in the process of setting interest rates, particularly if the central bank has a dual mandate that is concerned with the level of economic activity as well as inflation, as is currently the case in the US. More importantly, one of the main issues that has arisen with inflation targeting is the extent to which asset price inflation and, in particular, real estate prices should be taken into account in setting interest rates. It has been widely argued that central banks should only take asset prices into account to the extent they affect consumer price inflation and economic activity (eg, see Giavazzi and Mishkin, 2007). The idea is that asset prices are useful for providing information and may play a role in the transmission mechanism. However, they should not be targeted.

A standard tool of inflation targeting central banks is Dynamic Stochastic General Equilibrium Models (DSGE). These usually do not include a banking sector, however. The underlying assumption is presumably that problems in the banking sector are taken care of by regulation and that systemic risk has been eliminated. To the extent there is a financial sector, it consists of bond and stock markets that are important determinants of wealth. Where a more complex financial sector has been included in such models as that in Bernanke, Gertler and Gilchrist (1999), the sector typically involves a distortion, such as an agency problem, rather than a discontinuous event that causes a crisis.

The framework described above has turned out to be inadequate, particularly in the European Union. First, micro-prudential regulation of banks has been unable to maintain financial stability, largely because it has not recognised the problem of systemic risk. As a result, many European countries have had to provide bail-outs, particularly to cross-border banks, as previous chapters have documented. Second, rules to maintain fiscal discipline within the euro area have been ineffective because of the lack of proper enforcement mechanisms. Third, systemic risk arose in the private sector in countries such as Ireland and Spain. Before the crisis both had low debt-to-GDP ratios and were close to fiscal balance, so they were in full compliance with the Maastricht Treaty provisions. However, they have been among the hardest hit because of privately financed property bubbles. We next discuss in detail the sources and the propagation mechanisms of systemic risk and its importance for financial stability.

3.2 Sources and transmission mechanisms of systemic risk

Systemic risk arises from aggregate, and thus correlated, asset risk and from liability risk. Examples of the former are:

1. Common exposure to asset price bubbles, particularly real estate bubbles;
2. Fiscal deficits and sovereign default; and
3. Mispricing of assets.

Examples of liability risk are:

4. Currency mismatches in the banking system; and
5. Maturity mismatches and liquidity.

All these types of risks can lead to widespread crises in financial systems through a number of propagation mechanisms, such as.

6. Panic-based and fundamental runs; and
7. Contagion.

In what follows we discuss each type of systemic risk in turn and the propagation mechanisms.

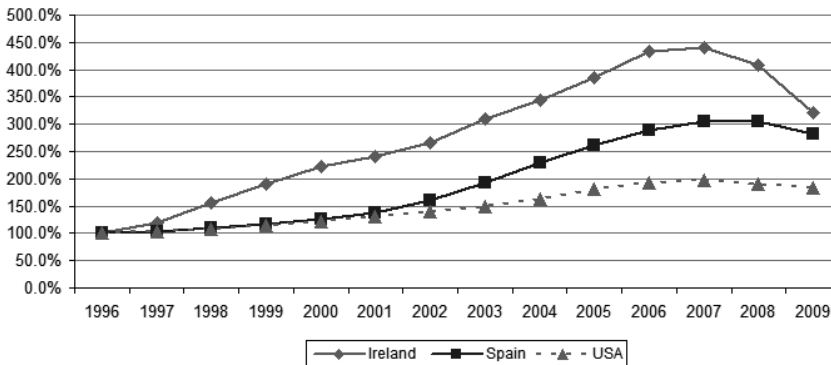
3.2.1 Real estate bubbles

Herring and Wachter (1999) and Reinhart and Rogoff (2009) provide persuasive evidence that collapses in real estate prices, either residential or commercial or both, are one of the major causes of financial crises. In many cases, these collapses occur after bubbles in real estate prices, which are often created by favourable macroeconomic conditions, such as those induced by prolonged loose monetary policy and excessive availability of credit. When the bubbles burst, the financial sector and the real economy are adversely affected.

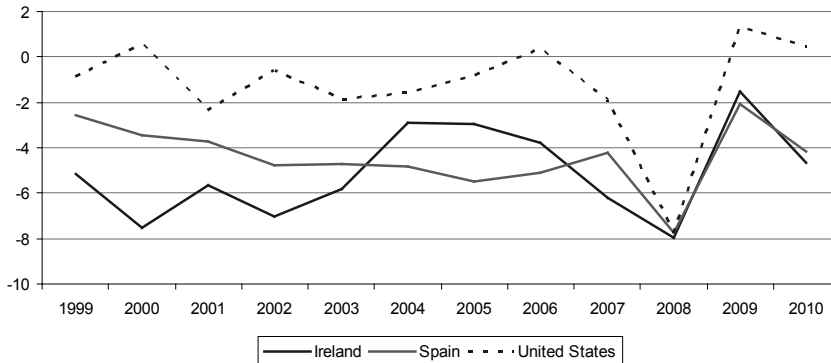
The current crisis provides a good example of this. Allen and Carletti (2010) argue that the main cause of the crisis was that there was a bubble in real estate in the US and in a number of other countries, such as Ireland and Spain. Figure 3.1 shows that in all three countries house prices rose significantly and then dropped. When the bubble burst this created problems in the real economy, as construction was a large sector in all these countries, but particularly in Ireland and Spain. In addition, in the US many financial institutions experienced severe problems because the fall in property prices led to a collapse in the securitised mortgage market. The fact that these securities were held by many European banks meant that the crisis spread quickly from the US to Europe.

Taylor (2008) argues that the real estate bubble was the result of favourable macroeconomic conditions and global imbalances that led to excessive credit availability. He suggests that prolonged loose monetary policy, especially in the US, contributed to excessive borrowing and thus to the creation of the real estate bubble. The Federal Reserve in the US set very low interest rates during the period 2003-2004 in order to avoid a recession after the tech bubble burst in 2000 and the 9/11 terrorist attacks in 2001. At the time, US house prices were already rising quite fast. As argued by Taylor (2008) and illustrated in Figure 3.2, these levels of interest rates were much lower than in previous US recessions, relative to the economic indicators at the time captured by the 'Taylor rule'.

Figure 3.1 Housing prices in Ireland, Spain and the US



Sources: Irish Dep. of the Environment, Banco de España, FHFA, OECD.

Figure 3.2 Deviations from the Taylor Rule in Ireland, Spain and the US

Notes: $TR_t = CPI_t + (\text{average IR over the sample period}) + 0.5*(CPI_t - 2\%) + 0.5*\text{output gap}_t$, where TR_t is the implied interest rate in period t , CPI_t is the consumer price index and IR is the central bank's official interest rate.

Sources: Data on inflation and output gap from the IMF World Economic Outlook Database and calculating the implied interest rate according to the formula.

As Figure 3.1 shows, Spain and Ireland also had very large run-ups in property prices. According to Taylor (2008), and as shown in Figure 3.2, these countries also had loose monetary policies relative to the Taylor rule. Spain, which had one of the largest deviations from the rule, also had the biggest housing boom, as measured by the change in housing investment as a share of GDP. Other countries in the euro area, such as Germany, did not have a housing boom; their inflation rates and other economic indicators were such that, for them, the European Central Bank's interest rates did not correspond to a loose monetary policy.

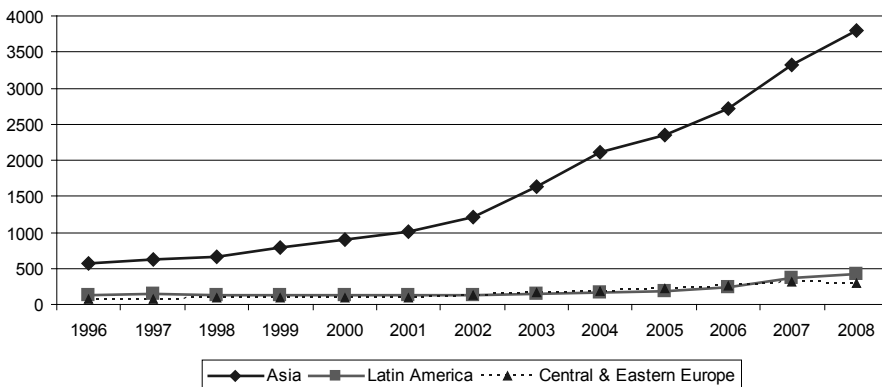
There is considerable debate about whether the Taylor rule provides a firm indication of the 'correct' level of interest rates. Furthermore, it is difficult to use monetary policy to lean against asset price bubbles in individual countries in a single currency area such as the euro area. Bernanke (2010) has argued that the Taylor rule is sensitive to the choice of inflation measure and to whether actual or forecasted inflation and output gaps are used. Once changes in these measures are introduced, it is no longer clear whether interest rates were unusually low, given the state of the economy, or whether house prices were unusually high, given interest rates and the state of the economy. Bernanke (2010) concludes that Taylor's claim is not persuasive enough. He suggests that what seems to have played a crucial role in setting the stage for the crisis is financial innovation in the form of mortgage contracts and securitisation. Rather than interest rates being set too low, the implications of financial innovation for monetary policy transmission were not understood by monetary policy makers. This failure, together with weak financial regulation and supervision, set the stage for the crisis.

