The Quest for Stability: The financial stability view

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Edited by
Morten Balling, Jan Marc Berk and Marc-Olivier Strauss-Kahn

Chapters by:
Nicola Brink and Michael Kock
Henk J. Brouwer
Dirk Schoenmaker
Jukka Vesala

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List of Authors

Nicola Brink
Head of the Financial Safety Net Division, Financial Stability Department, South African Reserve Bank, Pretoria

Henk J. Brouwer
Executive Director in charge of Banking Supervision, De Nederlandsche Bank, Amsterdam

Michael Kock
Senior Economist, Research Department, South African Reserve Bank

Dirk Schoenmaker
Dean, Duisenberg School of Finance, Amsterdam

Jukka Vesala
Deputy Director General, Prudential Supervision, Finnish Financial Supervision Authority, Helsinki

1. INTRODUCTION

Morten Balling, Jan Marc Berk & Marc-Olivier Strauss-Kahn

On September 3-4, 2009 SUERF and Utrecht University School of Economics jointly organized the 28th SUERF Colloquium *The Quest for Stability* in Utrecht, the Netherlands. The papers included in this SUERF Study are based on contributions to the Colloquium.

Chapter 2 "Macroprudential supervision: from concept to practice" by *Henk J. Brouwer,* Executive Director, De Nederlandsche Bank, compares micro-prudential and macro-prudential supervision with supervision of an airplane. Each part of an airplane must be monitored regularly but it is also crucial to monitor the whole aircraft and its ability to fly which depends on the interaction of all parts. Authorities with responsibility for respectively macro and micro issues should be under one roof, as is the case in De Nederlandsche Bank. The responsibility for financial stability should be anchored in legislation. A stronger legal backing is needed both at EU level and the national level. The mutual understanding between micro and macro experts needs to be strengthened.

Chapter 3 "How to bring in systemic risk considerations into financial regulation and supervision?" is based on the contribution by *Jukka Vesala,* Deputy Director General, Finnish Financial Supervision Authority. The author presents a review of several regulatory options. He argues against proposals to limit the size of individual institutions and to narrow the scope of bank activities per institution. Narrow banking would imply loss of synergy and lead to a financial environment in which non-banks develop even further and uncontrolled and unsupervised risks spread even more. Public intervention should be neutral, with it being left to the market forces to shape the structure and scope of the business activities of individual firms. The core issue is to strengthen risk management in especially systemic institutions in order to limit the probability of their failure. We should refrain from introducing another capital adequacy yardstick than the present Basel II risk-based minimum capital charge. Public authorities should not determine when a capital buffer should be built-up. The size of buffers should be based on individual banks' internal models and specific portfolio composition. Banks could be required to have a capital buffer based on recessionary parameters. Data requirements could be extended to cover past recession periods. In conclusion, the author repeats that sources of systemic risk should be managed within the present risk-based prudential regulation and supervision framework.

Chapter 4, "The Quest for Financial Stability in Europe" is by *Dirk Schoenmaker,* Dean, Duisenberg School of Finance, Amsterdam. According to the author, an important lesson to be learnt from the 2007-2009 financial crisis has been that coordination among European countries is wanting. Present crisis arrangements are primarily national based. Coordination works when the interests of the national governments are aligned. If national interests diverge, coordination breaks down. There is a need to put crisis management at a European footing. In addition, there is a need to upgrade macro-prudential supervision in the European Union. In tables, the author presents what he calls a toolkit for financial supervision and stability and an overview of the current division of powers between national and European authorities. Inspired by the de Larosière Report, the author explores the implications of stronger European cooperation concerning financial supervision.

Chapter 5, "Assistance to Financial Institutions in Distress: Implications for Central Banks" is written by *Nicola Brink* and *Michael Kock* from the South African Reserve Bank. The authors compare the interventions by the Federal Reserve System, Bank of England and European Central Bank and the implications of these interventions for the central banks themselves. In the period from August 2008 until December 2008, the balance sheets of the central banks more than doubled in total. The paper explains to what extent special loan facilities contributed to the growth and structural changes of the balance sheets in the three central banks. The Fed has emerged as being the most aggressive of the three central banks and has accepted large risk exposures related to uncollateralised loans and corporate securities.

2. MACROPRUDENTIAL SUPERVISION: FROM CONCEPT TO PRACTICE

Henk J. Brouwer

I'm of course delighted to be here at this 28th SUERF Colloquium. The interaction between academics and practitioners is now more important than ever. As the darkest clouds over the economy seem to be lifting, and the first sunbeams are breaking through, we have to make important decisions about the future design of the financial landscape. There are many questions and uncertainties about the specific characteristics of the new financial system. Not in the least because of the massive public interventions that have taken place. However, we all agree about one thing. The new financial system has to become more stable. Hence, this colloquium on 'The quest for stability' could not be more topical.

As an executive board member of the Dutch central bank, I have covered the central banking part of the institution for many years, before taking up responsibility for banking supervision at the start of this year. Hence, I should be in a good position to reflect today on the interface between these two areas. The place where macro and micro come together. That is, the so-called macroprudential approach. A rather new and difficult term, which even my up-to-date Microsoft spell checker still does not recognize. So in order to avoid confusion, I will first clarify this concept a bit more, before going into its practical implications.

2.1. WHAT IS THE MACROPRUDENTIAL APPROACH

The word 'macroprudential' is today on everyone's lips. Yet, the concept remains somewhat ambiguous. What do we mean when we say that we need a macroprudential approach? What is the difference with microprudential supervision? And what are the benefits of macroprudential supervision and regulation? Although it is easy to extend this list of questions, it is not always easy to answer them.

First, I have to point out that, although the current financial crisis has illustrated the importance of macroprudential supervision, the concept itself dates back to much earlier. The Bank for International Settlements used the term already in the late 1970s. It realized that focusing supervision exclusively on individual institutions is not sufficient to ensure financial stability. However, it was just since the start of this century that efforts were made by Andrew Crockett and Claudio Borio (BIS) to define the concept more precisely. Basically, they described the con-

cept by comparing micro and macro prudential supervision. I will do the same here.

Microprudential supervision tries to limit the distress of individual institutions. Think about supervision of banks like Rabobank or ING. In this case, the ultimate objective is to safeguard the stability of the institution and the interests of investors and depositors. Macroprudential supervision on the other hand aims to limit the risk to the financial system. So instead of looking just at Rabobank, ING or any other individual institution in isolation, we look at the system as a whole. The ultimate objective of this approach is to limit the probability and severity of financial crises, mainly in terms of costs to GDP.

It is useful to illustrate this with an example. Compare the financial system with a complex machine. For instance an aeroplane. Although a plane is much easier to navigate than our financial system, this analogy will fit my purpose. Since the safety of a plane is essential, each individual part, like the engine or wing, is monitored on a regular basis. Besides this, the parts of a plane need to satisfy strict quality requirements. Note that the main concern here is the functioning of the individual components. This is the microprudential dimension. Now, forget about the individual parts and try to take a macroprudential perspective. Since our ultimate objective is to prevent a crash, we need a broader view than just focusing on the individual elements. We want to assure that there are no vulnerabilities in the technical infrastructure of the plane. We want to give special attention to very crucial, systemically relevant parts that have little back-up and could by themselves cause a crash. And we definitely want to analyze in detail and high frequency the weather conditions. Thus, a macroprudential approach asks for a broader, more system-oriented perspective.

2.2. EMERGENCE OF MACROPRUDENTIAL PERSPECTIVE IN SUPERVISION

Now that we have some idea of what the macroprudential approach actually is, it is not difficult to imagine why it has been in the lime light for some time, and why, with this crisis, it is back on centre stage. Basically, a few forceful trends have amplified the move towards a macroprudential approach. First we have witnessed a wave of financial liberalization and globalization since the 1980s. Booming international trade has been accompanied by a rapid increase in cross-border financing. Financial institutions responded to these developments by spreading their wings and transforming themselves into global players. At the same time, with the benefit of new computer technologies, financial institutions drove many new innovations. More recently, this process of financial integration and innovation experienced a huge acceleration. The wide-spread use of collateralized debt

products and credit default swaps are just two examples of this. Over the years, these structural changes increased the efficiency of international capital flows, and of financial markets more generally. However, they also contributed to periods of market turbulence, asset bubbles and financial crises. The financial system has become far more complex. It is like we have exchanged a manageable one-propeller plane for a large high-speed jumbo jet – or perhaps even a stealth fighter, hard to detect on the radar.

A second trend has to due with the size and complexity of financial institutions. A number of institutions have become so important that they can be considered as systemically relevant. Not only due to their large balance sheets but also since they may dominate a particular market or are deeply embedded in the financial system. Ex post, an example to illustrate this is the demise of Lehman Brothers. This bank was so important to the financial system that its failure caused a financial earthquake. Its role in the global financial system was like the control stick, or one of the wings of the airplane. When troubles arise in these crucial parts it is extremely difficult to prevent a crash. Thus, the emergence of a larger, more integrated and complex financial system as well as the emergence of larger and more interconnected financial institutions need a macroprudential approach to mitigate systemic risks.

Finally, the focus on the macroprudential approach can be explained by the substantial economic costs of financial crises. Since the financial system has become more interconnected and complex, the impact of a crisis has increased dramatically. I think it is not necessary to elaborate on this since we all see and feel the impact of the crisis we are in today.

Without a doubt, in the run-up to the crisis, the macroprudential approach was certainly in the picture and early warnings were given by financial stability institutions, including my own central bank. But clearly, an adequate and effective macroprudential framework has been lacking.

2.3. PRACTICAL IMPLICATIONS

The dramatic impact of this crisis has brought the discussion on macroprudential oversight back to the fore. Although we are still investigating the black box, most experts agree about one thing: the macroprudential approach to supervision should become more important and better anchored. The challenge now is to put these ideas into practice. So, for the remaining part of my speech, let me elaborate on the practical implications of a macroprudential approach.

We can distinguish two broad categories when we practice macroprudential supervision. That is, rules and discretionary policies. The rule-based approach

can be built through automatic stabilizers that aim to limit system-wide risks, ex-ante. The construction of countercyclical capital buffers by the Basel Committee is an example of this. However, the difficulty to assess cycles makes it dangerous to rely purely on automatic mechanisms, that cannot be precisely calibrated. An autopilot for our financial system is certainly useful, but we also want to be able to adjust the course manually. Therefore, we need discretionary judgement and intervention. Yet, several issues have to be addressed to implement a proper discretionary macroprudential approach. I will focus on the institutional setting, the macroprudential monitoring and follow-up, and the role of financial stability in legislation.

2.4. INSTITUTIONAL SETTING

First, the institutional setting. What is the best institutional architecture for a macroprudential approach? Should we have a separate central bank and prudential supervisor? Or should we merge the two as we have done in the Netherlands? This question has been subject to heated debate for years now. But the crisis has shed new light on the answer. We have learned again that macroeconomic and financial imbalances can closely interact. So it is of great importance that we incorporate the macroeconomic dimension in our prudential framework. Since central banks have an analytical advantage in judging the business cycle, monitoring financial markets and the payment system, it makes sense to give them a pivotal role in assessing financial stability. Moreover, we should ensure intensive interaction between macro- and microprudential supervision. In my view, the first and most logical step is to bring both disciplines close together, ideally under one roof. Just the simple fact that colleagues in both fields can easily grab a cup of coffee together can make a difference. I think DNB already has taken some important steps in this direction. In 2004 we merged with the Pension and Insurance Supervisory authority. This brought prudential supervision of all relevant financial players within one organization. From then on we not only supervised individual institutions, but also focused on cross-sectoral risks. To make the most of this new set up, we simultaneously established a financial stability division.

2.5. MONITORING

The main objective of this division is to play a coordinating role in preserving financial stability. For that reason, we have to map risks in our financial system continuously. An important instrument in monitoring the financial system is macro stress testing. The forward-looking nature of this tool gives supervisors and institutions insight into broader vulnerabilities and the impact of shocks. From the macroprudential perspective, stress tests disclose possible behaviour

responses of firms that are often at the heart of systemic risk. At DNB, we conduct these macro stress-tests on a regular basis. In my view this tool is an indispensable part of the overall macroprudential framework.

Macroprudential analysis often finds it way in financial stability reports, in DNB's case called the financial stability overview. This semi-annual report analyses the condition of the Dutch financial sector and is used internally by microprudential supervisors. We also publish a shorter version with more aggregate information for the general public. Financial stability reports are an important macroprudential tool in the sense that they increase the awareness of vulnerabilities in the financial system.

However, I think that they have more potential and should be enhanced. By saying this, I do not refer to the analysis as such, but I am talking in particular about the follow-up. Some financial stability reports that were published before the crisis were shockingly accurate. Take for example our own financial stability report of March 2007. This edition contains a stress scenario that assumes a complete dry up of interbank funding. In the earlier overviews, we had pointed at the rapid increase of leverage, the vulnerabilities of the credit risk transfer model, and the risks of a sudden and sharp adjustment. These warnings were not exclusively given by DNB. Other central banks, the ECB included, and the IMF signalled the same risks in their financial stability reports. We have to acknowledge that, although there were signs that imbalances were building up, no, or only limited concrete policy actions were taken. It is like signalling dangerous thunderstorms on the flight route but not altering course. If we want to make the macroprudential approach work, we have to find a strategy for mitigating the risks that we identify.

2.6. TRANSLATING WARNINGS INTO POLICY

Hence, the discretionary approach to macroprudential supervision requires a translation of judgements into concrete risk mitigating policies. There are several difficulties in doing this.

For instance, it is difficult to signal the building up of imbalances on a timely basis, also because we need to have some comfort about observed weaknesses and about the probability of related risks materializing. In an international context, efforts are currently being made by the IMF and the FSB to develop a quantitative method to monitor systemic risks continuously. These so-called early warning exercises have risen to the top of the policy agenda. However, even when we are certain about specific vulnerabilities, it is hard to convince private or, for that matter, public agents of the need to alter their behaviour. It is not easy to take away the punch bowl at a party, especially when the party is just starting. The

IMF has extensive experience with policy recommendations that are not lived up to. Related to this, how transparent can we be regarding imbalances and risks without creating a self-fulfilling prophecy? In other words, how do you communicate about risks when the environment is already vulnerable without precipitating the crisis?

So although we have definitely made progress in developing our macroprudential monitoring framework, we need to think seriously about how we should use it. In this regard, continuing development of macroprudential policy instruments is crucial. I think the use of discretionary adjustments to capital ratios, provisions and margin requirements are a good starting point. However, in contrast to monetary policy that clearly has its own instrument; it is difficult to identify a distinct effective set of discretionary macroprudential tools. In fact, I think the search for effective macroprudential instruments is one of the greatest challenges for central bankers and supervisors in the near future.