There might be an interaction between asset booms, monetary policy, financial innovation and supervisory standards. Maddaloni and Peydró (2010) consider

the impact of low interest rates and securitisation on bank lending standards and risk-taking, using data from the euro area and the US. They find evidence that low short-term (policy) interest rates result in a softening of lending standards and increase in bank risk-taking. This effect is magnified when supervision standards for bank capital are weak, interest rates are held low for an extended period, and the more securitisation there is in an economy. Their results are more in line with Taylor's view that loose monetary policy is an important cause of the crisis. Similarly, Jiménez, Ongena, Peydró, and Saurina (2010) consider the impact of short-term interest rates on banks' risk taking. They use a unique data set from Spain on all loans since 1984, as well as all loan applications since 2002 up until the beginning of 2009, that can be matched with relevant bank and firm information. They find that loose monetary policy, in terms of low short-term interest rates, leads banks to take greater risks when granting loans, particularly banks with lower capital. Low long-term rates have much smaller effects. Using data from the credit registry in Bolivia, Ioannidou, Ongena and Peydró (2009) find similar results.

While the role of monetary policy in the creation of the recent real estate bubbles remains controversial, the role played by an expansion in credit in fostering them is less so. As Allen and Gale (2000a, 2007) have argued, asset price bubbles can also be caused by a growth in credit. During the recent crisis, credit expanded rapidly in many countries due to the presence of global imbalances. Several Asian countries have been accumulating large amounts of reserves since the late 1990s. Figure 3.3 shows that this acquisition of reserves was to a large extent an Asian phenomenon. The reserves in Latin American and central and eastern European countries did not increase significantly.

Figure 3.3 A comparison of foreign exchange reserves in different regions



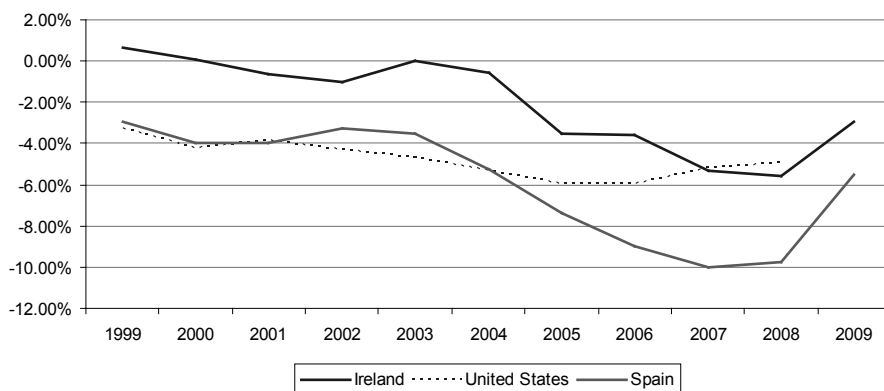
Notes: Asia is the six East Asian countries China, Hong Kong, Japan, Singapore, South Korea, Taiwan – province of China

Source: IMF website.

There are a number of reasons behind this Asian accumulation. Allen and Carletti (2010) argue that the Asian countries affected by the crisis of 1997 started accumulating reserves in response to the tough conditions that the International Monetary Fund imposed on them in exchange for financial assistance. The motivations for the reserve accumulation of China, which is the largest holder, are probably more complex than this. Beside the precautionary reason, China started accumulating reserves in order to avoid allowing its currency to strengthen and damage its exports, as well as to increase its political power.

The accumulated reserves were mostly invested internationally. Much of it was invested in US dollars, in debt securities such as US Treasuries, and Fannie and Freddie mortgage-backed securities. As Maddaloni and Peydró (2010) document, the large supply of debt in the US helped to drive down lending standards to ensure that there was enough demand for debt from house buyers and other borrowers. Funds did not only flow to the US. Ireland and Spain also ran large current account deficits, as shown in Figure 3.4. Cross-border banks and the interbank market considerably facilitated these flows.

Figure 3.4 Current account deficits as a % of GDP in Ireland, Spain and the US



Source: Eurostat.

In conclusion, the bursting of a real estate bubble can have damaging effects on the real economy and the stability of the financial sector. Although the cause of such bubbles remains controversial it is clearly important that policies be adopted to try and prevent them going forward.

3.2.2 Sovereign default

The Greek sovereign debt crisis in the spring of 2010, the subsequent Irish crisis in the fall, and the more recent application for European support by Portugal, have underlined the problem of sovereign default. For many decades there was no

credit risk for sovereign debt in developed countries. In Europe the introduction of the euro led to a significant integration in the bond market. The spread on the sovereign debt of the different euro area countries decreased significantly during this period. This reflected the idea that the monetary union across countries, together with the fiscal rules of the stability pact, would suffice to guarantee a greater fiscal harmonisation across Europe and thus the solvency of all euro area countries. Over the first part of 2010, it became clear that the architecture embedded in the Maastricht Treaty was not sufficient to achieve the predefined goals and that there can be credit risk in sovereign debt in Europe.

This is a serious problem in its own right but also a critical problem because of its effect on the stability of the banking system. If a sovereign defaults, banks are likely to face a severe problem particularly in the countries where the default occurs, but also in other countries, especially when these, like in Europe, are linked through a monetary union. Also, cross-border institutions operating in a variety of countries and holding a variety of sovereign debt are a potential source of propagation of sovereign default across countries.

The problems that started in Europe in the spring of 2010 show clearly that a sovereign debt crisis and the stability of the financial system are closely interlinked. The relation works both ways: The euro area crisis puts pressure on the financial system and the financial crisis in Europe puts pressure on the euro. Moreover, the European Union's financial system and the euro area share important features, like the lack of resolution procedures and burden-sharing, the reliance on voluntary cooperation among member states, and the presence of imbalances. There is no resolution procedure in Europe for a sovereign default and – as already discussed above – there is not a clear resolution mechanism for cross-border financial institutions. Cooperation and collaboration among European countries to bail-out a government in distress, or a cross-border institution operating in several countries, is voluntary in that there are neither clear rules nor guidelines on how this should be pursued. Some countries are clearly wealthier than others and the cross-border financial institutions operate with important imbalances between assets and liabilities across the different countries, as discussed in Chapter 2.

A sovereign debt crisis puts pressure on banks' balance sheets through different channels. For example, it increases the cost of funding for financial institutions since it increases the risk of their assets. Being perceived as being riskier, financial institutions holding large proportions of sovereign debt issued by countries in distress may have to pay higher interest rates and have more difficulty in raising funds in the wholesale markets. There may be potential pressure on these financial institutions to raise capital and liquidity holding. Finally, financial institutions operating in the country in distress may also suffer if the country experiences capital outflows and asset substitution and if the large amount of sovereign debt leads to a crowding-out of private investments.

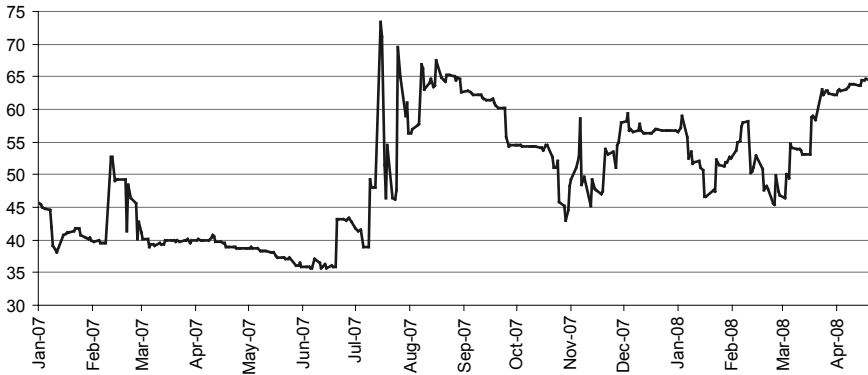
The European Union, together with the European Central Bank and International Monetary Fund, created a temporary facility, the European Financial Stability Facility (EFSF), to provide liquidity to countries in difficulty. This will last until 2013 and will be replaced by a permanent facility. However, the details of this have not been fully worked out – and in particular, its relationship to banking sector regulation. This issue is discussed further in the next chapter.

3.2.3 Mispricing of assets

A major problem in the current crisis was that many securitised assets fell dramatically in value. Since many of these were held by cross-border banks, the crisis spread quickly from the US to Europe. An important issue is the extent to which these values reflected fundamentals as opposed to mispricing of assets. According to the Bank of England (2008, pp. 18-21), if the changes in the prices of the (originally) AAA-rated tranches of subprime mortgage-backed securities and other structured credit products reflected a deterioration in fundamentals, the ultimate percentage loss rate of securitised subprime mortgages should have been equal to 38%. This would have been justified if, for example, 76% of households with subprime securitised mortgages would have defaulted and the loss given default rate had been 50%. These high default rates seemed, however, very unlikely. At the time, the estimates were that there would not be any default in AAA-rated subprime mortgage-backed securities, even with a continued decline in US house prices. Although it is still too soon to say what the final default rate will be, Amromin and Paulson (2009) report that after 23 months about 35% of subprime mortgages originated in 2006 had defaulted.

Perhaps more importantly, at the same time as the prices of AAA-rated tranches of commercial mortgage-backed securities and securitisations linked to corporate credit quality started declining, there was a dramatic increase in the co-movement of these instruments, as illustrated in Figure 3.5. Given the different fundamentals of these assets, the increase in co-movement also suggests that the falls in prices were likely not to be driven by fundamentals but rather by other explanations. Allen and Carletti (2008a) argue that the movements observed in the prices of the different AAA-rated tranches are consistent with the cash-in-the-market pricing of securities. The idea is that as news about the subprime default problems came out, many investors changed their estimate of the risk of these securities and readjusted their portfolios. This led to a wave of selling and overwhelmed the capacity of the market to absorb sales. As a result, prices of even the AAA-tranches fell. The prices of other securities such as AAA-rated tranches of commercial mortgage-backed securities then also fell, as they were traded by the same desks as securitised subprime products and so sales of these also led to a drop in prices.

Figure 3.5 Co-movement between AAA-rated US structured financial instruments (in %)



Notes: Graph plots the proportion of the variation in exponentially weighted daily changes in credit default swap premia for the most senior tranche of the ABX HE 2006 H1, CMBX NA Series 1 and CDX NA explained by the first principal component over a three-month rolling window.

Source: Bank of England calculations using data from J.P. Morgan Chase and Co. – Bank of England Financial Stability Report (2008, p. 24, Chart 1.19).

It remains to be explained why the drops in the prices of the AAA-rated tranches persisted over time. One might expect the cash-in-the-market prices to persist for a few days, but not for a prolonged period of time as happened during the crisis. According to the market efficiency theory, if assets become underpriced there is a profit opportunity. Investors can buy the underpriced security and make money. That incentive provides the arbitrage mechanism to make sure that prices rise to the correct level. In the crisis, this mechanism appeared to have broken down. In particular, it seemed that there were limits to arbitrage (see Shleifer and Vishny 1997). When, in the autumn of 2007, the prices of the mortgage-backed securities went down, some investment banks and hedge funds thought the securities were cheap and bought more. But the problem was that the prices kept on going down and this caused difficulties for many investors. It became too risky to arbitrage the securities. The mispriced securities became the so-called ‘toxic assets.’ In essence, once the link between prices and fundamentals is broken, the difference between them may widen in the wrong direction during the period of holding the position.

Another possible explanation of the pricing anomalies in the AAA-rated tranches of securitised securities is that they are due to asymmetric information as, for example, in Bolton, Santos and Scheinkman (2009). Strong adverse selection and moral hazard problems provide a potential explanation for the large discounts in prices for risky securities, like those backed by subprime mortgages. However, the sudden increase in the co-movements of AAA-rated tranches of different securities is more difficult to explain with the asymmetric information theory, as the fundamentals of the underlying instruments in commercial mortgage-backed securitisations and securitisations linked to corporate credit quality, had

not deteriorated much at the time. Another important issue with asymmetric information theories is how plausible the persistence of such asymmetries is over long periods of time. Given a few weeks it is possible to go through the documentation and carefully assess the risk of the mortgages.

The so called 'flash crash' of May 6, 2010 in the US, provides another example of the apparent mispricing of assets. In this case the official report (Securities and Exchange Commission, 2010) blames a particular trading strategy by a mutual fund for a dramatic drying up of liquidity and fall and recovery in prices in the space of a few minutes. At around 2:40pm major equity indices in both the futures and securities markets, which were already down about 4% for the day, fell another 5-6% in a few minutes, before rebounding almost as quickly. Some securities fell as much as 15% before recovering. Over 20,000 trades across more than 300 securities were executed at prices more than 60% away from their values at the start of the episode. Some of these were at prices of a penny or less, or as high as \$100,000. These trades were subsequently cancelled by the exchanges and industry association. At the end of the day the markets closed down about 3%.

Given the adoption of mark-to-market accounting for banks in the European Union, mispricing of assets is an important systemic risk. This is particularly the case for cross-border banks, where many assets from a variety of countries may be held. An important issue is whether mark-to-market accounting should be suspended when there is apparent mispricing. For example, if the flash crash had occurred just before markets closed it could have resulted in insolvencies of banks, if mark-to-market accounting were to be strictly observed.

3.2.4 Currency mismatches in the banking system

We next turn to the liability side of banks' balance sheets. An important source of systemic risk, which relates particularly to cross-border banks, is currency mismatches. This was one of the major problems in the 1997 Asian Crisis. Banks and firms in Korea, Thailand and the other countries had borrowed in foreign currencies, particularly dollars. When the crisis hit, banks and firms found themselves unable to borrow. The central banks did not have enough foreign exchange reserves and were unable to borrow in the markets. As a result, a number of countries had to turn to the IMF. Despite being one of the most successful economies in the world in the preceding decades, the IMF forced South Korea to raise interest rates in order to maintain the exchange rate and to cut government expenditure. Given that Korean firms used significant amounts of trade credit, the rise in interest rates had damaging consequences, bringing many thousands of them into bankruptcy. Unemployment went from around 3% to 9% and there was a long recession. This experience showed the Koreans the importance of becoming more independent economically by accumulating sufficient reserves

going forward. This was an important factor in the large increase in reserves, as shown in Figure 3.3.

During the Asian crisis bilateral swaps were not made available to Asian central banks. During the current crisis the major central banks agreed on foreign exchange swaps, which made a considerable difference in easing the international aspects of the crisis compared to 1997. Allen and Moessner (2010) describe the problems raised by cross-border and other banks lending in a low interest rate foreign currency and funding these loans in various ways.

The foreign currencies that were typically used to make loans were the US dollar, the Japanese yen and the Swiss franc. These were funded in two ways. The first was the international wholesale deposit market. The second was to take deposits in the domestic currency and then use the foreign exchange swap market to exchange these into the required foreign currency. The largest currency-specific liquidity shortage was 400 billion US dollars, in the euro area. The second largest was a shortfall of \$90 billion worth of yen in the UK. The next largest was \$70 billion worth of euros in the US, and after that, \$30 billion worth of Swiss francs in the euro area.

As the crisis progressed, banks found it more and more difficult to fund these shortfalls. The international wholesale deposit market dried up for many banks and became tight for many others. This forced funding of foreign denominated loans using domestic currency funding. Since longer maturities of domestic funding were also often unavailable, much of this funding was at short maturities, so the foreign currency mismatch was exacerbated by a maturity mismatch. The volatility in the foreign exchange markets meant these mismatches created a large amount of systemic risk for many banks, particularly cross-border banks.

The solution to this problem was swaps between central banks. Allen and Moessner (2010) provide a description of how these were implemented. Such swaps represent a very important component of macro-prudential measures to deal with problems raised by cross-border banking. They are discussed further in the next chapter.

3.2.5 Maturity mismatches and liquidity

Another important source of systemic risk originates from the maturity mismatch between liabilities and assets with which financial institutions operate. When confronted with a large liquidity demand, banks may be forced to sell some of their marketable long-term assets in order to satisfy it. This is not a problem if markets are liquid and can absorb large quantities of sales. However, when liquidity provision in the market is insufficient, mispricing of assets and fire sales may occur.

Asset pricing theory in financial economics relies on the assumption of fully rational agents and perfect and complete markets. Under these assumptions, assets are always correctly priced at their fundamental values. Agents understand risks perfectly; financial institutions and liquidity do not play any role and crises should not occur. The recent crisis, however, has shown the flaws of these theories in practice. Financial markets, including money markets, can work badly, and financial institutions and their role as liquidity creators can be at centre stage.

During the crisis there was considerable turmoil in the operation of the secured and unsecured interbank markets. The ECB, the Federal Reserve and other central banks significantly changed the way that they provided liquidity to the markets (eg, see, Heider and Hoerove, 2009, and Cassola and Huetl, 2010). It seems likely that without this liquidity provision a number of banks would have failed.

There are numerous theories that consider the role of liquidity in creating systemic risk (eg, see Gorton and Huang, 2004, Diamond and Rajan, 2005, Freixas and Holthausen, 2005, and Allen and Gale, 2007). Many of these combine the functioning of financial institutions and markets in a model of liquidity. Financial intermediaries provide liquidity insurance to consumers against their individual liquidity shocks. Markets allow financial intermediaries (and hence their depositors) to share aggregate risks. If financial markets are *complete*, the financial system provides liquidity efficiently in that it ensures that banks' liquidity shocks are hedged.

By contrast, in the plausible case where markets are *incomplete*, or there is some other kind of market imperfection, banks cannot hedge completely against shocks and the financial system stops providing an efficient level of liquidity. This can generate mispricing of assets, in that even the price of a safe asset can fall below its fundamental values. The reason is that with incomplete markets, liquidity provision is achieved by selling assets when liquidity is required. If liquidity is scarce, asset prices are determined by the available liquidity. Some financial institutions must hold extra liquidity that allows them to buy up low-price assets when liquidity is scarce. However, holding liquidity is costly, as it prevents investment in more profitable longer-term assets. With incomplete markets the suppliers of liquidity must be compensated for the cost of holding liquidity. Asset prices must be low in the states where banks need more liquidity and this can lead to financial instability. This leaves scope for central bank intervention in order to improve welfare.

In summary, when there are market imperfections, liquidity is costly to hold and asset price volatility is necessary to provide incentives to agents to hold it. But price volatility can cause crises. When prices fall to low enough levels, financial institutions go bankrupt. There is a market failure that provides the justification for central bank operations and other kinds of intervention in order to improve the allocation of resources and to avoid crises.