In the meantime, we should continue to make efforts to ensure that the expertise of macro and microprudential supervisors comes together. It is important that this interaction takes place on the basis of mutual trust, confidentiality and understanding. This is why at DNB we have internal financial stability reports that give concrete guidance and policy recommendations. We enhanced the process of horizontal interactions within the organisation by working with multidisciplinary teams that bring micro and macro expertise together around specific themes or cases. In the European context as well, steps have been taken to enhance the macroprudential approach.

2.7. FINANCIAL STABILITY IN LEGISLATION

Finally, I want to say a few words on anchoring financial stability in legislation. It is evident that the financial system has become far more complex than it used to be several decades ago. Many new players have arrived and financial institutions have become increasingly interconnected. Central bankers have a difficult task in guarding the stability of this complex financial system. The ongoing crisis stresses the need to improve our macroprudential instruments. In the same vein, we should create the necessary legal basis to allow a successful implementation of this macroprudential approach. If we want to be able to act quickly in case of stress, we need a legal backing. This is something that is currently being evaluated at European level by the commission. But also within our national boundaries, financial stability should get a firmer anchor. Most relevant laws, like the 'central banking law' in this country, offer sufficient room during normal times. However, they give little ability to intervene in case of an emergency. We do not want to pass through a thunderstorm for the reason that we cannot change course since we

then would cross forbidden territory. And we do not want a public organisation to violate the law either. If we take the macroprudential approach seriously, authorities should give priority to this issue. Right now we have the momentum to address difficult questions like shareholders' rights, insolvency laws, mandatory information sharing by non-regulated entities, and so on. This is one important step we have to take in our quest for stability.

2.8. CONCLUSION

Let me summarize the status of our flight today. There is common agreement of the need for an enhanced macroprudential approach for supervision. However, putting this noble ambition into practice is not easy. Several issues have to be addressed to make the concept workable. We need to strengthen the mutual understanding between micro and macroprudential supervisors. In addition we have to ensure that signalled risks are followed up by concrete policy actions. One way to realize this is by revising the instrumental and organisational setup, both on a national basis and globally. Another key priority for authorities today is to ensure that the financial stability mandate is better embedded in the relevant legislation. Although there are many other issues that have to be addressed, these are a good starting point. Of course, we should not have the illusion that with these changes we can prevent any future crisis. But we would already have accomplished a lot if such unfortunate event results in a smooth landing.

3. How to bring in systemic risk considerations into financial regulation and supervision?

Jukka Vesala[1]

3.1. Introduction

It has long been recognised that there are dangers in the almost exclusive focus of the micro-prudential regulation and supervision on the stability of individual institutions, failing to pay attention to the stability of the financial system as a whole (e.g. Borio and Lowe 2002, and Crockett 2000). However, rather little was done to change the approach prior to the present financial crisis. There are excellent and comprehensive analyses of the regulatory and supervisory failures leading to the present crisis e.g. in the de Larosière (2009) and Turner (2009) reports, and in the documents developed in the G20 process. It has now become clear that the systemic stability aspects were not well understood, which contributed to the severity of the present crisis, and that the pro-cyclical linkages between the financial sector and the overall economic performance are stronger than anticipated.

Consequently, the debate on the correct regulatory response has been centred on the question on how to reduce systemic risks to avoid another crisis of this magnitude. Frustration with the present framework has led many academics and policy-makers to propose an intrusive approach to deal with the issue, which could be labelled as "*elimination of systemic risks*". This approach includes: proposals to restrict the business activities allowed to regulated institutions (including 'narrow banking' proposals or even nationalizations of retail banks); higher capital ratios and leverage caps for systemic institutions; focusing supervision solely on legal units rather than financial groups; departing from international home-host principles and treating subsidiaries and branches as independent institutions; and cutting interbank and OTC derivatives market links between financial institutions.

In this presentation, I will argue against this approach and favour an alternative much less intrusive approach to "*manage systemic aspects*" via targeted measures *within* the current risk-based prudential framework. While not attempting to be comprehensive, I will also try to offer some concrete proposals to deal with the systemic risk aspects. I will organise my remarks in three categories: 1) Mitigating the financial stability concerns linked to the contagion of problems from one indi-

[1] The views and errors are my own responsibility.

vidual (systemic) financial institution; 2) Limiting the pro-cyclicality of financial regulation; 3) Enhancing the cooperation and coordination between micro- and macro-prudential authorities.

Underlying my analysis is the definition of financial stability adopted by Padoa-Schioppa (2004) as … "a condition in which the financial system is able to withstand shocks without giving way to cumulative processes that impair the allocation of savings to investment opportunities and the processing of payments in the economy". This definition focuses on the implications for the real economy as the key concern for public intervention in the financial sector. It also represents a broad definition of financial stability including the contagion of idiosyncratic problems across the financial system and the spreading of common problems of several financial institutions simultaneously. While the present crisis clearly started from idiosyncratic problems (i.e. the huge losses from US sub-prime related securities of Bear Stearns and Lehman Brothers and few other major institutions) and contagion through financial markets due to lack of liquidity, it has since then turned into a situation where the weakened condition of the whole financial sector and pro-cyclicality have triggered a major global recession.

3.2. LIMITING THE RISK OF FAILURES OF INSTITUTIONS THAT COULD NOT BE ALLOWED TO FAIL

3.2.1. Limits to size and/or business activities

As one solution to eliminate the systemic risks stemming from individual failures and to limit the moral hazard consequences of the public rescues of systemic institutions, *limits to the size* of single institutions have been proposed by e.g. Buiter (2009) and also Governor King. Size of institutions (that are 'too-big-to-fail') is considered to be the relevant aspect here. A complex or international business is not seen as a threat to systemic stability when business volumes are small.

A related and rather widely advocated proposal to deal with systemic risks and moral hazard has been '*narrow*' *or* '*public utility banking*'. Underlying this idea is also a lack of trust in the ability of regulation or supervision to adequately contain the risks of financial institutions.

In this approach, banks would just hold retail deposits on the liability side and reserves and very low risk or secured debt instruments on the asset side. Only 'narrow banks' would be entitled to take care of retail deposit and payment activities; and one could limit the public safety net (deposit insurance and lending-of-last-resort) to 'narrow banks' only. These institutions would not be allowed to engage in other financial activities, or have other sources of funding, thus limiting

the size of the banks and eliminating the possibility of excessive risk-taking (i.e. moral hazard). While 'narrow banks' would be closely supervised, the remainder of banking and financial activity would be completely free of regulation and supervision; but also excluded from the safety net.

The 'narrow banking' proposals are rather old and made by Merton and Bodie (1993), and even already much earlier by Tobin and Friedman when considering the virtues of '100% reserve banking'. There are three main reasons why I would think that the 'narrow banking' model would be clearly inferior to the present framework of not restricting the business activities of universal banks.

First, the model would be highly *inefficient* as it would break-up the synergies between the credit granting and deposit taking-functions of banks. For instance, Kashyap, Rajan, and Stein (1999) demonstrate that deposit-taking and providing credit lines can be regarded as manifestations of the same liquidity provision function, there are synergies between the two, and the need for liquid reserves and other resources would be much greater if the two services were produced separately.

Second, and most importantly, it will not be credible to leave major institutions *providing credit* to firms and households out of the scope of the public interest in the financial system. Following the definition of financial stability linking it with the performance of the real economy, it is not only the wealth of depositors which needs to be protected, but also the provision of credit to the economy.

Hence, the *scope of regulation and supervision* should be broad rather than narrow. Adoption of the 'narrow bank' model would probably lead to a financial environment in which non-bank banks develop even further and uncontrolled and unsupervised risks spread even more. The crisis has demonstrated that also other than banks can be sources of systemic instability and, hence, potential subjects of 'bank-like' regulation and supervision. For example, failures of investment banks, SIVs and hedge funds can be sources of contagion to the banking sector. Nevertheless, the banking system might still be the main link between the financial and real sectors of the economy through the credit and payment system channels.

Finally, the 'narrow banking' model might not even guarantee the stability of the restricted banks. By artificially restricting the margins earned by banks, one could actually increase the *incentives to gamble* in order to earn higher return on shareholder investment. Hence, a 'narrow banking' model would need to be coupled with ultra strict supervision of compliance with the investment restrictions.

The general reason for my negative stance to size and business restrictions is that, ideally, any public intervention should be *neutral,* leaving it to the market forces to shape the structure and scope of the business activities of individual firms.

Non-neutral regulation would always also cause competitive distortions, major inefficiencies and limit beneficial innovations. Moreover, the way in which financial activity can be structured makes it easy for financial institutions to circumvent any business limitations.

It is clear that before the crisis *financial innovations* went too far from investor transparency and risk management perspectives, for instance, but the underlying reason for banks' risk-taking in these instruments could actually be non-neutral regulation. Achraya (2009) attributes the expansion in the sub-prime related risks of major banks to circumvention of capital regulations rather than anything else. The two main channels of taking sub-prime exposures were: off-balance-sheet exposures via SIVs guaranteed by parent banks, and large super-senior tranches on banks' trading books, which were both treated much less stringently in the capital regulation than regular on-balance-sheet exposures. Hence, there was strong incentive to take on these risks as the returns on capital were high.

A specific problem is caused by "*too-big-to-save*" banks (as the Icelandic banking crisis demonstrates), which does not quite fit into the above analysis and where size restrictions might be even justified. Notably, the possibilities and incentives of national authorities to control the risk-taking of such relatively very large banks could be limited.

3.2.2. Strengthening risk management in systemic institutions

Rather than 'eliminating' systemic risks through intrusive regulations we should strive to 'manage' them within the current risk-based prudential framework. The core issue is to strengthen *risk management* in especially systemic institutions in order to limit the probability of their failure.

Risk management standards should be *graduated* to be more demanding for systemic institutions, reflecting the size and complexity of their activities and the externalities of their possible failures. After the outburst of the crisis, we saw that there were major shortcomings in the internal control and risk management functions in even the largest and most sophisticated financial institutions.

The origin of the present problems was the exposure to sub-prime securities. What we have, essentially, is one business area taking such a *large concentrated risk position* that can take down even some of the largest and complex banking organizations, active in dozens of business lines and countries. These institutions did not sell away or hedge these positions (especially in the super-senior tranches), as models told them the positions to be safe to hold and could be priced at a very low risk premium. With the benefit of hindsight, these risks were hugely mis-

priced and mismanaged. There was no central oversight (and maybe even understanding) of the major risk positions taken as there was largely management by profit objectives at the expense of effective centralized risk management. The senior management has to be aware of the firm-wide risks, risk-taking has to be in line with the overall policy of the organization, and risk management has to be strong enough to put in place the necessary controls upon the business units.

We need to have a framework that supports *incentives* for sound risk management. Supervisory authorities cannot perform this function and the main responsibility must lie with the banks themselves to implement sound internal governance and risk management. However, regulation and supervision also need to play an important role. Managers and traders are given implicit or contractual incentives by share-holders to take on risks. But it can be seen based on the finance literature that the incentives can be 'wrong' due to principal-agent problems and failure to internalise the costs of financial distress and systemic risks (see e.g. the seminal analysis by Dewatripont and Tirole 1993).

There has been a lot of attention in the literature to effective *market discipline* in providing the incentives for sound risk-taking and management. However, the present crisis has demonstrated major failures in the ability of market discipline to constrain institutions' behavior (see e.g. Gropp and Vesala 2003 and 2004 for discussion on the possibilities and limits of market discipline). The incentives of creditors and share-holders to influence management could be thwarted by the fact that systemic institutions would always remain in the public interest to be rescued without losses to non-insured creditors and even share-holders. Incentives to influence can also be reduced by the difficulty of reaching private sector solutions in case of major institutions (Mayes et. al. 2009). Hence, one would need to generate much stronger incentives to creditors and share-holders by restricting the public sector safety-net and setting out pre-agreed rules to deal with failing institutions, but even this might be regarded as time-inconsistent policy. Therefore, the role of official regulation and supervision is central in supporting sound risk management in systemic institutions, while market discipline should assume a complementary role.

More precisely, regulations would need to set out strong-enough *standards for risk management*, like independent and strong-enough status in the organization; and for corporate governance, such as requiring remuneration policies which do not encourage taking huge short-term bets. The observance of the principles in the actual activities of the institutions will need to be closely supervised, which puts high demands on supervisors' resources, and supervisors should spend more resources and set higher standards regarding the actual implementation of the principles in systemic institutions.

3.2.3. Changes to prudential requirements for systemic institutions

First of all, it is clear that the present prudential framework is *not neutral*. Basel II favours large size through lower capital charges for more sophisticated and bigger banks that can adopt more advanced internal modeling approaches. This is justified by creating incentives to develop more sophisticated risk management tools. As noted, Basel II also treated certain risks more favourably than the risks on the regular balance sheet. These two-types of shortcomings will have to be corrected in order not to actually lower the risk absorbing capacity of the large systemic institutions. There are already decisions aimed at fixing the second type of problems, while unfortunately not yet to eliminate the benefits of size.

Some observers have advocated *higher capital charges for systemic banks*, but this would go against the neutrality principle and cause new types of distortions. I would rather graduate the risk management principles and the intensity of supervision to be greater for systemic institutions, as I already noted.

Second, we will have to be much more critical towards the use of *models* and the assumptions on which the models are built. The present crisis has demonstrated many shortcomings: There has been too much reliance on historical data and the assumptions of neutrality and continued availability of market liquidity; and correlations between risks has been hugely underestimated, for instance. One aspect of systemic risks which needs to be recognized is that correlations tend to increase at times of stress and risk and capital allocation models will need to take this into account. Supervisors need to take a conservative stance, in my view, towards allowing for diversification benefits as these tend to disappear at times of stress when capital actually needs to be available to absorb losses.

Models will continue to be central for modern risk management and we should not reverse the developments put in place in Basel II extending the use of models also to the calculation of the minimum capital requirements. The key lesson is that the models cannot be left to dominate judgment – like seems to have happened – and firms will have to develop *stress testing* practices to identify the severity of the risks outside the scope of the models, or which are deemed by the models to be highly improbable.

Third, the internal controls and limit policies of the firms themselves must be substantially strengthened to avoid single business lines (or even single persons) from taking *life-threatening* risk positions, even how improbable the risks might seem. The problems experienced now are not new – single risk positions have taken down relatively big banks even before – remember Barings; and similar modelling failures resulted in the near-collapse of LTCM.

Supervisors should as a matter of priority see to that such concentration risks are addressed by means of adequate stress tests (so-called *reverse stress tests*). While institutions need to hold capital against concentration risks (in their Pillar 2 capital allocation), I think the extreme risk concentrations are not a capital allocation issue, but that institutions should refrain from taking-up altogether risk positions that would lead to the failure of the entire institution in any adverse situation.

In addition, supervisors should effectively enforce the Basel II/Pillar 2 requirement for banks to identify and manage *all* material risks at the group level irrespective of the structure of legal entities and to cover the risks with adequate capital buffers. In this context, *supervisors' powers* to require limits to risk positions and ask for higher capital buffers might need to be clarified and strengthened. At the moment, these powers can be in EU countries too vaguely stated, or allowed to be used only too late to be effectively used by supervisors (CEBS 2009a).

Finally, it is important for banks and supervisors to consider the concentration risks related to the specific *business model* employed. The obvious lesson from the cases of Northern Rock and Icelandic banks has been that the business models based on financing rapid growth by strong reliance of market-based funding can result in a major vulnerability. In response to these events, supervisors globally and in the EU have rapidly drafted new guidance and regulation of liquidity and funding risks. For instance, introduction of a core funding ratio is being considered as a new supervisory yardstick.

3.2.4. Managing interconnectedness between institutions

Strict limits on interbank exposures and exposures between parent and subsidiary institutions, effectively banning OTC derivatives by asking them to be moved on exchanges, and requiring always real time gross settlement of payment obligations rather than allowing net settlement, represent proposals to 'eliminate' systemic risks stemming from the *contagion* of individual firm failures. Also here I would support the 'risk management' approach to deal with the systemic risks for the same principle reasons of enforcement difficulties and high efficiency costs caused by intrusive regulations I already discussed. Inter-institution exposures should be dealt with as one aspect of managing concentration risks, and, without going into details, interbank markets and OTC derivatives markets could be made more transparent and resilient by moving towards clearing house-solutions.

Banning intra-group exposures, or requiring subsidiaries to fulfil all prudential requirements in the same way as individual institutions, would effectively cancel the efficiency benefits of centralised funding and risk management. Effective *con-*

solidated supervision and co-operation across different authorities should be relied upon instead.

Finally, co-operation in *colleges of supervisors* should be further developed to exchange information and to plan and execute supervisory duties such that all supervisors could be comfortable with the level of supervision. Safeguards in regulation are, however, needed for instance for the host supervisors of systemic branches of foreign institutions to guarantee access to relevant information and supervisory decision-making. Recent changes adopted in EU legislation move to the right direction, while the actual supervisory co-operation practices will need to be stepped up.

3.3. ADDRESSING THE PRO-CYCLICALITY PROBLEM

There is quite a lot of consensus on the need to remove or at least reduce the impact of the pro-cyclical elements of financial regulation (Basel II, IFRS rules etc.) on real economic performance. The objective is clear: "*to have a mechanism that allows the buffer of capital above the regulatory minimum to be built-up during an economic boom and strong earnings growth so that the buffer would be available to absorb higher losses in stressful environments*" (Financial Stability Forum 2009). There are, however, quite diverging views on how the objective should be accomplished in practice.

I think we should focus on having a buffer that is able to deal with the business cycle fluctuations. Having a buffer aimed at covering also losses from extreme adverse events or worst case scenarios could result in unrealistically high or inefficient capital charges (e.g. Rajan 2008 presents the drawbacks of too high capital requirements). These risks should rather be covered by internal limits on risk concentrations, as I already noted. Rajan (2008) also makes interesting suggestions about how private capital insurance could be used to draw on extra capital when needed (replacing the need for an ex ante buffer), but I will not be dwelling on such proposals. I will concentrate on how the size of the capital buffer (i.e. the target level of capital above the minimum charge) should be determined and how the buffer could be depleted when needed.

3.3.1. Determining the size of the buffer above minimum capital requirements

A principal choice is between non-discretionary, rules-based and discretionary mechanisms (leaving the size of the buffer to banks' and supervisors' judgment). There are clear arguments in favour of a transparent *rules-based calculation* of the size of the adequate capital buffer. Most importantly, investors might not

allow the depletion of the buffer if it is not clearly set out in advance that banks will build-up a buffer above the minimum capital requirement in an expansion and will run it down in a recession.

As a starting point, I think we should strongly refrain from introducing another *capital adequacy yardstick* than the Basel II risk-based minimum capital charge. The original justifications for risk-based capital charges underlying the Basel II reform are still very valid (see e.g. Gordy and Howells 2006). Only a risk-based measure avoids the incentives to risk-arbitrage and to take on risks that are high, but which would be allocated too a low capital charge in a non-risk based system. At least there is no strong evidence yet accrued by supervisors that – while difficult and resource-consuming for both banks and supervisors – Basel II charges could not be reliably implemented by banks. Moreover, Basel II measures have favourable information content compared to non-risk based capital ratios.

Hence, also when determining the target buffer to be used to absorb economic fluctuations we should use a measure that draws on the *internal models* and the actual detailed portfolio composition of individual banks. Using any other measure for the target buffer size (e.g. macro-economic variables such as credit growth figures as in the Spanish 'dynamic provisioning' model) and imposing the same rudimentary target for all banks would fail to capture the risk profile of individual banks. This would also not take into account differences in the modelling of Basel II capital minimum capital charges: i.e. whether the internal models are based on the 'through-the-cycle' or 'point-in-time' methodologies for internal ratings, or on something in between.

I also hold a strong view against having *public authorities* determining when a capital buffer should be built-up or when banks could move down from the target level towards the minimum capital charge. This idea of public 'engineering' is currently quite strongly held by e.g. European policy makers.

There are several reasons why it will not possible to allocate this responsibility to any public authority, domestic or international. First, large banks have global portfolios and economic fluctuations are not synchronised across countries. A publicly determined use of capital buffers cannot take into account the specifics of banks' individual portfolios. Second, it could be difficult for supervisors to coordinate the required buffers for a cross-border financial group and its different entities. Third, it will not be possible to determine a suitable trigger point in terms of macro-economic variables. Banks could, for instance, have positive profits even when the economy has started turning down or the demand for credit has slowed down. The lowering of the required capital level might not change anything (credit development could be only demand rather than supply driven), or it could come either too early or too late. A lot of discretion would need to be given to public authorities, but then we would depart from the favoured rules-based

approach. It is also doubtful whether public authorities could have the information to spot supply constraints in credit granting, which should trigger a lowering of the required capital level.

In sum, we should have a mechanism to determine the size of the buffer that is based on individual banks' internal models and specific portfolio composition, maintains the risk-based measurement of capital charges and which automatically allows for the depletion of the buffer when needed. Such a mechanism is possible to be defined by determining the required buffer as a difference between the capital levels calculated using *risk parameters estimated for recessionary conditions* (i.e. recessionary PDs and LGDs) and those based on minimum capital charges under the allowed Basel II methods ('point-in-time' parameters or 'though-the-cycle' parameters – i.e. current or average parameters over economic cycles). The usual official definition of a recession could be referred to also in this context.

In such a mechanism, banks would be required to have a capital buffer based on *recessionary parameters*: PDs and LGDs estimated for historical recession periods for each of their country and sector-based portfolios. This kind of an approach is considered for banks' and supervisors' Pillar 2 dialogue by CEBS (2009b) to judge the adequacy of banks' current capital buffers. Such a methodology could, in my view, form a basis for actual hard-wired regulation of banks' capital buffers when applied at the level of banks' credit portfolios, or most preferably, at the level of each internal rating grades.

In this approach, banks would be required to build-up and hold the capital buffer as long as the current parameters (PDs and LGDs) are below the recessionary ones. While rather complex, the calculation would based on banks' *existing modelling approaches*, but extending the data requirements to cover the past recession periods. Pillar 3 disclosures should be expanded to cover the determination of the capital buffer.

The beauty is that this kind of a buffer would be *automatically depleted* in a recession without any need for discretion by public authorities. The extra capital buffer would disappear when the risk parameters correspond to (or be above) the currently prevailing parameters and the difference between the target level and the minimum capital charge would be zero. Banks would also not be required to acquire extra capital when economic conditions deteriorate as there would not be an increase in the required level of capital in a recessionary period as happens under the current pro-cyclical Basel II rules. This approach would also be consistent with the previous recommendations of supervisors for banks to move towards the 'though-the-cycle' measurement of risk parameters (while clearly more demanding).

The capital buffer requirement should be strongly *enforced by supervisors*, e.g. by not allowing dividend pay-outs when the buffer is not in place. For small banks following the standard formulas, an automatic buffer could also be developed based on the migration of external ratings in times of a recession. However, the need would be much smaller than in the case of the internal models-based approaches as they are much strongly pro-cyclical than the standard ones.

In effect, banks would be required to hold capital to cover the risk-levels in historical recession periods, which would mean a significant *increase in the capital requirements* in good times. A transition rule should be established to move to these higher requirements, and the increase in the requirements should await, naturally, the ending of the current recession. An increase in the required level of capital from the levels calibrated for Basel II is justified in my view on the basis of the experiences of the present crisis in addition to dampening pro-cyclicality: many banks have clearly been too highly leveraged.

3.3.2. Do we need other measures?

There are dangers in a simple, non-risk based *leverage ratio*, which is currently widely advocated as another capital adequacy yardstick. Having such a measure could easily crowd-out the risk-based Basel II measure, resulting in a loss of their beneficial features, unless it is used as a mere floor to Basel II measures, lowly-calibrated to pick-up only extreme leverage levels and 'outlying' banks.

Such a measure could also be easily *non-neutral* by treating unevenly banks with high amounts of regular on-balance-sheet exposures, such as retail mortgage loans, unless off-balance-sheet items are accurately brought in the measure. Then we are easily back in the complex measurement of exposures. I think it will be much more advisable to remedy the observed shortcomings in Basel II measures – also re-considering the correct calibration of the different exposure types, e.g. real estate exposures – rather than embarking on the complex work on completely new types of capital charges.

Basel II framework is based on the idea of covering unexpected losses with capital and the expected ones with *accounting provisions*. Under the IFRS rules, provisions have not covered expected losses as the rules only allow provisioning against incurred losses; hence creating a need for higher capital levels to cover the share of provisions as well. A clear improvement would be represented by a system where provisions would take up their appropriate role to cover expected losses, preferably determined again on the basis of banks' internal models. It seems, currently, that the IFRS rules are being changed in this direction. This would require a change in the present accounting standards. In a much less pro-cyclical accounting system based on adequate provisions, the principle of mark-

to-market, or fair asset valuation could be in my view more easily kept. Thus, we could keep the favourable feature of early recognition of economic losses of the current IFRS rules.

3.4. EFFECTIVE COOPERATION BETWEEN MICRO- AND MACRO-PRUDENTIAL AUTHORITIES

The most general lesson from the present crisis is that we will have to pay much closer attention to the risks taken in the expansion phase and make sure that, at the same time, adequate financial buffers (capital and provisioning reserves) are created to withstand the risks and sound banking policies are maintained. Supervisors will also have to look at the developments at the level of the *entire financial sector.* One institution may look all right in relation to others, but the whole industry may be accumulating huge concentrated risk positions. A typical feature in the inflation of credit-asset bubbles has been 'disaster myopia', meaning that private bankers may not sacrifice enough thought on the possibility that the expansion in credit and asset prices might one day come to an end. Adopting a more cautious strategy could also mean significant loss of market share. It may have to be the task for supervisors and central bankers to challenge the industry in such instances.

The crisis has shown that central banks' macro-prudential supervision has lacked tools to mitigate systemic risks. In practice, the most important avenue for macro-prudential concerns to result in corrective action is to work through micro-prudential *regulatory and supervisory standards*. Conversely, macro-prudential analysis can be of great significance for micro-prudential supervisors as they traditionally focus on individual institutions' risks rather than risks in the financial system as a whole. Hard separation of the two functions would risk leading to a situation in which neither central banks nor supervisory authorities would be able to perform their functions satisfactorily (Crockett 2000).

The institutional framework has been built on the *segregation of the duties* of the micro-prudential supervisors and central banks exercising macro-prudential oversight. The recently agreed framework for supervision in the EU based on newly created EU bodies: European Systemic Risk Board and three sectoral European Supervisory Authorities, represents a chance to develop strong co-operation between micro- and macro-prudential supervision and the necessary regulatory and supervisory actions to counter financial stability risks. The framework is still based, however, on the separation of micro-and macro prudential supervision into different structures, and there could be obstacles to smooth cooperation and information gathering. Having the prudential supervision of banks and other institutions conducted within or closely linked with central banks would overcome this separation.

The information demands of effective macro-prudential supervision at the European level are high. Confidential information on systemic entities has to be *pooled* together at the EU and even global levels as it is not possible for national authorities to monitor all contagion links between institutions, or monitor the stability risks to integrated money and capital markets and payment systems (Enria and Vesala 2003). Information needs to be collected without constraints at the EU level also because national authorities may not have the incentives to inform of risk exposures of their national institutions due to conflicts of interest. The data on individual cross-border groups should be shared freely in supervisory colleges as well, including all national supervisory authorities of such groups.

Moreover, crisis management decisions would easily be sub-optimal if conducted only from a national perspective. Hence, there are clear needs for strong *EU-level decisions and co-ordination* in such matters.

Take as an example that a problem would emerge for a major player in the interbank market. The assessment of the potential for contagion would require information, which resides with other central banks and supervisors, while the home country authorities are only able to assess the 'first-round effects'. Bilateral arrangements may be activated to signal the problem to all the supervisors of the banks with which the ailing institution has large exposures. But how could the impact of the 'second-round effects' be assessed without a fully-fledged multilateral setting?

A shared 'too big to fail' bias in rescue policies would virtually eliminate this co-ordination problem, but only at the cost of heightening moral hazard. If it is agreed that banks, which do not give rise to major systemic problems, should be allowed to exit the market; multilateral co-operation should be in place to assess the real scope for contagion in the interbank market at the EU-wide level. The need for multilateral co-operation is even more pronounced when there is widespread tension affecting a large number of participants in the market, due, for instance, to a common external shock causing a drying-up of liquidity.

Even if the systemic relevance of the crisis were correctly assessed, co-ordination is required to effectively activate the policy tools. There could be a problem in terms of cost sharing, particularly if systemic implications in other Member States are relevant. In addition, the tools to be activated might take into consideration damage limitation at the domestic level only. For instance, the central bank may decide to provide liquidity support to the domestic lenders, thus encouraging other central banks to intervene as well. Alternatively, an 'orchestrated solution' could be sought, which does not take due consideration of the legitimate rights of all foreign creditors.

3.5. CONCLUSION

In this paper, I have argued against responding to the present crisis by 'eliminating' the sources of systemic risks. This response can be tempting, but it would cause too a high efficiency loss and would probably be unenforceable in any case.

Instead, the sources of systemic risks should be 'managed' within the present risk-based prudential regulation and supervision framework. While supervision should be graduated and more intensive for systemic institutions, financial regulation should be neutral with respect to size and business model in order not to cause further distortions.