3.2.6 Panic-based and fundamental runs

A systemic crisis can materialise in various ways. First, financial institutions can experience widespread runs. These may occur when there is a generalised fear that other debt holders will demand their claims back unexpectedly, thus forcing the institutions into bankruptcy. We refer to this kind of situation as a panic. Another possibility is if one of the risks identified above materialises and causes a run that is justified by fundamentals. Second, a systemic crisis can result from the propagation of individual bank failures to others in the system through contagion. We start by considering panic-based and fundamental runs, and then in the next section discuss contagion.³⁸

Panic-based runs were analysed in the seminal works by Bryant (1980) and Diamond and Dybvig (1983). Agents have uncertain needs for consumption and long-term investments are costly to liquidate. They deposit their endowment in a bank in exchange for a demand deposit contract that insures them against their liquidity needs. If all depositors believe that the other depositors withdraw their funds only according to their consumption needs, then the good equilibrium arises in which the bank can satisfy all depositors' demands, without liquidating any of the long-term assets. If, however, depositors believe that other depositors will withdraw prematurely, then all agents find it rational to redeem their claims and a panic occurs. Although the importance of panics in the current crisis is unclear, they remain an important possibility and thus deserve some attention as one of the macroeconomic aspects of systemic risk.

The second set of theories suggests that banking crises are not random events but a natural outgrowth of the business cycle. The idea is that an economic downturn will reduce the value of bank assets, raising the possibility that banks are unable to meet their commitments. If depositors receive information about the impending downturn in the cycle, or any of the other events discussed in previous sections, they will anticipate financial difficulties in the banking sector and try to withdraw their funds prematurely, as in Gorton (1988). This attempt will precipitate the crisis. In this case crises are a response of depositors to the arrival of sufficiently negative information on the unfolding economic circumstances. Thus, a fundamental widespread run can, for example, result when banks are exposed to common asset shocks. When these turn out to lose value, as in an economic downturn or consequently to the burst of a bubble, then widespread fundamental runs may occur.

The empirical evidence is mixed on historical crises. Friedman and Schwartz (1963) argue that the systemic risk and financial instability in the US in the late nineteenth and early twentieth centuries were panic-based, as evidenced by the absence of downturns in the relevant macroeconomic time series prior to the

³⁸ We can only touch on some highlights of the literature on banking panics and crises here. More complete surveys are provided by Gorton and Winton (2003), Freixas and Rochet (2008), and Allen, Babus and Carletti (2009).

crises. In contrast, Gorton (1988), Calomiris and Gorton (1991) and Calomiris and Mason (2003) provide a wide range of evidence that most of the crises that occurred in the US in that period were fundamental-based.

3.2.7 Contagion

One propagation mechanism leading to systemic risk, that does appear to have been important during the recent financial crisis, is contagion. This refers to the possibility that the distress of one financial institution propagates to others in the financial system, thus leading ultimately to a systemic crisis. Central banks often use the risk of contagion to justify intervention, especially when the financial institution in distress is big or occupies a key position in particular markets. This is the origin of the term 'too big to fail'. The recent crisis abounds with examples of this. For example, Bernanke (2008) argues that the takeover of Bear Stearns by J.P. Morgan, arranged by the Federal Reserve Bank in March 2008, was justified by the likelihood that its failure would lead to a whole chain reaction, where many other financial institutions would have gone bankrupt. There would have been contagion through the network of derivative contracts that Bear Stearns was part of.

When Lehman Brothers failed in September 2008, it was presumably expected by the Federal Reserve that its failure would not generate contagion. In fact there was contagion, but it was quite complex. The problem spread first to the money market funds and the government had to intervene rapidly by providing a guarantee of all money market mutual funds. In addition, the failure of Lehman led to a loss of confidence in many financial firms, as investors feared that other financial institutions might also be allowed to fail. The volumes in many important financial markets fell significantly and there was a large spillover into the real economy. World trade collapsed and in trade-based economies, such as Germany and Japan, GDP fell significantly in the fourth quarter of 2008 and the first quarter of 2009. This dramatic fall in GDP in many countries underlines the importance of the process of contagion.

Despite its importance, our understanding of the effects of contagion risk is still limited. The academic literature has provided a few explanations of the mechanisms at play, but much work is still needed. The literature on contagion takes a number of approaches (see Allen, Babus and Carletti, 2009, for a survey). In looking for contagious effects via direct linkages, early research such as Allen and Gale (2000b) and Freixas, Parigi and Rochet (2000) studied how the banking system responds to contagion when banks are connected under different network structures. It is shown that incomplete networks are more prone to contagion than complete structures. Follow-up research focused on network externalities created from individual bank risk and some papers applied network techniques to the study of contagion in financial systems. The main result in this theoretical literature is that greater connectivity reduces the likelihood of widespread default.

However, shocks may have a significantly larger impact on the financial system once they occur.

A second type of contagion investigated by Wagner (2010a), Ibragimov, Jaffee and Walden (2010) and Allen, Babus and Carletti (2010) arises from common asset exposures. Diversification is privately beneficial but increases the likelihood of systemic risk, as portfolios become more similar. The use of short-term debt can lead to a further significant increase in systemic risk.

A key issue is how likely contagion is in practice. A substantial strand of empirical literature is based on the first type of approach, where financial institutions have direct linkages resulting from the mutual claims they have on one another. Most of these papers use balance sheet information to estimate bilateral credit relationships for different banking systems and estimate the stability of the interbank market by simulating the breakdown of a single bank.³⁹ Studies on Germany, Portugal, the US, Austria, and Belgium find that the banking systems demonstrate high resilience, even to large shocks. For instance, simulations of the worst case scenarios for the German banking system show the failure of a single bank could lead to the breakdown of up to 15% of the banking sector based on assets. Since these results depend heavily on how the linkages between banks are estimated and they abstract from any type of behavioural feedback, it is likely that they provide a downward biased estimator of contagious outcomes.

Several recent papers document empirically how indirect connections between financial institutions pose problems for systemic risk. Adrian and Brunnermeier (2009) propose a new measure for systemic risk that is conditional on an institution (or the whole financial sector) being under distress. Their concern is confirmed by Boyson, Stahel and Stulz (2008), who find that the average probability that a hedge fund style index has extreme poor performance increases with the number of other hedge funds with extreme poor performance. Similarly, Jorion and Zhang (2009) find evidence of credit contagion via counterparty effects.

In practice, contagion remains one of the most worrying concerns for policymakers. With the exception of Lehman Brothers, all the large financial institutions in distress have been saved during the crisis. Policymakers have acted upon the fear that the failure of a large financial institution would lead to a chain of failures through the financial system. This argument certainly has its justification in the importance of preserving a stable financial system. However, one also has to keep in mind that even when there is a realistic risk of contagion that justifies central bank or government intervention, bail-outs also involve costs that should be traded off against the costs deriving from contagion. These costs of intervention include the future moral hazard associated with increased risk-taking by financial institutions going forward.

³⁹ This literature is surveyed in Upper (2007).

3.3 Conclusions

In recent years the standard macroeconomic framework that was widely used in Europe and other parts of the world was inflation targeting. This framework, however, did not explicitly incorporate a role for banks, with the justification that micro-prudential regulation of banks took care of financial sector risks. The recent crisis has clearly shown that this approach is inadequate because it ignores systemic risks.

In this chapter we have considered a number of different types of systemic risk that threaten cross-border banks and other banks and intermediaries. On the asset side of the balance sheet, we have considered common exposure to real estate bubbles, sovereign default, and mispricing of assets. On the liability side of the balance sheet, we have discussed currency mismatches in the banking system and maturity mismatches and their implication for liquidity. All these types of risks can lead to systemic crises in the financial system through panic-based and fundamental runs and contagion. In the concluding chapter we consider, among other things, macro-prudential regulation in order to counteract these systemic risks.

4. Policy Implications

In this report we have documented and reviewed the role of cross-border banking during the crisis. We have also analysed the financial stability and broader macroeconomic aspects of cross-border banking. In this chapter, we discuss the policy implications of our analysis. Much has been written on the implications for financial supervisory policy, the so-called micro-prudential dimension of supervision (eg, see De Larosière, 2009). We focus on three other dimensions: (1) the resolution framework for cross-border banks; (2) the macro-prudential dimension; and (3) broader macroeconomic reforms that can reduce the risks stemming from cross-border banking. We will provide recommendations for policy actions on three levels: the national level, the EU level and the global level. The latter can comprise action on bi- or multi-lateral levels, with respect to specific banks, or coordination on a supra-national level, but not necessarily on the EU level.

Before we provide our specific policy recommendations, we first address the key question whether solutions should be adopted at the European or national level. Section 1 reviews the need for European policies. Next, we start in Section 2 with our recommendations on macro-prudential and macroeconomic policies. Finally, we consider the appropriate policies for resolution in Section 3. Section 4 summarises our recommendations in a schematic format.

4.1. The need for European solutions

Regarding the future of banking, Europe faces a fundamental choice. It can either continue on the path of cross-border banking based on the single market, or retreat to national banking with 27 segmented banking markets in the EU. This fundamental choice is based on the financial ‘trilemma’, which states that the three objectives of maintaining European financial stability, fostering cross-border banks and preserving national sovereignty, do not easily sit together (see Schoenmaker, 2011). Any two of the three objectives can be combined, but not all three; one has to give.