More specifically, I supported:
- development and effective supervision of stronger risk management standards for especially systemic institutions;
- focusing more on concentration risks (including business model risks) by institutions and supervisors and limiting contagion risks via diversification requirements;
- requiring limits on risk concentrations that could be life-threatening via 'reverse stress tests';
- strengthening the Pillar 2 supervisory process that all material risks are covered by institutions' risk and capital management processes irrespective of legal structures and seeing to that supervisors have adequate powers;
- demanding higher capital buffers to limit the pro-cyclicality of the Basel II, basing the size of the buffer on banks' own risk parameters and data for recession periods;
- limiting the role of the simple leverage ratio (if any) to a simple and lowly-calibrated floor for capital adequacy;
- changing accounting rules to allow for provisions to cover expected losses over economic cycles;
- eliminating the strict separation of the macro-and micro-prudential supervision;
- having unconstrained pooling of information for macro- and micro-prudential purposes, and developing stronger centralised co-ordination of supervisory and crisis management decisions regarding major systemic financial groups in the EU.

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4. The Quest for Financial Stability in Europe

Dirk Schoenmaker

Abstract

The current framework of voluntarily cooperation in Europe fails to produce the public good of financial stability. The paper identifies coordination failures and argues for European arrangements. An integrated approach is needed. The starting, and politically most controversial, point is a binding burden sharing agreement to deal with cross border banks in problems. Further ingredients are establishing a European System of Financial Supervision, with powers at the European level, and entrusting the ECB with a mandate for financial stability. In addition, the ECB should also get a tool to manage financial stability. The proposals of the de Larosière group (2009) only incorporate some of these ingredients.

The quest for financial stability in Europe should also look at the incentive structure to give information. Currently, supervisors have no incentive to provide central banks with up to date information about potential problems in financial institutions. Moreover, national central banks do not always timely share stability concerns in their domestic financial system with the ECB.

4.1. Introduction

The 2007-2009 financial crisis is instructive to see how the European framework for financial stability stands up in practice. In a historical summit of the euro-area leaders, President Sarkozy presented an impressive concerted European action of the euro-area countries to face the challenges of the financial crisis (Summit, 2008). The action plan was based on voluntary cooperation among the governments. The declaration of this euro area summit, which was subsequently been broadened to the European Union, introduced an action plan with three main measures:

1. ensuring appropriate liquidity conditions for banks. The ECB provides ample liquidity to banks against adequate collateral;
2. facilitating the funding of banks. National governments provide a guarantee for medium term funding of banks. These government guarantees cover medium term bank debt issuance with a maturity ranging from 3 months up to 3 to 5 years;
3. recapitalising banks. Governments provide capital injections to restore Tier 1 capital at an appropriate level. Furthermore, governments may allow for an efficient recapitalisation of distressed banks.

How has the institutional framework in the EU coped with this action plan? On the first measure, the ECB has been very successful to ensure appropriate liquidity in the euro-area interbank market throughout the financial crisis. In this crisis, surplus banks have become unwilling to lend to deficit banks because of worries about their solvency related to losses on sub-prime mortgages. The ECB is pro-active and provides short-term funds to deficit banks and absorbs funds from surplus banks. In this capacity of general lender of last resort, the ECB provides liquidity to the banking system as a whole against adequate collateral.

On the second measure, individual governments provide the funding guarantees. The ECB managed to broker a common fee across the EU. The market for bank funding is integrated and a common fee ensures a level playing field. For maturities up to 1 year, there is a flat fee of 50 basis points. The fee for maturities from 1 year up to 3 to 5 years is based on the credit default swap spread of the involved bank plus 50 basis points.

The third measure is the most intriguing. To recapitalise banks, supervisors and governments have to cooperate. Supervisors have the information on the severity of the problems at the banks in trouble, while governments have the deep pockets (based on their fiscal powers) to provide capital if needed. These supervisory and fiscal functions are currently executed at the national level. Supervisors and governments have been effective in dealing with troubled banks with a primarily national orientation. The summit declaration has been successful in fostering some consistency between the national approaches though there are some differences.

The main problem has been with truly cross-border banks. The institutional setting with national authorities was not capable to reach a collective approach for Fortis, a cross-border bank with its main operations in the Benelux countries. The crisis management was done on national lines. When Fortis was first recapitalised, the Belgian, Dutch and Luxembourg governments provided capital injections to the national banking parts (Fortis Bank, Fortis Bank Netherlands and Fortis Bank Luxembourg respectively) and not to the Fortis Group as a whole. When the first recapitalisation of EUR 11 bn proved to be insufficient, Fortis was torn apart along national lines: the Dutch parts nationalised by the Dutch government and the solvent Belgian/Luxembourg parts sold to BNP Paribas.

So, what do we learn from the 2007-2009 financial crisis? First, coordination may be wanting. Present crisis arrangements are primarily national based. Coordination works when the interests of the national governments are aligned. As all governments without exception were severely hurt by the crisis, they had a strong incentive to sign up to the Sarkozy plan[1]. But if national interests diverge, coor-

[1] Even stronger, Germany had domestic political problems to get an action plan for the German financial system agreed and used the European plan to push ahead domestically.

dination breaks down. The Fortis case is an illustrative example. Schinasi (2007) and Schoenmaker (2010) analyse coordination of decision-making in a group of countries. They find that the provision of shared financial stability public goods results in a sub-optimal equilibrium, even though each country views its own decision as optimal. The authors suggest adopting a supranational approach. This paper examines the need to put crisis management at a European footing.

A second lesson to be drawn from the crisis is the urgent need to upgrade macro-prudential supervision in the European Union. Supervisors have focused on the individual players in the system (micro-prudential supervision) rather than the financial system as a whole (macro-prudential supervision). Financial imbalances may be building up in the system, while individual players are looking fine. This point was already known before the crisis, both in academic circles (e.g. Hartmann, Straetmans and de Vries, 2004) and policy circles (e.g. Borio, 2003). Hartmann *et al.* (2004), for example, investigated whether financial markets crash jointly. The more markets crash simultaneously, the more in danger are even large banks that hold widely diversified trading portfolios. A High Level Group chaired by former managing director of the IMF Jacques de Larosière (2009) stresses that central banks have a key role to play in a sound macro-prudential system. The ECB and the European System of Central Banks (ESCB) should receive an explicit formal mandate to assess high-level macro-financial risks to the system and to issue warnings where required in order to fully play their role in preserving financial stability. Moreover, we believe that the ECB should not only give warnings, but also needs a tool to manage financial stability.

This paper is organised as follows. Section 4.2 reviews the current arrangements for financial supervision and stability in the EU. Taking a holistic view, it proposes a more streamlined division of powers between the national and the European level. Section 4.3 looks at financial supervision. The new proposals of de Larosière (2009) for the establishment of European Supervisory Authorities are discussed. Section 4.4 analyses the new framework for macro-prudential supervision. Section 4.5 concludes.

4.2. NEED FOR EUROPEAN FRAMEWORK

The establishment of one single, unified European financial system, plus a common eurozone currency, raises the issue of the appropriate level (federal or national) for managing financial stability. The emergence of pan-European banks has stimulated the debate on European arrangements for financial supervision and stability. The search to establish an appropriate division of labour between home and host supervisors in the European Union is part of this debate. The fiscal competence to deal with banking crises and the banking supervisory function are

inter-related. It is not possible to move on one of these without the other (Goodhart, 2004).

Table 1 presents an integrated framework for financial supervision and financial stability. There are three stages in the process: preventive, remedial and resolution. In the preventive stage, new entrants in the financial system need to apply for a license and are screened by the supervisor. After entry, the supervisor performs ongoing supervision. At the level of financial stability, central banks examine the robustness of the financial system. If there are weaknesses, they redesign the infrastructure. Examples are the move to real-time gross settlement for large payments (TARGET) at the start of EMU and the current move to more efficient and safer settlement of securities (TARGET2-Securities)[2]. The ongoing monitoring of threats to the stability of the financial system culminates in the publication of a Financial Stability Review.

In the remedial stage, supervisors take action if they see problems emerging. They could, for example, ask for improvements of internal controls or remove managers. Other important tools are liquidity and capital requirements. Supervisory capital requirements for individual banks typically differentiate across the riskiness of assets (cross-sectional). Moving to financial stability, central banks could put a liquidity charge on banks if they find an overreliance on short term funding of longer-term assets. Another tool is increasing capital requirements across the board for all banks if they find that credit growth is excessive and risks are underpriced. This anti-cyclical application of capital requirements differentiates over time (longitudinal).

In the resolution stage, authorities have to deal with a crisis at one or more financial institutions. The toolkit ranges from closure and private sector solutions (e.g. a take-over of a weak bank) to public support of liquidity (lender of last resort) or capital by the government (De Haan *et al.,* 2009). Liquidity and capital can be given either to individual banks or more generic to the banking system as a whole.

Table 2 provides the current division of powers in the European Union. The supervisory tools are in the realm of national authorities. Although there is some coordination in the level 3 supervisory committees (CEBS, CEIOPS, CESR), formal powers rest firmly at the national level. The stability tools are more of a mixed bag. Both the ECB and national central banks are active in improving the infrastructure and publishing financial stability reviews. There are no financial stability tools at the remedial stage. This is an important gap in the toolkit, both in Europe and elsewhere. In Section 4, we discuss proposals for such remedial

[2] It should be noted that the payment system for interbank payments, TARGET, held up remarkably well during the severe liquidity problems in the interbank market in Autumn 2008. The concept of real-time gross settlement, in which processing and settlement take place continuously ('in real time') and gross payments are based on adequate cover, has contributed to the robustness of the payment system.

tools. At the resolution stage, there is a split between general LOLR responsibility for the ECB and general capital support by national governments.

Table 1. Toolkit for financial supervision and stability

	I. Preventive	II. Remedial	III. Resolution
A. Financial supervision	1. Licensing 2. Ongoing supervision	1. Internal controls 2. Management 3. Liquidity rules 4. Capital requirements (cross-sectional)	1. Private sector solution 2. Closure 3. Individual LOLR 4. Individual capital injection
B. Financial stability	1. Financial system design 2. Financial stability review	1. Liquidity charge 2. Capital surcharge (longitudinal)	1. General LOLR 2. General capital support

Table 2. Current division of powers

	I. Preventive	II. Remedial	III. Resolution
A. Financial supervision	**NATIONAL**	**NATIONAL**	**NATIONAL**
B. Financial stability	**EUROPEAN/ NATIONAL**	**NONE**	**EUROPEAN** (general lolr) **NATIONAL** (general capital)

This mixed picture of Table 2 raises two issues. First, at which level should financial supervision and stability be managed? Second, are the different tools interrelated? There has been an extensive discussion in the literature on the appropriate level of supervision and stability (e.g. Vives, 2001; Schinasi, 2007; Decressin *et al.*, 2007; Schoenmaker and Oosterloo, 2008; Schoenmaker, 2010). Financial stability is a public good, as the producer cannot exclude anybody from consuming the good (non-excludable) and consumption by one does not affect consumption by others (non-rivalness). An important question is whether governments can still produce this pubic good at the national level in today's globalised financial markets. Especially in Europe, an important challenge for maintaining financial stability arises from cross-border banking. Pan-European banks may create cross-border externalities in case of (potential) failure. The interaction of highly penetrated banking systems and national financial stability management might be a dangerously weak institutional feature. The reason is that national authorities have a mandate for maintaining financial stability in their own system and they may therefore be reluctant to help solving problems in other EU Member States.

To formalise this issue, Freixas (2003) examines two different models of recapitalising banks: a single country and a multi-country model (see also Schinasi, 2007, and Schoenmaker, 2010). Freixas finds that the multi-country model has a multiplicity of equilibria, In particular, the closure equilibrium may occur as no

individual country is ready to finance the recapitalisation of a cross-border bank itself, even if it is efficient to recapitalise the bank. Current national based arrangements undervalue externalities related to the cross-border business of financial institutions. As a result, insufficient capital will be contributed and the financial institution will not be bailed out. This model pinpoints the public good dimension of collective bailouts and shows why improvised co-operation will lead to an under-provision of public goods, that is, to an insufficient level of recapitalisations. Countries have an incentive to understate their share of the problem so as to incur a smaller share of the costs. This leaves the largest country, almost always the home country, with the decision whether to shoulder the costs on its own or let the bank close, and possibly be liquidated. The outcome of the Freixas-model is consistent with Schinasi (2007). Applying the theory on 'economics of alliances', he examines decision-making in a group of countries. Schinasi (2007) also concludes that the provision of shared financial stability public goods results in an equilibrium that is sub-optimal from a European perspective, even though each country views its own decision as optimal and has no incentive to change its resource allocation decision if other countries maintain theirs.

Moving to the second issue, there are different views. On the hand, some argue that the arrangements for supervision and stability can be considered separately (Posen and Véron, 2009). According to this view, supervision could be moved to the European level, while leaving the more thorny issue of burden sharing aside and keep the core of crisis management (capital support by the government) at the national level. On the other hand, it is argued that the tools are interrelated (Goodhart, 2004; Goodhart and Schoenmaker, 2006). The framework should be incentive compatible. What is the incentive for a national supervisor to put in sufficient effort, when the costs of failing supervision are shared with other countries? Would national governments be prepared to support ailing banks, when a European supervisor has neglected its duty?

In this paper, we take the view that supervision and stability are interrelated. The question is then where to start designing the division of powers in Table 2. Goodhart and Schoenmaker (2006) propose a backward-solving approach starting at the bottom right (general capital support). The guiding principle for decision-making on crisis management is "he who pays the piper calls the tune". So long as recapitalisations are organised and paid on a national basis, the national governments will normally want to oversee and undertake the function of supervision. That is the current set-up for financial supervision and crisis management, which are nationally organised. As there is no fiscal back-up to the ECB, the ECB is happy to let the national central banks (NCBs) take the lead on individual lender of last resort operations. Only when recapitalisations would be done at the European level, then supervision and stability could also be moved to the European level.

Summing up, the Freixas-model indicates a need to put potential recapitalisations on a European footing. The backward-solving approach in turn suggests that the other crisis management tools as well as supervision should also be moved to the European level.

4.3. FINANCIAL SUPERVISION (MICRO PRUDENTIAL)

A typical distinction is between micro and macro prudential supervision. Micro prudential supervision (i.e. financial supervision) focuses on the risks within individual institutions and does not address any effects on the wider financial system (externalities). Financial supervision is the working territory of supervisory agencies. By contrast, macro prudential supervision focuses on the stability of the financial system as a whole. Financial stability is the working territory of central banks. This section examines financial supervision. Different proposals to establish a European structure of financial supervision have been put forward, as documented by Decressin *et al.* (2007) and Schoenmaker and Oosterloo (2008). The three main policy options are:

1. appoint a lead supervisor for the supervision of cross-border financial groups. In practice, this will mean that the home country authority of a pan-European financial group is given full responsibility for the EU-wide operations, both branches and subsidiaries;
2. establish a single EU supervisor either for all EU banks or merely for the large cross-border banking groups (i.e. a so-called two-tier system), and;
3. establish a European System of Financial Supervisors, in which a central agency works in tandem with national supervisors. The role of the central agency is to foster cooperation and consistency among members of the System, but could leave the day-to-day supervision of cross-border financial groups with the consolidating supervisor.

4.3.1. Lead supervisor

According to the European Financial Services Round Table (EFR, 2005), a clearly defined lead supervisor (usually the home supervisor) for prudential supervision of large cross-border financial institutions would be an important step towards a more coherent and efficient supervisory framework in the EU. The lead supervisor should in particular be the single point of contact for all reporting schemes, validate and authorise internal models, approve capital and liquidity allocation, approve cross-border set-up of specific functions, and decide about on-site inspections. Furthermore, the lead supervisor should not only be responsible for supervision on a consolidated level, but also on the level of individual subsidiaries.

The EFR agrees that host countries should be involved in the supervisory process, as local supervisors have generally a better understanding of the local market conditions. The EFR suggests forming colleges of supervisors (one for each specific group) in which all supervisors involved share relevant group-wide and local information regarding the financial group in question. The lead supervisor, who is the home supervisor of the parent company, would chair the college of supervisors that would comprise, at a minimum, all supervisory agencies in whose jurisdictions the financial institution has sizeable operations. The lead supervisor would make intelligent use of the expertise and knowledge of the local supervisors in the college and entrust tasks to them by means of the delegation of tasks and, where appropriate, responsibilities. A mediation mechanism would be available if disagreements were to arise between the lead supervisor and other members of the college.

In comparison with the current situation, the efficiency of supervision is enhanced under this option as duplication is eliminated. Nevertheless, the lead supervisor does poorly with respect to financial stability, as its national mandate does not induce the lead supervisor to incorporate the cross-border externalities of a failure of a financial institution in its decision-making.

4.3.2. Single supervisor

Some have argued that developments in the EU banking sector call for establishing a single pan-European supervisor (e.g. Schüler, 2002), which should assume full responsibility for the supervision of both branches and subsidiaries of all EU banks. There may indeed be merit in centralising day-to-day supervision and pooling of information, allowing for effective market surveillance of European-wide systemic risks. A major drawback of a central European supervisory authority could however be that the distance between the central authority and the supervised institutions may be too large – both physically as well as in terms of familiarity with local circumstances. Bank supervision may therefore be better executed at the local level, because of the availability of specific expertise of the local market.

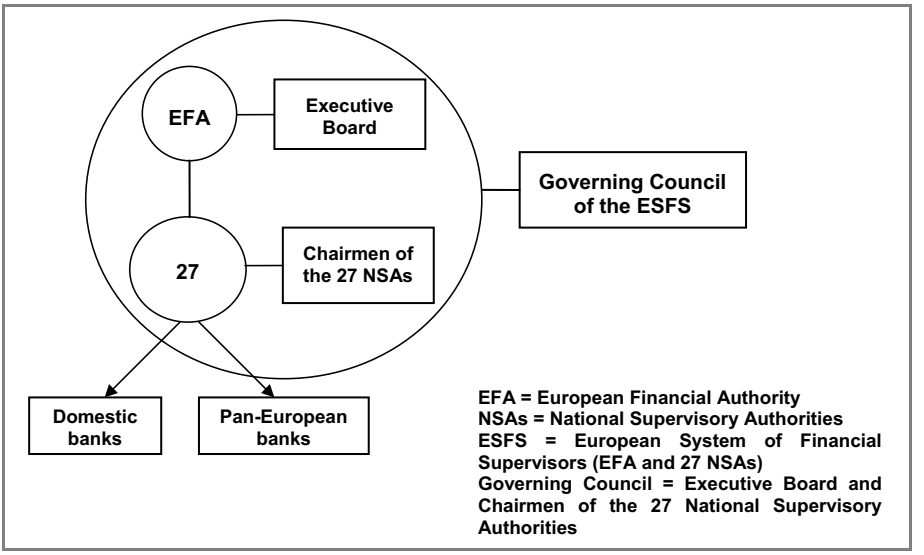
Another option would be to set up a two tier system, i.e., a system in which large cross-border banking groups are supervised by a central pan-European supervisory authority, while local banks are supervised by the existing national supervisory authorities. This option may however risk creating an un-level playing field in supervision between pan-European banks and banks operating at the national level, while both are competing on the same market. The potential problems with respect to the distance to the activities of the large cross-border banking groups may also be applicable to this option.

4.3.3. European System of Financial Supervisors

Vives (2001) and Schoenmaker and Oosterloo (2008) propose to establish a European System of Financial Supervisors (ESFS) with a European Financial Authority (EFA) at the centre of the system and national supervisory authorities (NSAs) in the different countries. Such a system could be set up along the lines of the European System of Central Banks (ESCB). A key issue is the appropriate level of (de)centralisation of the central authority. Supervision is primarily a micro-policy as day-to-day supervision should be conducted close to supervised institutions. Nevertheless, there may be some merit in centralising policy-making and pooling information, allowing effective market surveillance of European-wide systemic risks. The drawback of a central European supervisor could be that the distance between the central authority and the supervised institutions may be too large – physically and in terms of familiarity with local circumstances.

A decentralised ESFS could combine the advantages of a European framework with the expertise of local supervisory bodies. Figure 1 illustrates such a framework with an EFA at the centre working in tandem with the 27 decentralised national supervisory branches. A crucial element of the proposal is that the ESFS operates under a European mandate. In this proposed system, small and medium-sized banks (as well as insurers) which are primarily nationally oriented, are supervised by one of the 27 national supervisors. Pan-European banks are supervised by the consolidating or lead supervisor (usually the supervisory team of the home country). This national supervisor will be the single point of contact for all reporting schemes (no reporting to the host authorities), validate and authorise internal models, approve capital and liquidity allocation, approve cross-border set-up of specific functions and decide about on-site inspections. With respect to the latter, the lead supervisor can ask host authorities to perform on-site inspections on its behalf. The lead supervisor is compelled to inform host authorities about its activities and host authorities should have access to all reporting schemes (i.e., a common database of the ESFS). If a host authority feels the lead supervisor does not take account of its interests and no agreement can be reached, it can present its concerns to the EFA. If necessary, the EFA can overrule the lead supervisor and enforce the European mandate.

Figure 1. A decentralised European System of Financial Supervisors (ESFS)



Source: Schoenmaker and Oosterloo (2008)

Crisis management is also done on a European basis. While the national supervisor in the home country takes the lead during a crisis at an individual institution (gathering information, making an assessment of the situation), the ESFS is involved to ensure an adequate EU-wide solution. When a crisis hits more (large) financial institutions at the same time, the involvement of the EFA (in close co-operation with the ECB) will be intensified.

Key supervisory decisions (for example, the assessment of potential cross-border mergers and acquisitions or crisis management decisions) as well as the design of policy are done at the centre by the Governing Council consisting of the Executive Board of the EFA and the Chairmen of the 27 National Supervisory Authorities (in the same way as the ESCB takes decisions on monetary policy). In this way, host country authorities are fully involved and the interests of their depositors are fully taken into account (i.e., potential cross-border externalities are incorporated). Day-to-day supervision is conducted by one of the 27 national supervisors close to the financial firms. The EFA will be responsible for information pooling and is therefore best equipped to perform EU-wide peer group analysis of large European financial groups.

The EFA is responsible for the correct and uniform application of supervisory rules (level playing field) and it can also act as a mediator in case of problems between home and host country authorities. In doing so, it may give instructions to the 27 national supervisors. A drawback of a system with a central authority and 27 national supervisors is that decision-making structures can be complicated.

4.3.4. De Larosière proposals on micro-prudential supervision

In October 2008 the European Commission mandated a High Level Group chaired by former managing director of the IMF Jacques de Larosière to give advice on the future of European financial regulation and supervision. The Group presented its final report on 25 February 2009 and their recommendation provided the basis for legislative proposals by the Commission later that year.

After having examined the present arrangements and in particular the cooperation within the level 3 supervisory committees, de Larosière (2009) considers that the structure and the role bestowed on the existing European supervisory committees are not sufficient to ensure financial stability in the EU and all its Member States. It is argued that although the level 3 committees have contributed significantly to the process of European financial integration, there are a number of inefficiencies which can no longer be dealt with within their present legal structure (i.e. as advisory bodies to the European Commission). To address the inefficiencies, de Larosière (2009) makes a clear choice for the third model, i.e., the European System of Financial Supervision (ESFS).

The ESFS should constitute an integrated network of European financial supervisors, working with enhanced level 3 committees, i.e., the latter would be transformed into European Supervisory Authorities. De Larosière (2009) argues that this would be a largely decentralised structure, fully respecting the proportionality and subsidiarity principles of the EU Treaty. Existing national supervisors, who are closest to the markets and institutions they supervise, would indeed continue to carry-out day-to-day supervision and preserve the majority of their present competences. However, in order to be in a position to effectively supervise an increasingly integrated and consolidated EU financial market, the European Authorities will carry-out a defined number of tasks that are better performed at the EU level. De Larosière (2009) therefore argues that, in addition to the competences currently exercised by the level 3 committees, the Authorities should have the following key-competences: (i) legally binding mediation between national supervisors; (ii) adoption of binding supervisory standards; (iii) adoption of binding technical decisions applicable to individual financial institutions; (iv) oversight and coordination of colleges of supervisors; (v) designation, where needed, of group supervisors; (vi) licensing and supervision of specific EU-wide institutions (e.g. credit rating agencies). But the final step of replacing the national mandates by a European mandate is not proposed.

4.3.5. An expanded LOLR role for the ECB

In the current national setting for financial supervision and stability, the individual LOLR operations and possible recapitalisations of banks are in the realm of national authorities (Padoa-Schioppa, 1999). So, the NCBs are performing the individual LOLR operations. If and when the financial supervision and stability arrangements are moved to the European level, the ECB as central bank is well placed to play the individual LOLR role (Boot and Marinč, 2009). The ECB would incorporate the cross-border externalities of possible bank failures in its decision-making. A centralized LOLR function would thus optimise the LOLR decision, as argued in Secton 4.2. The current Statute of the ESCB would allow this LOLR role (art 18.1). Another advantage of a centralized LOLR is that it could lead to a more prudent use of the LOLR facility (Vives, 2001; Boot and Marinč, 2009). The ECB has less of an incentive to 'protect' national banks (other than for systemic risk reasons) than national central banks.

A key issue is how to deal with the credit risk on LOLR operations. Although officially LOLR support is meant to deal with liquidity problems of banks, liquidity problems often turn into solvency problems (Goodhart and Schoenmaker, 1995). So LOLR operations are risky. Central banks can create unlimited amounts of liquidity, but their capacity to bear losses is constrained to their capital base. Governments are typically the owner of central banks and thus the provider of capital. There is a national government behind each national central bank. But who will assume the credit risk on the LOLR operations of the ECB[3]?

That question has not yet been answered by European politicians. Goodhart and Schoenmaker (2009) argue for burden sharing rules among national governments to deal with the credit risk on LOLR and possible recapitalisations of ailing banks. Such burden sharing will only work if the rules are agreed ex ante and are legally binding. The argument for burden sharing is that systemic risk in an integrated EU financial system can only be managed at the EU level (see 4.3.2.). The burden of this systemic risk management should subsequently be shared by the beneficiary countries of the maintained stability of the financial system. But at the political level, there has been little support so far from politicians to give up part of their sovereignty with regard to spending tax payers' money.

[3] Art. 32 of the ESCB Statute specifies that income from monetary operations (i.e. seigniorage) as well as any losses will be shared among the participating NCBs according to their capital key in the share capital of the ECB. However, a decision to take up the individual LOLR role at the ECB would need political endorsement.

4.3.6. Information challenge

As LOLR to individual banks, the ECB would need to have full access to supervisory information on these banks. This information is crucial to make an informed judgment about the solvency and liquidity position of a bank in problems (Goodhart and Schoenmaker, 1995). This is a major challenge in a supervisory structure where central banking and supervision is separated. The bank run on Northern Rock in 2007 is a clear illustration of this challenge. Up to the very last moment, the Bank of England was unaware of the funding problems (caused by the underlying maturity mismatch between LT assets and ST funding) at Northern Rock. An effective LOLR needs to be closely linked to the prudential supervisor. Padoa-Schioppa (2003), therefore, argues for implementing the twin peaks model in Europe. In this twin peaks model, there is a prudential supervisor looking at the solvency of financial institutions (internal dimension) and a conduct of business supervisor looking at the treatment of customers (external dimension). Padoa-Schioppa is in favour of the central bank performing the prudential supervisory task. The ECB would then combine monetary policy and prudential supervision and consequently have direct access to supervisory information on banks. However, the ECB is not likely to get a direct role in micro prudential supervision.

As explained below, de Larosière (2009) suggests establishing a new independent body, the European Systemic Risk Board (ESRB), in which the ECB, the NCBs and European Supervisory Authorities operate. In the set-up of the ESRB, attention should be paid to a proper incentive structure so that both the central banks and the supervisors will inform each other timely within the newly envisaged structure[4]. Otherwise, the ESRB runs the risk to become just another talking shop.

4.4. FINANCIAL STABILITY (MACRO PRUDENTIAL)

The case for macro prudential supervision has been reinforced by the current financial crisis. Financial imbalances may be building up in the system, while individual players are looking fine. This point was already known before the crisis, both in academic circles (e.g. Hartmann, Straetmans and de Vries, 2004) and policy circles (e.g. Borio, 2003). Hartmann *et al.* (2004), for example, investigated whether financial markets crash jointly. The more markets crash simultaneously, the more in danger are even large banks that hold widely diversified

[4] Boot and Marinč (2009) argue that national authorities could be more willing to share information with the ECB, since only then support can be expected. But on the negative side, there is the bureaucracy effect (Kremers and Schoenmaker, 2009). Bureaucratic agencies are notoriously bad in exchanging information. In the Northern Rock case, the second effect has dominated.

trading portfolios. The number of markets affected by a crisis situation may also determine the severity of any real effects that might follow. Hartmann *et al.* (2004) find evidence that stock market returns are statistically dependent during crises. Nevertheless, the present EU supervisory arrangements place too much emphasis on the supervision of individual firms, and too little on the macro-prudential environment in which these firms operate.

What are the key channels for system risk in the financial system? The first channel through which shocks propagate from one financial institution (or market) to another is linkages among financial institutions. In the case of the failure of Lehman Brothers in September 2008, it appeared that many financial (and non-financial) institutions were exposed to Lehman Brothers. Worries about the vulnerability of Lehman's counterparties caused a general loss of confidence in the financial system. The second channel is common exposures. Joint failures may arise from common exposures to shocks that come from outside the financial system (e.g. exposures to sub-prime mortgages). Next, to these systemic risk channels, pro-cyclicality amplifies the negative or positive effects throughout the cycle. The dynamics of the financial system and the real economy reinforce each other. In good times, banks have ample capital (through retained earnings) causing or contributing to asset bubbles and credit booms. Conversely, in bad times, banks face reduced capital (through losses) and tighten lending standards leading to credit crunches.