Assuming that safeguarding European financial stability is a desirable goal, the choice is between cross-border banking and national sovereignty. In the first case, the financial crisis has taught us that we need new European institutions, such

as the new European Supervisory Authorities and the European Systemic Risk Board, and new approaches to provide appropriate solutions for monitoring and, if necessary, resolving European banks. In the second case, cross-border banks are required to organise themselves as a string of national stand-alone subsidiaries (foregoing the single market). National authorities will then monitor and, if needed, resolve the separate subsidiaries. Some loose coordination between national authorities may then suffice.

A full cost-benefit analysis of the options would involve calculating the costs for the financial system and the impact on the economy. On the financial system side, cross-border banks would face the costs of maintaining separate capital and liquidity buffers at their national stand-alone subsidiaries. In a first study on this topic, Cerutti *et al* (2010) simulate the potential capital needs of 25 major European cross-border banking groups resulting from a credit shock affecting their affiliates in central, eastern, and southern Europe (CESE). The simulations show that under ring-fencing (stand-alone subsidiaries), sample banking groups have substantially larger needs for capital buffers at the parent and/or subsidiary level.⁴⁰ On the economic side, the cost of capital may start to differ among the EU member states. The purpose of the single market in banking is to integrate banking markets and thus to drive down the cost of borrowing across the EU to the lowest denominator (see Guiso *et al*, 2004). When banking markets are segmented, the cost of borrowing may start to rise in banking markets that are dominated by foreign stand-alone subsidiaries with higher capital and liquidity buffers.

In this report, we therefore follow the first option to maintain the efficiency gains of the single market in banking. In the next two sections, we examine the macro-prudential policies and the resolution policies for the European banking system consistent with this objective.

4.2. Macro-prudential and macroeconomic policies

The previous chapter has highlighted a number of sources of systemic risk in the financial sector. Systemic risk played an important part in the crisis. Large cross-border banks in Europe, such as the Royal Bank of Scotland and Lloyds Bank Group in the UK, and Fortis in Belgium and the Netherlands, were significantly affected. This section discusses the macro-prudential regulatory measures and broader macroeconomic policies that could, and should, be put in place in order to deal with the identified sources of systemic risk. Some of these measures are general in the sense that all financial institutions should comply with them. Others should rather be designed and implemented only for large cross-border institutions, as these institutions often contribute the most to the emergence of

⁴⁰ Cerutti *et al* (2010) find that in the case of ring-fencing the sample banks' aggregate capital needs resulting from a CESE shock are 1.5–3 times higher than in the case of no ring-fencing.

a systemic financial crisis. Finally, some measures that will be discussed, such as those aiming at preventing bubbles or avoiding sovereign default risk, should be designed to guarantee a stable macroeconomic environment.

What is most important is that the new macro-prudential regulation deals with systemic risk and no longer only with the risk of failure of single financial institutions.⁴¹ The current crisis has clearly shown that the micro-prudential approach to financial regulation does not suffice to prevent systemic crises. In the following, we follow the outline of section 3.2 and identify the challenges for each macro aspect of cross-border banking, before we turn to specific recommendations in the next sub-section.

4.2.1 Recommendations for macro-prudential and macroeconomic policies

1. Dealing with asset price bubbles

As highlighted in the previous chapter, asset prices bubbles seem to be one of the major causes of financial crises. Bubbles, in particular real estate bubbles, seem to be caused by loose monetary policy and excessive credit supply. One way to prevent them is through interest rate policy. In particular, very low interest rates at a time when property prices are surging should be avoided. Once they have started, the question is whether interest rates should be raised to prick them. It may be possible and desirable to do this in economies with a high degree of homogeneity, such as in small countries like Sweden or possibly the UK. However, doing this may be difficult for political reasons. In particular when such policies are first introduced, it may be difficult to explain why it is worth causing a recession to burst a property bubble. Also, raising interest rates in small open economies may have the effect of attracting capital from overseas, increasing credit and exacerbating the bubble situation.

The problem is more complicated in large heterogeneous economies like the euro area, the US, or China. Different regions within these economies differ in terms of economic fundamentals and the rate of property price increases. Using interest rates to prick bubbles will not be so desirable because this will adversely affect the areas that do not have bubbles. The recent events in the euro area constitute a clear example. The interest rate policy followed by the European Central Bank was correct for countries like Germany, where there was no bubble, but it was inappropriate for Spain, where it contributed to the creation of the property bubble. A tighter policy may have been effective for preventing the bubble in Spain but at the cost of a recession or at least slower growth in some of the other countries.

⁴¹ Christensson, Spong and Wilkinson (2010) provide a nice summary of three policy steps associated with macro-prudential regulation and supervision: (i) Countercyclical regulatory policy; (ii) control of contagion risk; and (iii) discretionary policies.

When interest rates cannot be used, it may be better to use other forms of macro-prudential regulation to prevent bubbles. One example would be limits on loan-to-value ratios that would be lowered as property prices increase at a faster pace. This can be effective for residential property but may be difficult to enforce for commercial property. The reason for this is that firms may be able to use pyramids of companies that effectively increase leverage. Another measure is to have property transfer taxes that are greater the higher the rate of property price increases. Another, perhaps more direct, measure is to impose restrictions on real estate lending in certain regions.

Saying that monetary policy should not be used to prick bubbles in larger economies, or in monetary unions where countries have different economic conditions, does not imply that monetary policy should not be constrained. One of the most important macro-prudential measures should be constraining monetary policy so that it does not trigger bubbles. Excessively low levels of interest rates should not be implemented, particularly when real estate prices are already rising. A possible way to do this is to set up a check-and-balance mechanism. The idea behind this is to introduce some form of accountability for central banks. Another, more drastic, way to do it is to give central banks the clear mandate to prevent asset bubbles.

As discussed in the previous chapter, the second major cause of bubbles is excessive credit. During the recent crisis excessive credit emerged because of large global imbalances. To prevent bubbles in the future, it is important to solve this problem. While it is individually advantageous for countries to self-insure by accumulating reserves, this is an inefficient mechanism from a global perspective.

One important issue in the European context is whether there should be restrictions on imbalances within the EU. As has already been pointed out, countries like Spain and Ireland have run large current account deficits in the years preceding the current crisis. These seem to have contributed to the emergence of bubbles in those countries. Going forward, it is important to control external imbalances, especially when a current account deficit fuels domestic imbalances, such as a credit boom and/or a construction boom. The European Commission has proposed an expanded scope for European-level surveillance in the form of the 'excessive imbalances procedure' (EIP), which will monitor external and domestic sectoral imbalances, using a scorecard approach to signal the emergence of imbalances.

An important question is whether these rules should be distinguished depending on what the deficits are funding. For example, countries could be tolerated to run large current account deficits when these are used, as in eastern Europe, to expand the manufacturing sector or other industrial activities. In contrast, large current account deficits should not be allowed when they fund large increases in the real estate sector. This clearly leaves open the issue of how to effectively control the use of current account deficits.

2. Fiscal deficits and sovereign default

The Greek and Irish sovereign debt crises in 2010 underlined the problems with the design of the euro area. The stability pact contained rules on the amount of current public deficits. The possibility that a country would go into default, however, was not even contemplated in the architecture of the euro area. When the Greek crisis emerged, there were therefore no guidelines or regulations that could be used. In the end, the way the EU and the euro area dealt with the problem of sovereign default was to set up the European Financial Stability Facility (EFSF). In 2013, this will be replaced by the European Stability Mechanism (ESM). While the precise details of how this will operate are yet to be finalised, in essence it will be similar to the EFSF, in that countries will be lent funds when they are unable to borrow money at reasonable rates in the market. In exchange they will be required to introduce austerity programmes to ensure they cut deficits and return to budget balance quickly. However, in contrast to the EFSF, access to the ESM will require a prior debt sustainability assessment. If it is assessed that a country's debt is not sustainable, existing creditors will be bailed-in before ESM funding is made available.

These mechanisms obviously create moral hazard, in that they change the incentives of governments to deal with fiscal excesses. In addition, there is the question of how sustainable the bail-out mechanism is in terms of political economy. If Greece, Ireland or any other countries do default or restructure their debt, Germany will pay a large share of the cost. This opens the question of how much German voters are willing to subsidise defaulting countries. In such a scenario there may be demands to pull out of the euro area in order to avoid having to make large transfers. This political economy problem is a very serious one. As the perception that a country might default increases, investors will have to make a judgement as to how this political process will play out. This makes the effect of the guarantees quite uncertain.

The sovereign debt crisis has led to calls for the reform of the Growth and Stability Pact. This was designed to prevent governments from running up large debts and then not fulfilling their obligations. One issue is how meaningful the pact is anyway because of the fact that once France and Germany flouted it and were not penalised in the early 2000s, it became clear the rules were unenforceable except on the small countries. However, perhaps a more serious problem with the pact is that the country that is among those under the highest pressure at the moment, namely Spain, was actually doing extremely well in terms of the pact criteria, as it was running a surplus and had low levels of public debt.

In part, the apparent good performance under the pact was a mirage, in the sense that fiscal revenues were artificially high due to the high level of domestic spending associated with the large current account deficit and the wealth effect of a housing boom. In addition, potential output growth was overstated, due to the impact of sectoral and external imbalances in driving up output levels in an unsustainable fashion. In retrospect, much larger fiscal surpluses would have

been more appropriate in view of these imbalances. Indeed, the new economic governance rules for the EU are directed at providing an institutional framework that can facilitate the running of larger surpluses during boom periods. Moreover, to the extent that a core weakness was the large current account deficits that were funding the property bubble, the scope of macroeconomic policy should be expanded to guard against such imbalances (see Lane, 2010).

This raises the question of whether the pact needs to be reformed to include restrictions on capital inflows that are invested in real estate. A similar argument applies to Ireland. While the European Commission has proposed an expanded scope for European-level surveillance in the form of the 'excessive imbalances procedure' (EIP), which will monitor external and domestic sectoral imbalances, the optimality of the proposed scorecard approach is open to question.

The real problem with sovereign default is the contagion that will follow such an event. For example, if Greece does default then there is likely to be a severe problem of instability among Greek banks and among many other countries' banks. Under the current arrangements there would be great uncertainty as to how any workout would proceed and this in itself would considerably exacerbate the problems in the markets. After Argentina's default in 2001, it took a great deal of time to determine how much creditors would receive.

A better solution to the problem of sovereign default is perhaps a bankruptcy mechanism of some kind that would avoid the need for a bail-out. This would remove a great deal of the uncertainty, especially if the process could be expedited. Also, there could be the equivalent of corporate debtor-in-possession finance for governments. If Greece does default then the first thing the Greek government could then do is to issue senior bonds to save its banking system. One way that such a mechanism could work is for the country to declare default. A team from the ECB and the European Commission would do an assessment of what the best repayment structure would be.

Another issue raised by the question of sovereign default is what risk weights should be attached to sovereign debt. Banking regulation should recognise that the market views the debt of many countries as a worse credit risk than the debt of many corporations. One way to do this is to assign risk weightings and diversification requirements on sovereign debt. This should be done in conjunction with the introduction of a bankruptcy mechanism.

3. Policies with regard to mispricing of assets

As discussed in Chapter 3, one of the major problems in the current crisis is that many securitised securities appear to have been mispriced. The problem is to design policies that allow this problem to be corrected. This was the origin of the TARP programme in the US. The idea was that by buying large amounts of the toxic assets the Treasury could restore the functioning of the market. In practice they were unable to actually implement the programme. This type of direct

intervention seems problematic to say the least. Clearly there are significant political economy issues. There are also issues of whether such a scheme could actually restore the market to proper functioning. This is one of the most important areas of macro-prudential policies. As yet, no convincing solutions have been suggested.

Given the lack of an immediate solution to this problem, what should governments do? One of the major problems is that recent reforms have ensured that financial institutions mark their assets to market. In normal times this is undoubtedly the best system. Financial institutions have traditionally used historic cost accounting for many of their assets. This system has the disadvantage in that it allows institutions to hide falls in asset values for significant periods of time.

How should the advantages and disadvantages of mark-to-market accounting be balanced? As long as markets are efficient, mark-to-market accounting dominates. However, if as during times of crisis they cease to be efficient, market prices do not provide a good guide for regulators and investors. The key issue then becomes how to identify whether financial markets are working properly or not. Allen and Carletti (2008b) suggest that when market prices and model-based prices diverge significantly (more than 2% say), financial institutions should publish both. If regulators and investors see many financial institutions independently publishing different valuations, they can deduce that financial markets may no longer be efficient and can act accordingly.

4. Currency mismatches

As discussed previously, one of the major problems in the 1997 Asian Crisis was that the banks could not get hold of foreign currencies. One of the reasons that currency mismatches were not such a problem in the current crisis was the introduction of central bank currency swaps (see Allen and Moessner, 2010). These swap networks involved considerable overlap. As they were organised between central banks the credit risk borne was sovereign rather than commercial. The receiving central bank would then pass on the foreign currency to firms and financial institutions so that they bore the commercial credit risk. Some of the swaps between central banks were collateralised with the currency of the counterparty central bank. These swaps considerably eased foreign exchange problems during the crisis and are widely regarded as having been successful.

One major issue that the G20 has been considering, last year and this year, is the introduction of a foreign exchange safety net. Many of the emerging countries want to have the type of swaps used in the crisis guaranteed to be available should another crisis arise. At the moment the US is unwilling to do this. The EU should perhaps push for this as it is, to a large extent, European banks that have a shortage of dollars. This is a very important aspect of cross-border banking.

5. Maturity mismatches and liquidity

As discussed in Chapter 3, many banks rely on asset markets being liquid in order to deal with maturity mismatches. In a financial crisis these markets can dry up, which causes significant difficulties. In the current crisis, central banks were required to introduce extraordinary measures to provide liquidity to markets. This included taking a much wider range of collateral than they had done in the past and increasing short-term lending to banks. Changing the procedures for providing funds, by introducing new types of auction and so forth, played an important role in their liquidity provision. All of this was done in a very short timeframe. The measures worked in the sense that they averted banks failing because of a lack of liquidity. More careful consideration of the optimality of different procedures is needed going forward.⁴² So far, there has been little assessment of the benefits and costs of the different measures introduced.⁴³

6. Panic-based and fundamental runs

As argued previously, it is unclear whether panics have played an important role in the current crisis. In contrast, panics were thought to be the main cause for the occurrence of runs in the past. Starting with the influential work of Friedman and Schwarz (1963) it was widely believed that the crises that occurred in the US, in the latter part of the nineteenth century up until the early 1930s, were mostly caused by panics. The introduction of deposit insurance for retail depositors represented one simple way to stop them. The idea is that if people know that the government will cover any losses, it becomes rational for everybody to leave their money in the banking system. This eliminates runs stemming from panics. Moreover, since the guarantees will not be called upon, they are costless.

During the crisis, two problems emerged with deposit insurance. The first is the principle of co-insurance, which was applied in the UK. As UK depositors only received 90% of their deposits, they still had an incentive to run on Northern Rock. This design fault was subsequently repaired by a move to a full 100% insurance of up to €100,000 across all EU countries (the US has even moved further to full deposit insurance up to \$250,000 in the crisis). The second problem relates to cross-border banking. Deposit insurance is based on the home country principle. This is consistent with the single market regime for supervision, which is also home country based. But when the major banks in Iceland failed, the Icelandic authorities only covered the domestic deposits and failed to repay the deposits in the foreign branches. So the credibility of deposit insurance for cross-border banks is now in question. A European deposit insurance fund would address this lack of credibility. It reinforces the notion that cross-border banks should be resolved at the European level, as discussed in the next section.

42 Perotti and Suarez (2010) propose a liquidity risk charge for short-term wholesale funding. This liquidity charge would induce banks to get more stable funding with a longer maturity, thus reducing the maturity mismatch.

43 Gerlach-Kristen and Kugler (2010) outlines the measures introduced by the major central banks and the limited literature that assesses them.

However, deposit insurance is only for small depositors. It does not cover large deposits or wholesale funding that, as shown in the recent crisis, constitute the majority of funding for many financial institutions. As a result, deposit insurance alone is no longer adequate to solve the problem of panics. A simple possibility is to extend deposit insurance and guarantee for all forms of short-term debt. While this solution can be effective in preventing panics, it has the clear drawback of generating moral hazard. If banks have access to low-cost funds guaranteed by the government, they have an incentive to take significant risks. A better solution to prevent risk-taking may be to remove deposit insurance and deal with the problem of panic runs through lender of last resort policies. If depositors know that the central bank will provide the needed liquidity if they attempt to withdraw early, they will not withdraw and there will not be a run. As always though, it is not easy to distinguish between panic and fundamental runs and this will make it difficult for a lender of last resort policy to be effective.

The final problem with deposit insurance and guarantees is that they may be very costly. If panics were the only problem, the authorities could prevent them costlessly, as mentioned above. However, in practice there are many types of systemic risk and this may mean that large amounts of funds are needed to make good on the guarantees. Ireland is a good example of this. In such cases, guarantees can threaten the solvency of the state. In providing deposit insurance and guarantees, great care needs to be taken to balance the probability of preventing runs with the fiscal cost of the policies when other systemic risks hit.

7. Contagion

As argued in the previous chapter, contagion is arguably one of the most important systemic risks. Despite its importance, it is not yet fully understood how contagion can occur and there is little work done so far on how to stop it. The channels for contagion are multiple, ranging from direct linkages among banks on the interbank market or the payment system to common asset exposure.

There may be a need for several policies and regulations that address the different channels and types of contagion. Capital regulation has been the main tool for regulating banks in recent years and has been coordinated internationally through the Basel agreements. There is a long-standing debate on how much capital banks should hold. The recent crisis and the current discussions behind the proposal for a new regulatory framework have highlighted the difficulties embodied in these proposals. The starting point of the discussion is that capital is a more costly form of funding than debt so that, if unregulated, banks minimise the use of capital. There is therefore the need for a regulation that forces banks to hold minimum levels. The same argument is typically assumed in the academic literature (eg, see Gorton and Winton, 2003).

Modelling the cost of equity finance for financial institutions is one of the major problems in designing capital regulation. The first issue is whether equity is in fact more costly than debt. If that is so, the second issue is whether equity is

more costly only in the financial industry or also in all other industries. It is the case that financial institutions hold approximately 10% of capital while industrial companies operate with 30-40% equity. Understanding the reasons for this large difference in capital structures is of crucial importance for designing capital regulation appropriately (eg, see Miles, Yang and Marcheggiano, 2011 and Admati, DeMarzo, Hellwig and Pfleiderer, 2010).