The task of macro prudential supervision is to identify these channels and to mitigate these sources of instability. This is typically a central bank task for two reasons. First, monetary and financial stability are interrelated. Failures or disruptions in the financial system have an impact on the real economy, with related effects on output and inflation. Reversely, monetary (or broader macroeconomic) imbalances may lead to financial instability. The current financial crisis has *inter alia* been fed by a prolonged period of overly expansionary monetary policy. Second, Brunnermeier *et al.* (2009) identify the need for macroeconomists to be involved in macro prudential supervision. Goodhart *et al.* (2002) have conducted a cross-country survey of the skill profile of central bankers and supervisors. Using a dataset of 91 supervisory agencies, they find that central banks employ more economists and fewer lawyers in their supervisory/financial stability wing than non-central bank supervisory agencies do. Economists have the capacity to analyse the impact of macro-economic trends on the financial system as a whole. The empirical findings of Goodhart *et al.* (2002) suggest that a setting with central bank involvement in macro prudential supervision is more likely to produce a macro-approach than a setting without such central bank involvement.

4.4.1. De Larosière proposals on macro-prudential supervision

De Larosière (2009) argues that a key lesson to be drawn from the crisis is the urgent need to upgrade macro-prudential supervision in the EU for all financial activities. In the report of the High Level Group it is stressed that central banks have a key role to play in a sound macro-prudential system. However, in order for them, and in particular the ECB/ESCB, to be able to fully play their role in preserving financial stability, they should receive an explicit formal mandate to assess high-level macro-financial risks to the system and to issue warnings where required.

It is therefore suggested to establish a new independent body, the European Systemic Risk Board (ESRB), responsible for safeguarding financial stability by conducting macro-prudential supervision at the European level. The ESRB would include the members of the ECB/ESCB General Council (the President of the ECB, the Vice-President of the ECB and the Governors of the 27 central banks), plus the Chairs of the three European Supervisory Authorities (EBA, EIOPA and ESNA) and a member of the European Commission. To ensure appropriate geographical coverage and a well-balanced composition, de Larosière (2009) rightly proposes to cast the ECB/ESCB's involvement in the format of the General Council, which includes the NCBs of all 27 EU Member States, rather than that of Governing Council, which includes only the NCBs of the 16 euro area countries.

The main task of the ESRB would be assessments of stability across the EU financial system in the context of macro-economic developments and general trends in financial markets. If significant stability risks are foreseen, the ESRB would provide early warnings and, where appropriate, issue recommendations for remedial action. The addressees of warnings and recommendations would subsequently be expected to act on them unless inaction can be adequately justified.

4.4.2. Financial stability tools needed

De Larosière (2009) is silent on the tools for macro prudential supervision. It is all very well to do analysis and, if needed, to give warnings/recommendations. But what if nobody listens? We argue that the ECB needs a tool to actively manage financial stability. Tinbergen, the first winner of the Nobel prize for economics, already taught us that you need one instrument for each policy goal. The ECB serves the two goals of monetary and financial stability. As the ECB has a clear instrument, setting the interest rate, to serve monetary policy, it also needs a clear instrument for financial stability. The ECB can then pro-actively decide about applying the tool. The proposed ESRB can subsequently be used to liaise between macro and micro supervision.

So, what is needed are preventive tools to manage aggregate risk creation at times of exuberant markets. Two different tools are proposed in academia. The first proposal is to revisit Basel's system of capital requirements and make it more cycle-neutral (e.g. Brunnermeier *et al.*, 2009; Kremers and Schoenmaker, 2009). The Basel system is geared towards the stability of individual financial institutions, and does little to take account of their interaction with their environment and its stability. Capital requirements that "breathe with the cycle", however imperfect because difficult to design, may help avoid banks overly expanding credit when capital is ample in boom-time and, conversely, help avoid them tightening credit in the aftermath precisely when this is least conducive to financial stability. A simple way to introduce countercyclical capital buffers is to scale the minimum capital requirement multiplicatively. When credit or GDP growth is at its neutral level, the multiple is set to 1. If credit/GDP growth is above trend, the multiple is proportionally set above 1. Vice versa, the multiple is set below 1, if credit/GDP falls below trend. The challenge is to get a proper indicator for credit and GDP growth and to establish the required adjustment to the minimum capital requirement.

A second proposal is to impose liquidity charges. Perotti and Suarez (2009) argue that in all crises which spread beyond the original shock, liquidity runs which force fire sales are a main cause of propagation. If systemic crises involve liquidity runs which only liquidity insurance by central banks can absorb, then it is appropriate for the central bank to be responsible to monitor the buildup of risk and to manage the liquidity insurance provision with effective tools. Perotti and Suarez (2009) propose to establish a mandatory liquidity charge, to be paid continuously during good times to the central bank which, in exchange, will provide emergency liquidity during systemic crisis. The charge would be set according to the principle that future regulation should work like Pigouvian taxes on pollution, discouraging bank strategies that create systemic risk for everyone. Hence, it should be increasing in the maturity mismatch between assets and liabilities, and should be levied on all financial institutions with access to the LOLR. So, if the ECB observes an increase in short term funding of a bank (while asset maturities remain constant), it will increase its liquidity charge for that bank.

Moving to crisis management, the ECB needs a tool to resolve a general financial crisis affecting the whole financial system. For that purpose, the ECB can act as general LOLR flooding the interbank market with liquidity when needed. The Statute of the ESCB provides the basis for this classical central banking tool (art. 18.1) "In order to achieve the objectives of the ESCB and to carry out its tasks, the ECB and the national central banks may … conduct credit operations with credit institutions and other market participants, with lending based on adequate collateral". So, the ECB needs to take adequate collateral. During the 2007-2009 financial crisis the ECB has expanded the range of eligible collateral. As the

range of collateral expands beyond safe assets such as Treasuries, credit risk increases. The ECB has made a provision of EUR 5.7 billion for the increased credit risk of its general LOLR operations. The NCBs have underwritten this provision according to their capital key in the share capital of the ECB (De Nederlandsche Bank, 2009, p. 174). As each NCB is backed by its own government, the ECB's expansion of collateral rules is implicitly underwritten by the national governments of the euro area. By expanding its role as general LOLR, the ECB is coming close to becoming an individual LOLR to (ailing) banks.

While implicit for general LOLR operations, burden sharing becomes explicit when moving to general capital support operations. Capital support to ailing banks can only be given by governments which have deep pockets. Currently, national governments support national banks. That is the picture throughout the 2007-2009 financial crisis. Only US head-quartered banks were eligible for support by the programmes of the US Treasury. Similarly in Europe, only Iris head-quartered banks were eligible for capital support from the Irish government, while banks from other EU countries were left in the cold. To resolve this tendency to disintegrate in Europe (and beyond), a supranational approach is needed. Goodhart and Schoenmaker (2009) propose to move to legally binding burden sharing rules for LOLR and capital support operations for cross-border banks. See 4.3.3. for a full discussion.

4.4.3. Information challenge

Timely information on the condition of financial institutions and markets in the EU is crucial to make an up-to-date assessment of the stability of the EU financial system and to act swiftly when needed. A main challenge for the ESRB to work is a full flow of information from NCBs and national supervisors to the ECB. We discuss here the information flow between central banks (see 4.3.3. for the information flow between central banks and supervisors). Game theory suggests that the envisaged arrangements are not incentive compatible. The ECB has a mandate for the stability of the EU-wide financial system (European mandate), while the remit of NCBs is limited to the stability of their respective national financial system (national mandate). If the interests of the ECB and the NCBs are aligned, NCBs may provide the necessary information to the ECB. But if there is a conflict of interests between a NCB and the ECB, then there is no incentive for this NCB to provide timely information. A case in point are emerging problems with a national bank in one of the EU Member States. While a NCB may have an incentive to help a major player of their national banking system and to wait (and hope) for better times (forbearance), the ECB may want to act swiftly to prevent the problems spreading to the wider EU financial system (prompt corrective

action). However, without the information from the NCB who is closer to the bank in problems, the ECB cannot act timely.

The solution to this incentive problem is to align mandates. We propose to remove the national mandate of NCBs and replace it with a European mandate. This has been the case for monetary policy from the start of EMU. The Maastricht Treaty provides the ESCB (both the ECB and the NCBs) with a clear mandate to maintain price stability in the euro area. In this setting, Governors of NCBs are not allowed to vote on the basis of their respective national inflation outlook.

4.5. CONCLUSION

The current framework for financial supervision and stability is a hotpotch of national and European powers. The quest for financial stability in this paper has resulted in the conclusion that we need streamlined European arrangements for both financial supervision and financial stability.

The de Larosière proposals (2009) go some way. The first steps are set towards establishing European Supervisory Authorities at the centre of a European System of Financial Supervision with national supervisors and European supervisors. National supervisors keep their mandate and the new European Authorities get the power of binding mediation in case of conflicts. We propose to set also the final step and move from a collection of national mandates in each country to a European mandate for the proposed European System of Financial Supervisors.

On the financial stability front, the ECB should not only get a task, but also a tool to manage financial stability. We discuss two possible tools for the ECB: a counter-cyclical capital charge and a liquidity charge. In the further design of the European Systemic Risk Board, in which the ECB, the NCBs and the European Supervisory Authorities participate, due attention should be paid to incentives for information flows between supervisors and central banks and between national agencies and European agencies. A move from national mandates to a European mandate may also be helpful here.

Finally, and most importantly, we can only move to European arrangements if the problem of burden sharing for cross-border banks is solved (Goodhart and Schoenmaker, 2009). A move to burden sharing is politically the most controversial decision to take. At the same time, this decision would be necessary to make progress on the quest for financial stability in Europe.

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5. Assistance to financial institutions in distress: Implications for central banks

Nicola Brink and Michael Kock

Abstract

The global financial crisis that started in 2007 differs from previous ones in several ways: in its severity, its origins, its global nature and widespread effects on financial and economic conditions across the world. The magnitude of the crisis and the speed with which its effects spread across the world also distinguished it in respect of the extent of actions that governments and central banks had to take, both on an individual and coordinated basis, to stabilise financial markets and limit the effects on real economic activity. Central banks and governments of (mostly) the developed countries reacted by providing general market support, specific support to financial and other institutions, as well as significant fiscal packages to support economic sectors and stimulate demand.

This paper focuses on the implications of these interventions for central banks themselves, through their balance sheets, as well as a number of possible future policy implications of these interventions.[1] Three central banks have been selected as case studies, based on their global importance as well as the extent of their interventions, namely the Federal Reserve System (the Fed), the Bank of England (the BoE) and the European Central Bank (the ECB). The analyses have been restricted to these three central banks because this number was regarded as adequate to illustrate the balance-sheet effects of various interventions without becoming too cumbersome.

The structure of the paper is as follows: As a general background, the generic types, characteristics and classifications of central bank intervention are described. With this in mind, the interventions of the three central banks during the height of the crisis (August 2008 until June 2009) are described and the effects on their respective balance sheets are illustrated. This is followed by a discussion of a number of possible policy implications for the future.

[1] In addition to central banks, governments have also provided large amounts of fiscal support in various forms, directed either at stabilising financial institutions or stimulating their economies. However, this paper only focuses on the support provided by central banks and some policy implications specific to central banks. A comprehensive record of total financial sector rescue plans and the specific measures that were used was published by the BIS in July 2009 (BIS, 2009c).

5.1. GENERIC CHARACTERISTICS AND TYPES OF CENTRAL BANK INTERVENTION

The most distinguishing characteristics of central banks – typically supported by special legislation and legal powers – are that:

- they issue banknotes and coin, thereby creating new money;
- they are the sole creators or destroyers of central bank liquidity in the financial system and;
- they have the ability to set the level of short-term interest rates – either through a deficit system (lending money in the money market at a lending rate) or by influencing the demand and supply of bank reserves in the money market (i.e., by influencing liquidity conditions). This ability provides central banks with the tool most commonly used to influence inflation (Kock & Brink, 2008: 24).

As part of their implementation of monetary policy in normal times, central banks use their unique ability to create or destroy liquidity[2] to influence money-market conditions in order to maintain short-term interest rates at levels close to their policy rates. They typically inject new liquidity into money markets by increasing their assets or decreasing their liabilities, both of which result in credit entries into commercial banks' current accounts with the central bank. Such liquidity injections can be either of a permanent nature (for example through outright purchases of financial or other assets), or temporary, for example repurchase transactions or extending loans to the banking sector. Central banks would increase liquidity whenever market interest rates rise above the policy rate, thus putting downward pressure on market rates as banks try to offload this additional liquidity on each other in the interbank market.

Central banks can also use their ability to create liquidity[3] in order to assist financial institutions in distress, for example by providing emergency liquidity assistance (ELA) to specific institutions. Likewise, they can choose to augment the overall level of liquidity in a financial system for purposes other than the implementation of monetary policy. This has been done extensively by the major central banks during the crisis, as described in subsequent sections of the paper.

[2] It is useful to make a distinction between narrow central bank liquidity and broader market or aggregate liquidity. The former is created and destroyed through transactions between the central bank and the banking sector, which result in changes in banks' balances with the central bank. The latter refers to the ease with which banks can fund growth in their assets. Adrian and Shin (2008) defines aggregate market liquidity as the rate of growth in the aggregate balance sheets of financial institutions, and found in a study that aggregate liquidity is strongly pro-cyclical. If the growth in banks' balance sheets consistently exceeds that of other sectors of the economy, a situation of surplus market liquidity (or easier monetary conditions) exists.

[3] This paper does not distinguish between interventions aimed to achieve either monetary policy or financial stability objectives, as the two objectives have been interwoven during the crisis period under review. This approach differs from, for example, that of Meier (2009), which focused on unconventional monetary policy interventions.

Conversely, central banks can destroy existing liquidity either permanently or temporarily. Liquidity is destroyed when a central bank reduces its assets or increases its liabilities, both of which would result in debiting commercial banks' current accounts with the central bank. An outright sale of securities would result in a permanent draining of liquidity, while a sale on a repurchase basis would result in a temporary draining. A central bank would typically drain liquidity from the money market if market interest rates fall below its policy rate. By creating a shortage of liquidity, the central bank puts upward pressure on market rates as banks try to source additional liquidity from each other in the interbank market.

The conventional set of instruments used by central banks to influence money-market liquidity is fairly standardised. The most commonly used instruments are (BIS, 2008):

- short-term collateralised loans to, or deposits from banks;
- short-term repurchase and reverse repurchase transactions to smooth daily liquidity fluctuations;
- short-term foreign exchange swaps to smooth liquidity conditions;
- issuing their own paper to drain excess liquidity;
- outright sales and purchases of financial securities to permanently increase or reduce the level of liquidity in the market; and
- longer-term repurchase and reverse repurchase transactions to address liquidity imbalances that are expected to persist for some time.