One simple answer as to why capital is privately more costly is that in many countries debt interest is tax deductible at the corporate level but dividends are not. It is not clear why this is and whether this should be the case. There does not seem to be any good public policy rationale for having this deductibility, which appears to have arisen as an historical accident. If tax deductibility is why there is a desire to use debt rather than equity, then the simple solution is to remove it.⁴⁴

A final point concerns the reason why financial institutions hold so little capital relative to other industries. The tax deductibility argument cannot explain this difference, as it holds for all industries. A more plausible explanation is that debt in the financial industry is implicitly subsidised through government guarantees and bail-outs. If this is why financial institutions rely so much on debt, then it is necessary to remove guarantees and create credible enforcement mechanisms, *ie*, proper resolution procedures – a topic we will turn to below. Without this, banks will continue to minimise the amount of capital they hold and the society will bear the costs of this through increased financial instability.

4.3. Resolution policies

Chapters 1 and 2 have shown how interwoven the economies of the EU are through their banking systems. In the Nordic and Baltic regions, in particular, the economies are very much linked through some large banks. The Scandinavian connections are neither balanced nor diversified. The contagion effects can be therefore strong. A shock can spread swiftly through the region. Another illustration is the dependence of the NMS on their western neighbours and the connectedness between these western European countries and the NMS. The NMS were experiencing severe problems during the financial crisis, putting pressure on the foreign banks active in the NMS. The countries of the parent banks, notably Austria, became very worried about the solvency of their banking system. In the Vienna Initiative, the relevant countries and the international organisations provided assistance to the NMS in order to prevent a meltdown (see Chapter 1).

⁴⁴ Other possible rationales for the high cost of equity are agency problems within the firm. According to this rationale, the cost of equity is that it does not provide the correct incentives to shareholders or managers to provide the right monitoring. High leverage is needed to ensure this. There is little empirical evidence that this is in fact a severe problem in the banking sector. For example, leverage in private equity and venture capital firms where the agency problem seems much greater is typically less than in banks.

The policy question is how to resolve cross-border banks in such an interconnected setting? We identify three alternative policy options to address the interconnectedness:

1. Change banking structures
2. Ring-fence through subsidiaries
3. Share the financial stability risks

The first option involves diversifying the banking inflows and outflows of countries. In that way, a country becomes less exposed to the failure of a particular financial institution. Such diversification would be difficult to achieve in a free market system. It would imply that banks are 'ordered' to diversify their cross-border flows. To make it really work authorities have to assure that enough banks with sufficiently large flows would enter each EU country. In addition, banks would need to expand abroad, including the banks in the NMS. Such interference with the free market order is not realistic.

The second option aims at separating the banks on national lines. As soon as business starts to grow in a certain country, a bank has to establish a separate subsidiary. These subsidiaries would each have to hold adequate liquidity and solvency buffers. As discussed in section 2, this approach can be very costly.

The third option is to share the financial stability risks among countries. Taking the interconnectedness as given, banks would be supervised and resolved at the European level or, where appropriate, at the sub-regional level. In the next subsection, we discuss the key elements of a European resolution regime.

We apply the following guiding principles for an orderly and swift resolution:

- Shareholders take the first losses;
- Unsecured creditors take the residual losses;
- Senior management can be replaced, if needed;
- A special resolution regime is in place;
- A resolution plan is prepared;
- Public support is only provided if private sector solutions are exhausted and stability concerns are overriding.

4.3.1 Recommendations for resolution policies

1. Contingent capital

It has been widely suggested that banks should issue convertible debt that could be converted into equity in the event of a crisis. The issue of this kind of security by the Royal Bank of Scotland and Lloyds in the UK, Rabobank in the Netherlands, Credit Suisse in Switzerland and UniCredit in Italy, is an example. The idea is that 'CoCos' have two main advantages. First, it is not necessary for banks to raise capital in difficult times as it would already be available. Second,

contingent capital allows sharing losses with debtholders. This would also have a disciplinary role and would induce bank managers to behave more prudently.

Overall, the use of CoCos or any other hybrid instruments has the potential to enhance bank stability, but only if financial institutions will issue a large enough amount of them and conversion will occur at the right time. For this, in the design of these instruments it is important to take into account other aspects that affect the functioning and the stability of the financial system. For example, if market triggers are to be used, it is important to recognise that markets do not always work efficiently and that market illiquidity may affect prices significantly. Similarly, the conversion, in particular if occurring simultaneously in several financial institutions, has the potential to generate panics, sudden withdrawals and downward spirals in prices. Finally, even if fully successful, the use of CoCos may still not be enough to ensure that financial institutions will always remain solvent. Their use has therefore to be complemented by proper and credible *ex post* mechanisms.

Given all the uncertainty related to the design and the effects of contingent convertibles, one important question is why not simply force banks to hold higher levels of equity instead? That way the capital is always in place and problems associated with conversion are avoided. The main advantage of convertibles is that they are designed to have interest that is tax deductible, while dividends on equity are not. If there was no tax advantage to CoCos it is not clear there would be any incentive to issue them. This points to the fact that much of the debate about capital regulation should actually be about tax reform, as discussed in the previous section.

2. Resolution at group level

Irrespective of whether financial institutions will be required to use CoCos or equity to raise capital, it can still happen that they will experience difficulties and won't be able to maintain the required regulatory capital or to obtain funding from the market. What should happen then? Should the financial institution in distress be allowed to fail or be bailed out? As argued in the previous chapter, the principle of 'too-big-to-fail' has been one of the most important principles guiding policy during the recent crisis. The notion is that if a large financial institution, or one which occupies a special position in the financial system, is allowed to fail, this is going to cause contagion through the financial system. To avoid this, with the exception of Lehman Brothers, governments have saved important financial institutions that would otherwise have failed by buying warrants, preferred shares and common stock. The effect of this type of intervention has been to provide a guarantee to long-term bondholders as well and to potentially create a severe moral hazard problem in the future. Evidence suggests that larger financial institutions hold less capital and are riskier than smaller ones (see Carletti, 2010, for a survey of this evidence). The reason for this seems to be that these institutions internalise that they are too-big-to-fail and thus anticipate that they will be bailed out. Moreover, even if appropriately

designed, bail-outs may be inefficient in that they keep inefficient institutions alive and generate disparities between small and large banks, with negative competitive consequences for the former.

It can be argued that the indiscriminate bail-outs that occurred during the current crisis are not the right way to deal with the too-big-to-fail problem. As Lehman Brothers' bankruptcy in September 2008 illustrated, contagion is a very real problem and large banks and non-bank financial institutions should not be allowed to simply go bankrupt. However, too-big-to-fail does not mean that these institutions should be allowed to survive. It is not necessary to bail-out an institution to prevent contagion. Too-big-to-fail does not mean – 'too-big-to-liquidate.'

Financial institutions should definitely be prevented from failing in a chaotic way. The purpose of resolution plans is to allow for an orderly winding down of (parts of) a large systemic financial institution. Large financial institutions have multiple legal entities, which are typically interconnected through intercompany loans, funding arrangements, etc. While supervisors try to restrict intercompany exposures, banks optimise their activities across business lines and not necessarily across legal entities. In this process of business optimisation, banks do several intercompany transactions between the legal entities. It is therefore more cost effective to resolve a failing bank at the group level, where the intercompany transactions are falling away in the consolidation (see Avgouleas, Goodhart and Schoemaker, 2010). In its consultation paper on resolution, the European Commission (2011) also proposes resolution at group level.

A group level approach would also imply that resolution plans (living wills) are prepared at group level. In these group resolution plans, systemic banks have to conduct a strategic analysis of how they could be resolved under the applicable insolvency laws. Banks have to map business lines to legal entities and provide information on their corporate structure. If needed, they have to simplify their structure.

3. *Clear lines of command*

National interests can be overriding in times of stress, in particular when public money is spent. The resolution of cross-border groups in the global financial crisis was done on national lines. Examples are the Lehman Brothers, Fortis and the Icelandic banks. In order to establish an effective group-level approach, a clear line of command is needed. That can be done through a central European resolution authority (see Fonteyne *et al*, 2010). Alternatively, a new supervisory approach can be followed, where the European Banking Authority (EBA) is at the centre of the network of national banking supervisors in the EU. Central command is embodied in this decentralised structure as follows. The EBA has the power of mediation when two or more national supervisors disagree. More importantly, EBA can override national supervisors in times of crisis.

Depending on the choice of resolution authority (supervisor or central bank), the EBA or the ECB can be given this central power in the college of resolution authorities. The current proposals (see European Commission, 2011) only provide for a group resolution authority coming from the home country (where the consolidated supervisor also resides). While the group resolution authority is seen as the *primus inter pares*, it has no binding decision-making authority. So each national resolution authority can still go its own way in the resolution of a cross-border bank.

4. Compatible resolution regimes and insolvency framework

Resolution regimes are typically designed to deal with domestic failures. A general issue is whether bank resolution is based on general corporate insolvency law or on a special resolution regime that ensures a higher speed of procedures. The UK, for example, implemented a special bank resolution regime in order to increase the range of options for the authorities and to speed up the process (see Avgouleas, Goodhart and Schoenmaker, 2010). A challenge for the failure of a cross-border bank is the incompatibility of national insolvency regimes. There are different approaches. Under the territorial approach, each country resolves the domestic parts of a cross-border bank within its borders. This basically boils down to ring-fencing the assets within the country. This is the approach adopted in the US. Under the universal approach, the institution as a whole, *ie*, including its foreign branches (but not subsidiaries), is resolved across borders. This was the approach adopted in the EU through the winding-up directive.⁴⁵ But even in countries with a universal insolvency procedure, each authority may pursue its own national interests in a crisis. These different approaches are clearly not compatible. The resolution plans make these inconsistencies transparent.