With the exception of some off-balance sheet activities and valuation accounts, which normally should not be significant, all factors that influence money-market liquidity conditions can be derived from changes in the assets and liabilities of central banks.

Table 1 presents a generic balance sheet framework that can be applied to most central banks, reflecting their various operations and how these relate to the main central bank functions. Against this generic framework, the impact of the three central banks' interventions during the crisis is discussed in the next section[4].

[4] All balance sheet data used in the analyses were sourced from the respective central banks' websites.

Table 1. Generic balance sheet structure of central banks

Liabilities and equity (increase: drain liquidity) (decrease: inject liquidity)	**Assets** (increase: inject liquidity) (decrease: drain liquidity)	**Central bank function or objective**
Notes and coin in circulation		Issuer of currency
Monetary policy liabilities	**Monetary policy assets**	
Liquidity draining open-market operations Reverse repo transactions Securities issued Reserve balances (deposits by banks)	Repurchase transactions Securities purchased to inject liquidity	Price stability
Non-monetary policy liabilities	**Non-monetary policy assets**	
Government deposits Foreign currency deposits Other deposits	Gold and foreign currency holdings	Banker to government; payment systems operations; and foreign reserves management
	Assets acquired through emergency support measures	Financial stability
Other liabilities	Other assets	
Total liabilities and equity	**Total assets**	

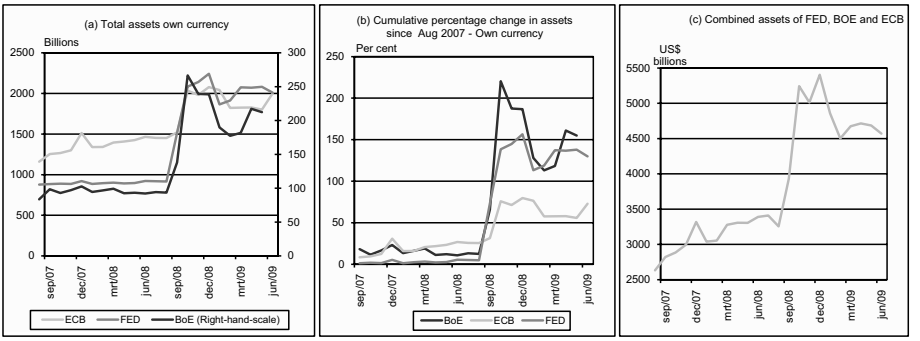
5.2. NATURE, SIZE AND BALANCE-SHEET IMPACT OF INTERVENTIONS BY SELECTED CENTRAL BANKS

Since the onset of the recent financial crisis, the conventional objective of central bank intervention in the major industrial countries has become much broader, and liquidity management has also become a tool to help restore financial stability. A distinction can therefore be made between conventional, or 'normal' (monetary policy) interventions (i.e., those aimed at maintaining market interest rates at a desired level), and 'special' interventions (i.e., those aimed at achieving objectives related to the stability of the financial system). Some of the activities that had been conventional in nature, such as repurchase transactions and reverse repurchase transactions, have become 'special' in terms of the size of these transactions, their duration or the wider range of collateral that has been accepted.

In this section, the operations of each of the Fed, the ECB and the BoE are discussed, making a distinction between normal and special operations. The analyses focus on the period from August 2008 until June 2009, during which period most of the central banks' activities were observed. Graphs 1 (a) and (b) show that the balance sheets of the Fed and the BoE more than doubled between August

and October 2008. This was when the crisis intensified following the failure of Lehman Brothers, while the ECB's balance sheet also showed significant growth, albeit less that that of the Fed and BoE. Although the balance sheets have shrunk since their peaks in October 2008, they were still almost twice as large by June 2009 than in August 2008. Expressed in US dollar, the three central banks' balance sheets in total increased from about USD 2.6 trillion in August 2007 to a peak of about USD 5.4 trillion in December 2008, declining somewhat to USD 4.5 trillion by June 2009 (Graph 1(c)).

Graph 1. Balance sheets of the Fed, ECB and BoE in their respective currencies



The nature of the activities and interventions that lead to the substantial growth and change in composition of balance sheets in each case is described separately in subsequent paragraphs.

5.2.1. The Federal Reserve System

5.2.1.1. Operations and crisis intervention

In normal circumstances, the Fed implements monetary policy by influencing the federal funds rate to fluctuate close to a targeted policy level. This is achieved by aligning the supply of balances held by depository institutions (banks) at the Fed – the so-called reserve balances – with banks'[5] demand for such balances, through open-market operations. The Fed's conventional open-market operations comprise the outright selling or purchasing of securities in order to increase or reduce bank reserves on a permanent basis, as well as repurchase and reverse repurchase transactions to have a temporary effect on bank reserves. Outright purchases of US Treasury securities via purchases had traditionally accounted for the bulk of the Fed's open-market operations portfolio. Repurchase transactions are used to

[5] For consistency and simplicity, 'depository institutions' are referred to as 'banks'.

respond to volatility in the supply of and demand for reserve balances and to forecasted changes in autonomous factors that affect reserve balances (Federal Reserve Bank of New York, 2009; Federal Reserve System, 2009).

From December 2007, the Fed introduced a number of new facilities to address increasing strains in financial markets. These facilities were introduced to address escalating problems in financial markets as the crisis evolved. The new facilities through which liquidity was provided to the market in general can be broken down into three broad classes that evolved over three periods (Dudley, 2009):

The first class of intervention relates to additional liquidity facilities extended to banks in general. In addition to the Fed's discount window facility, through which liquidity strains in individual banks or the banking system are normally met, Term Auction Facilities (TAF) for banks were introduced in December 2007 to alleviate the freezing up of interbank financing markets. The Term Securities Lending Facility (TSLF) and Primary Dealer Credit Facility (PDCF) for primary dealers were introduced in March 2008. The Fed also entered into swap agreements with the major central banks to channel dollar liquidity across borders. These swap amounts peaked at USD 552 billion in December 2008, declining to USD 115 billion by June 2009.

The second class of general market intervention was when the Fed expanded its provisioning of short-term financing beyond banks and primary dealers, to highly-rated corporate borrowers that experienced funding or liquidity constraints (Dudley, 2009). The need for this intervention was caused by the malfunctioning of credit markets, which made it difficult for corporates to access funding. The Commercial Paper Funding Facility (CPFF) was introduced in September 2008, and the Term Asset-Backed Securities Lending Facility (TALF) was announced in November 2008, but in fact only implemented in March 2009. At its peak in November 2008, the CPFF contributed USD 355 billion to the growth in the Fed's balance sheet, but this has since declined to USD 122 billion by June 2009.

The third class of general market intervention relates to the expansion of the types of assets that the Fed started to buy as interest rates approached zero. In order to put downward pressure on longer-term borrowing rates, the Fed purchased the debt of Fannie Mae and Freddie Mac and the mortgage-backed securities that they issue. It also started to buy longer-term Treasuries (Dudley, 2009). As a result, the Fed's holdings of mortgage-backed securities increased from zero in the beginning of 2009 to USD 462 billion by June 2009.

In addition to the three classes of general support provided to the market, the Fed also provided support to a number of specific institutions, namely Bear Stearns, American International Group (AIG), Citigroup and Bank of America (New York

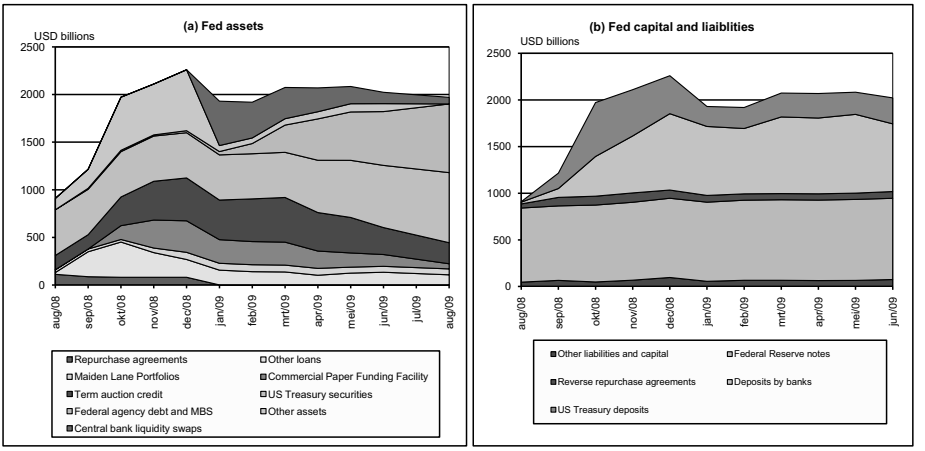
Fed, 2009; Bernanke, 2009c). Assistance to Bear Stearns and AIG were conducted through separate limited-liability companies (Maiden Lane I, II and III) as subsidiaries under the Federal Reserve Bank of New York. Assistance to Citigroup and Bank of America comprised a combination of financial support and contingent liabilities in the form of guarantees and access to liquidity and capital, negotiated in cooperation with the US Treasury and the Federal Deposit Insurance Corporation (FDIC).

5.2.1.2. Balance sheet analysis

The interventions and facilities described in the previous section had a significant impact on the size as well as the structure of the Fed's balance sheet. These interventions were focused on the asset side rather than the liability side of the Fed's balance sheet. According to Dudley (2009), the purpose of acting on the asset side of the balance sheet was deliberate, as the Fed attempted to alleviate illiquidity in certain asset classes by lending funds against such assets and expanded its asset holdings via purchases of less liquid agency debt, mortgage-backed securities (MBS) and Treasuries. The increase in excess reserves in the system on the liability side was a by-product of these actions, rather than an objective.

Graph 2 shows the impact that the various facilities had on the size and composition of the balance sheet of the Fed. The growth in assets between October 2008 and January 2009 (Graph 2(a)) was largely attributable to increased lending through the TAF, outstanding reciprocal dollar swap agreements with other central banks, CPFF commercial paper holdings and other loans. The holdings of the various limited liability rescue funds totalled USD 75 billion by the year-end, thus contributing only marginally to the balance sheet growth. 'Other assets' also increased significantly between September and December 2008. The Fed does not publish a breakdown of this item, but states that it includes the daily revaluation effects on other assets denominated in foreign currencies. It could include the value of foreign exchange holdings related to central bank liquidity swaps, which the Fed only started to report separately from January 2009.

Graph 2. Composition of the Fed's balance sheet



From March 2009, balance sheet growth was mainly driven by increased holdings of securities. Between the end of February 2009 and the end of June 2009, outright holdings of US Treasury securities increased by USD 179 billion, while holdings of agency debt and MBS increased by USD 60 billion and USD 398 billion, respectively. Total assets remained relatively stable as some of the other facilities started to mature.

During August and September 2008, the main source of funding on the Fed's balance sheet was increased Treasury deposits (Graph 2(b)). The US Treasury established a special account with the Fed in order to assist with the draining of reserve balances from banks (Bernanke, 2009a). However, as the Fed increased the amount of liquidity in the system and the interbank market became dysfunctional, banks deposited increasing amounts of the 'excess' liquidity with the Fed. In addition, the Fed started to pay interest on excess reserve balances of depository institutions from September 2008, as part of its strategy to influence the level of the fed funds rate.

Reflecting these factors, deposits by banks increased sharply between September and December 2008, replacing US Treasury deposits as the main balancing item on the liability side of the Fed's balance sheet. These deposits – also referred to as the monetary base – increased from USD 19 billion in August 2008 to USD 819 billion in December 2008, peaked at USD 845 billion in May 2009 and declined to USD 726 billion by June 2009.

The Fed's capital account amounted to only USD 48 billion in June 2009, comprising about 2.4 per cent of the total balance sheet[6].

[6] The issue of the Fed's risk exposure relative to its capital is addressed in a later section.

5.2.2. The Bank of England

5.2.2.1. Operations and crisis intervention

Within the sterling monetary framework, the operations of the BoE aim to align overnight money-market interest rates with its policy rate (the rate at which it lends to financial institutions) in order to create a flat risk-free money-market yield curve. Because the BoE is the final provider of cash to the system at the end of each settlement day, it can choose the interest rate at which it will provide these funds every day. The interest rate at which the Bank supplies these funds is quickly passed on throughout the financial system, influencing interest rates for the whole economy (BoE, 2008a).

In normal conditions, the BoE's operational framework has four main elements, namely:

- the averaging of target reserve balances by banks over a maintenance period from one meeting of the Monetary Policy Committee (MPC) to the next meeting;
- operational standing facilities for deposits and collateralised lending for eligible UK banks and building societies that may be used on demand. The lending or deposit rates are, respectively, 25 basis points higher or lower than Bank Rate;
- a discount window facility at which eligible banks and building societies may borrow gilts for up to 30 days, against a wide range of collateral in return for a fee; and
- open market operations (OMOs) to provide to the banking system the amount of central bank liquidity needed to enable reserve-scheme members, in aggregate, to achieve their reserve targets. OMOs comprise short-term repos at Bank Rate, long-term repos at market rates determined in variable-rate tenders and outright purchases of high-quality bonds (BoE, 2009a).

The BoE responded to the crisis with significant reductions in its policy rate, aimed at stimulating the economy through increased aggregate demand. It also made changes to its existing market operations in order to stabilise market interest rates and to alleviate pressures on bank funding. The main changes were:

- conducting repurchase transactions to inject additional reserves;
- extending the size and frequency of sterling long-term repurchase operations;
- extending the range of eligible collateral for long-term repurchase transactions under the government's Credit Guarantee Scheme (CGS);
- extending the drawdown for new debt under the government's Credit Guarantee Scheme (CGS);
- establishing a new guarantee scheme for Asset-Backed Securities (ABS);

– extending the drawdown period under the Special Liquidity Scheme (SLS); and
– extending the Discount Window Facility (DWF).

However, as interest rates approached zero, the policy rate became a less effective monetary policy instrument. This necessitated the direct injection of money into the economy, or 'quantitative easing', which embodied a shift in the monetary policy instrument from the price of, to the quantity of money. Quantitative easing was facilitated by the BoE and the HM Treasury through a process of engaging in a range of exceptional operations as part of a comprehensive package that began in October 2008 to deal with the tensions and problems related to money and funding in the sterling markets.