The first issue is to develop special resolution regimes for banks (and more broadly systemically important financial institutions) to allow for a swift resolution. The incompatibility of national resolution regimes makes the resolution of cross-border banks almost impossible. Group-level resolution can only work if national resolution regimes are compatible. In the aftermath of the crisis, countries are in the process of introducing national resolution regimes. The European Commission (2011) is working on an integrated regime for the EU.

In addition to the work on special resolution regimes for banks, it is also important that the key elements of the insolvency procedures are harmonised or, at a minimum, made compatible. Avgouleas, Goodhart and Schoenmaker (2010) suggest a standard insolvency model for systemically important financial institutions. Such a standard insolvency model would be a special regime with respect to general insolvency laws. Such a regime may only be introduced into

⁴⁵ EC Directive (2001/24/EC) on the reorganisation and winding up of credit institutions and EC Directive (2001/17/EC) on the reorganisation and winding up of insurance undertakings. This Directive is currently under review.

national legal orders by means of special legislation to ensure that it will not be vulnerable to legal challenge before national courts.⁴⁶

5. *Appropriate burden-sharing arrangements*

A final, and most controversial, element of an effective resolution framework is appropriate burden-sharing arrangements. While private sector solutions are preferable and should always be explored to the full first, there may be cases where public support is needed to keep systemic banks (or part of systemic banks) alive to prevent a meltdown of the financial system. We have experienced that in the recent global financial crisis.

Game theory suggests that national authorities will follow their own national interest when they have to refinance a failing cross-border bank. As mentioned earlier, good examples of this coordination failure in Europe are the handling of Fortis and the Icelandic banks. *Ex ante* burden-sharing arrangements can overcome this coordination failure (Goodhart and Schoenmaker, 2009). By agreeing *ex ante* on a burden-sharing key, authorities are only faced with the decision to intervene or not. In that way, authorities can reach the first best solution: if the social benefits (systemic stability) exceed the costs, the intervention will go ahead according to plan. There is no fight about the division of the burden across the countries as it is pre-arranged.

Given their strong banking connections, the Nordic and Baltic authorities are pioneering burden-sharing. In August 2010, they agreed to a burden-sharing scheme to make up for lack of proper diversification (see Nordic Baltic Memorandum of Understanding, 2010). Under this burden-sharing scheme, the ministries of finance share the costs of a possible bank failure according to a burden-sharing key reflecting the spread of their assets over the different countries. Enforcement of burden-sharing mechanisms is important. While the European Financial Stability Facility is legally binding, the Nordic Baltic MoU is not legally binding. The Nordic Baltic arrangement can be strengthened by incorporating the burden-sharing arrangement in the resolution plans of the Nordic banks. Resolution plans may thus enable specific burden-sharing institution by institution.

4.4 Summary of recommendations

In this chapter we have reviewed the policy implications of cross-border banking. We have made, in particular, recommendations on macro policies (both macro-prudential and macroeconomic) and resolution policies. The key recommendations are summarised below in Matrix 4.1 and spelled out in the following. We organise the 10 recommendations along two dimensions: ‘policy

⁴⁶ An example of such a special regime is the ISDA master agreement and its close out netting clauses, which provide a mechanism for the reduction of credit exposure in the markets.

dimension' (macro-prudential, macroeconomic – fiscal and monetary, and resolution policies); and 'decision level' (national, EU and global).

4.4.1 Macro-prudential policies

1. Applying macro-prudential tools to prevent bubbles

Different forms of macro-prudential regulation may be used to prevent bubbles. An example is limits on loan-to-value ratios that would be lowered as property prices increase at a faster pace. Next, Basel III introduces a countercyclical capital charge that increases when the economy is in upswing (credit growth to GDP is above trend) and decreases in the downswing. These tools are applied at the country level, as asset price bubbles tend to be country specific.

2. Monitoring the national application of macro-prudential tools, exposure to cross-border banks and overall exposures of the EU banking system

As important as the application of macro-prudential tools on the national level is a proper monitoring at the EU level. Institutions, such as the ESRB and the ECB, are critical in this context. Similarly, a careful analysis of the exposure to cross-border banks for each EU member and of the diversification of this exposure is called for. Moreover, the aggregate exposures of the EU banking system should be monitored by the ESRB and ECB.

3. Risk-weights for sovereign debt

Banking regulation should recognise that the debt of countries, including OECD countries, can be risky. One way to do this is to assign risk weights and diversification requirements on sovereign debt. This could be done in the Basel Committee on Banking Supervision, consisting of central banks and supervisors.

4. Mark-to-market rules to avoid mispricing of assets

As long as markets are efficient, mark-to-market accounting dominates. However, since during times of crisis they cease to be efficient, market prices do not provide a good guide for regulators and investors. When market prices and model-based prices diverge significantly (more than 2% say), financial institutions should publish both. If regulators see many financial institutions independently publishing different valuations they can deduce that financial markets may no longer be efficient and can act accordingly.

4.4.2 Macroeconomic policies

5. Eliminate tax deductibility of debt

Minimum capital is needed to foster sound banking, but equity is perceived to be more costly than debt. One of the reasons why capital is privately more costly is that in many countries debt interest is tax deductible at the corporate level but dividends are not. The removal of tax deductibility across all sectors can go some

way towards reducing the incentive to use debt rather than equity in financial institutions.

6. Bankruptcy regime for countries

A solution to the problem of sovereign default is a bankruptcy mechanism of some kind that would limit the need for a bail-out. This would remove a great deal of the uncertainty, especially if the process could be expedited, as well as reduce moral hazard risks. One way that such a mechanism could work is for the country to declare it cannot fully meet its debt obligations, which would be verified by a team from the IMF, ECB and the EC that would then assist in designing the optimal repayment plan. A high priority for this element of the proposed European Stability Mechanism (ESM) is to establish this bankruptcy mechanism in a transparent and predictable fashion.

7. Standing foreign exchange swap facilities

Currency mismatches are an important feature of cross-border banking. In crisis times, shortages of certain currencies can and do happen. When central banks arrange foreign exchange swap facilities, they can provide the private banking sector with sufficient foreign currency to alleviate any shortages. Adjustments to mandate and legal regimes of the central banks involved might have to be made.

4.4.3 Resolution framework

8. Compatible bank resolution regimes including contingent capital

Reform of bank resolution regimes at the national level is critical in order to avoid corner solutions, such as costly and moral hazard inducing bail-outs, or lengthy and disruptive liquidations. In the aftermath of the crises, many countries are therefore in the process of introducing special resolution regimes to allow for orderly and swift resolution. These national regimes should be compatible in order to facilitate the resolution of cross-border banks. Next, shareholders and unsecured debtholders should share in the losses to a larger extent than they currently do. Banks could therefore issue convertible debt that could be converted into equity in the event of a crisis. These so-called CoCos have two main advantages. First, it is not necessary for banks to raise capital in difficult times as it would already be available. Second, contingent capital allows sharing losses with debtholders. This would also have a disciplinary role and would induce bank managers to behave more prudently.

9. European-level deposit insurance and bank resolution framework

The credibility of current deposit insurance arrangements based on the home country principle for cross-border banks is in question. A European deposit insurance fund would address this lack of credibility. It would also reinforce the notion that cross-border banks should be resolved at the European level. While different institutions are possible, a European-level framework for deposit insurance and bank resolution is critical in order to enable swift and effective

intervention into failing cross-border banks, reduce uncertainty and strengthen market discipline. Depending on the choice of resolution authority (supervisor or central bank), the new European Banking Authority (EBA) or the European Central Bank (ECB) can be given this central power in the college of resolution authorities.

10. Resolution framework on bank group level with ex ante burden-sharing agreements
Resolution plans for cross-border banks should be developed to allow for an orderly winding down of (parts of) a large systemic financial institution. As large financial institutions have multiple legal entities, interconnected through intercompany loans, it is most cost effective to resolve a failing bank at the group level. This can imply a split-up of the group, sale of parts to other financial institutions and liquidation of other parts. In this context, *ex ante* burden-sharing arrangements should be agreed upon to overcome coordination failure among governments in the moment of failure and ineffective *ad hoc* solutions. By agreeing *ex ante* on a burden-sharing key, authorities are faced only with the decision to intervene or not. In that way, authorities can reach the first-best solution. While burden-sharing should be applied at the global level, it can only be enforced with a proper legal basis. That can be provided at the EU level, or at the regional level. A first example, albeit legally non-binding, is the Nordic Baltic scheme.

Table 4.1 Matrix of policy recommendations for cross-border banks

	Macro-prudential	Monetary – Fiscal	Resolution framework
National	1. Applying macro-prudential tools to prevent bubbles	5. Eliminate tax deductibility of debt	8. Compatible bank resolution regimes, including contingent capital
EU	2. Monitoring the national application of macro-prudential tools, exposure to cross-border banks and overall exposures of EU banking system	6. Bankruptcy regime for countries	9. European-level deposit insurance fund and resolution framework
Global	3. Risk weights for sovereign debt 4. Mark-to-market rules to avoid mispricing of assets	7. Standing foreign exchange swap facilities	10. Resolution framework on bank group level with <i>ex ante</i> burden-sharing agreements

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