On 19 January 2009, the Chancellor of the Exchequer announced that an Asset Purchase Facility (APF) would be introduced. The BoE was authorised to create a wholly-owned subsidiary – the Bank of England Asset Purchase Facility Fund Limited – with all losses for the account of HM Government. The BoE published details of the APF on 6 February 2009 and announced on 5 March 2009, that its interest rate policy will be supplemented by quantitative easing through the APF. With effect from 6 March 2009 the purchases of private sector securities under the APF was financed by central bank reserves rather than through the issuance of Treasury Bills by the Debt Management Office (DMO). Those securities already financed by means of Treasury Bills will be held to maturity. The purchases of gilts in the secondary market will also be financed by central bank reserves. Asset purchases provide an additional tool to help the MPC meet its objectives. Through these purchases, the BoE seeks to influence the quantity of money in the economy by injecting additional reserves. The BoE retained its influence over market rates, as these are affected by both the level of the policy rate and the amount of reserves that the BoE is injecting. Asset purchases shifted the focus of monetary policy, but not the overall objective of meeting a 2 per cent inflation target (Benford *et al.*, 2009).

Beyond the sterling markets the BoE, in co-operation with a number of other central banks, offered to lend US dollars at a range of maturities since September 2008. The US dollar financing offered to the UK banking system through US dollar repo operations was extended and funded through swap transactions with the Federal Reserve.

In practice, the MPC now votes on, and is accountable for both the appropriate level of interest rates and the amount of asset purchases. After its meeting on 5 March 2009, the MPC announced a programme to purchase GBP 75 billion of medium and long-term government bonds and private sector debt, financed by the issuance of central bank reserves. In May, the MPC increased the size of the programme to GBP 125 billion. It surprised the market on 6 August by increasing

the amount of quantitative easing by another GBP 50 billion, to GBP 175 billion. The objective of this policy is to boost the supply of money in the economy, ease conditions in corporate credit markets and, ultimately, to raise the rate of growth of nominal demand to ensure that the inflation rate meets the target in the medium term (BoE, 2009b). However, the BoE has also been criticised for continuing to raise the amount of quantitative easing that this is used as a means of monetizing government debt, given the limited effect that these interventions have on boosting credit extension and broad money supply (e.g. Nixon, 2009).[7]

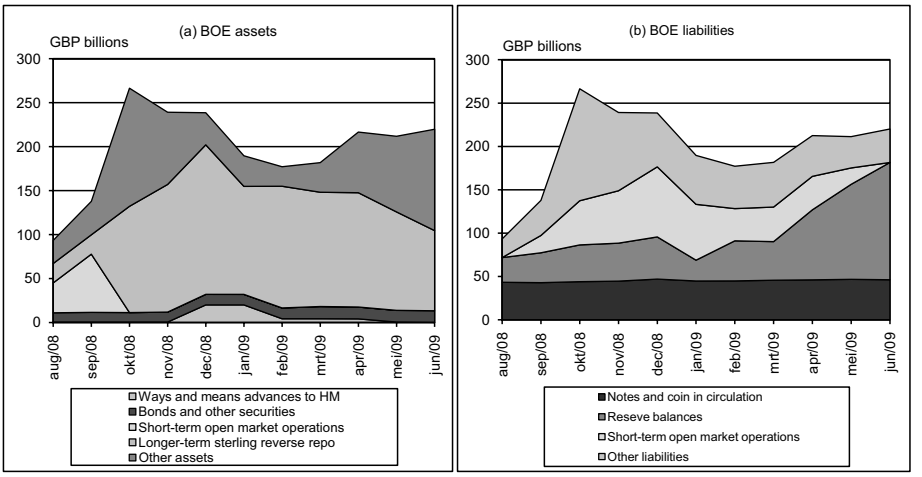
5.2.2.2. Balance sheet analysis

The operations and interventions of the BoE aim to stabilise market interest rates and to manage and support liquidity in the banking system, the extent of which is reflected in the change in the aggregate size and structure of its balance sheet. The BoE's consolidated balance sheet consists of the balance sheets of the Issue and Banking Departments. The Issue Department's balance sheet consists of banknotes in issue and the corresponding assets, while that of the Banking Department reflects all other assets and liabilities.

Similar to the Fed, the direct injection of money through quantitative easing was mostly facilitated through transactions on the asset-side of the BoE's balance sheet. Graph 3 (a) shows the composition of assets on the consolidated balance sheet of the BoE. The growth in the balance sheet of the BoE was driven mainly by banks' utilisation of the longer-term sterling reverse repo facility from September 2008, which replaced the BoE's normal short-term open-market operations. In addition, 'other assets' increased significantly in October 2008 and onwards, comprising mainly foreign currency swaps with the US Fed. There was no noticeable increase in the BoE's holdings of securities, but 'other assets' increased significantly, most likely reflecting holdings of assets by its subsidiary in terms of the APF, which amounted to about GBP 100 billion by the end of June 2009.

[7] This issue is further discussed in a later section on policy implications.

Graph 3. Composition of the BoE's balance sheet



On the liability side of the BoE's balance sheet, the sources of funding varied over time (Graph 3(b)). Between September and December 2008, short-term open-market operations – the instrument with which the BoE drained the additional liquidity provided through longer-term sterling reverse repos – increased. In addition, other liabilities also increased significantly from September 2008. These liabilities largely reflected counter-entries of the foreign exchange swaps conducted with the Fed.

In contrast to the Fed, the interventions of the BoE did not result in an increase in the monetary base until the end of March 2009. Both bank reserves and notes and coin in circulation remained relatively unchanged. However, as the BoE drained less sterling liquidity through short-term open-market operations and the BOE started to implement its policy of quantitative easing in full force, bank reserves with the BoE increased from GBP 44 billion at the end of March 2009 to GBP 135 billion at the end of June 2009. The BoE does not report any capital on its balance sheet.

5.2.3. The European Central Bank and the Eurosystem[8]

5.2.3.1. Operations and crisis intervention

The primary objective of monetary policy in the euro area is the maintenance of price stability. The ECB subscribes to the principle of the 'long-run neutrality' of money, which is related to the assertion that inflation is ultimately a monetary

[8] The Eurosystem consists of the European Central Bank (ECB) and the national central banks of the European Union (EU).

phenomenon. The link between monetary policy and the price level begins with the setting of official interest rates and central bank operations. The Governing Council sets three key interest rates in the euro area that determine the monetary policy stance, namely the interest rate on main refinancing operations through fixed or variable rate tenders: on the deposit facility for overnight deposits and on the marginal lending facility for overnight credit.

The ECB uses various monetary policy instruments to align short-term money market interest rates with the minimum bid rate on the main refinancing operations, which serves as a signal of the monetary policy stance. The main instruments used are the following:

- main refinancing operation (reverse repurchase transactions);
- longer-term refinancing operations (reverse repurchase transactions);
- fine-tuning operations (repurchase transactions, foreign exchange swaps, outright transactions and fixed-term deposits);
- structural operations (repurchase transactions, outright transactions, issuance of debt instruments);
- standing facilities (marginal lending facility and deposit facility); and
- minimum reserves.

The ECB responded to the crisis with significant reductions in official interest rates and liquidity management interventions. The first strains in liquidity conditions already appeared in August 2007, at which time the ECB reacted by providing additional liquidity through its normal channels. In October 2008, the crisis intensified and the ECB started to allot more liquidity than normal in its refinancing operations by adopting a fixed-rate, full-allotment tender procedure, through which banks had access to essentially unlimited liquidity. In addition to extending the main refinancing operations, amounts allotted in terms of long-term refinancing operations also increased. Liquidity provisioning was supplemented by the US dollar overnight TAF, funded through swap transactions with the Fed.

In May 2009, the maturity of the long-term refinancing operations was extended from six to 12 months. All refinancing operations were conducted at fixed rates with full allotment against a broader range of eligible collateral. The ECB already had a large number of counterparties participating in its operations even before this crisis, but this number increased even further during the crisis (Trichet, 2009). The ECB also announced that it would start to purchase euro-denominated covered bonds issued in the euro area.

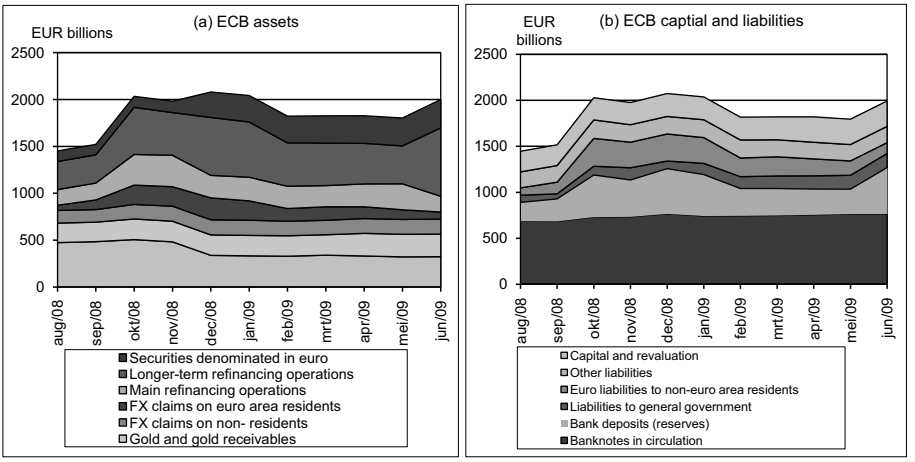
Trichet (2009) noted that the different responses between the ECB and the Fed could be explained by differences in financial structures: In the euro area, the financial system is much more bank-based, and therefore the ECB's non-standard measures were much more focused on the banking sector. Another reason for the

differences could be that the ECB is a much younger central bank than the Fed, with its statutes and processes more aligned to a modern banking system.

5.2.3.2. Balance sheet analysis

The operations and interventions of the ECB are reflected in the change in the ECB's balance sheet in aggregate size and composition. In normal conditions, the ECB supplies most of the liquidity to the banking system through the main refinancing operations, supplemented by smaller amounts provided through longer-term refinancing operations. The other operations, such as fine-tuning, structural, and standing facilities, only have a marginal impact. However, from October 2008, banks increasingly tendered for the ECB's longer-term repos, and these transactions, combined with some increase in the main refinancing amounts, contributed to the growth in the ECB's assets (Graph 6(a)). In June 2009, participation in the longer-term refinancing operations increased by EUR 325 billion, reflecting strong demand for the extended one-year operations, at the expense of liquidity obtained through the main refinancing operations. The increases in the ECB's holdings of euro-denominated securities reflect purchases of these securities by the ECB. From September 2008, foreign-exchange denominated claims on euro residents increased as a result of US dollar liquidity provided in cooperation with the Fed.

Graph 4. Balance sheet of the ECB



Graph 4(b) shows the main components of ECB liabilities. Notes and coin in circulation represent 40 per cent of the ECB's total liabilities. From October 2008, banks deposited increasing amounts in the ECB's interest-bearing deposit facility, as well as in their current accounts with the ECB. Total bank deposits

increased from EUR 204 billion in August 2008 to EUR 492 billion in December 2008. It retreated somewhat in the first quarter of 2009, but increased again to EUR 505 billion in June 2009 as the additional liquidity provided by the ECB on the asset side of its balance sheet found its way back into banks' various accounts with the ECB.

At the end of June 2009, the ECB's capital account amounted to EUR 73 billion, representing about 3.7 per cent of total assets.

5.2.4. Summary of central bank interventions

The 2009 Annual Report of the BIS gives a useful summary of central bank responses to the crisis as it evolved, and their various objectives. This summary is partly reproduced in Table 2.

Table 2. Central bank responses to the crisis

Objective	Measures adopted	Fed	ECB	BoE
Achieve the official stance of monetary policy	Exceptional fine-tuning operations	✓	✓	✓
	Change in reserve requirements			✓
	Narrower corridor on overnight rate	✓	✓	✓
	Payment of interest on reserves	✓		
	Increased treasury deposits	✓		
	Short-term deposit or central bank bill		✓	✓
Influence wholesale interbank market conditions	Modification of discount window facility	✓		✓
	Exceptional long-term operations	✓	✓	✓
	Broadening of eligible collateral	✓	✓	✓
	Broadening of counterparties	✓		✓
	Inter-central bank FX swap lines	✓	✓	✓
	Introducing/easing conditions for securities lending	✓		✓
Influence credit market and broader financial conditions	CP funding/purchase/collateral eligibility	✓		✓
	ABS funding/purchase/collateral eligibility	✓	✓	✓
	Corporate bond funding/purchase/collateral eligibility			✓
	Purchase of public sector securities	✓		✓
	Purchase of other non-public sector securities			

Source: BIS 2009 Annual Report

Many of the interventions by central banks were short-term measures aimed at stabilising financial markets and institutions. These operations were conducted with little time and opportunity available to take into consideration possible longer-term implications. As the crisis evolved, a number of policy implications for the future emerged, some of which are discussed in Section 4[9].

[9] Due to the wide range of interventions and the limited focus of this paper, this is not a comprehensive list of all possible policy implications. Due to limited length, the paper also does not address the issues of regulatory reform and macro-prudential analyses and supervision.

5.3. SOME FUTURE POLICY IMPLICATIONS

5.3.1. Risk exposures of central banks

Liquidity management operations did not only change the size and composition of central bank balance sheets, but also the risk profile of central banks' asset and liability mix. Central banks responded to the sudden and extreme risk aversion in financial markets and the rapid de-leveraging of financial institutions by taking additional financial risk onto their balance sheets. They have effectively placed their capital at risk to become market makers in a dysfunctional financial system (Stella, 2009). As shown in the balance sheet analyses in the previous section, central banks generally have very little capital available to absorb financial losses. As a result, financial losses that may be incurred as a result of these actions are eventually borne by the public, although in a less visible way than budgeted government spending.

Among the three central banks studied in this paper, the Fed has been the most aggressive in this respect, in view of its substantial outright acquisitions of securities and uncollateralised loans that were granted. Due to the fact that credit in the US is mostly extended through the financial markets, rather than the banking system, the Fed's interventions were also directed at the financial markets to a relatively larger extent. By contrast, the ECB and BoE increased their provision of liquidity mainly through collateralised refinancing operations with banks, and although they accept a wider range of collateral in these transactions, these transactions are inherently less risky than taking outright ownership of lower-grade assets. Meijer (2009) agrees that the BoE, for example, pursued a very cautious approach to credit risk by focusing its quantitative easing transactions on purchases of government bonds and a few selected private sector assets. Only towards the middle of 2009 did these two central banks venture into somewhat more aggressive asset purchases. It should, however, be noted that even though government bonds and high-quality assets may have limited credit risk, they also expose the central banks' balance sheets to the valuation effects associated with market risk, and possible realised losses arising from assets sales in the future.

Stella (2009:28-33) classified the Fed's assets according to their degree of risk and estimated that on an overall risk exposure of USD 2.05 trillion, the Fed could face losses of USD 183 billion, but concludes that the Fed has sufficient capital available to cover such losses. It should be noted, however, that the Fed has increased its holdings of MBS significantly since the time of Stella's study, making these risk estimates probably somewhat optimistic.

Although the financial risks on the central banks' balance sheets seem to be at manageable levels, they are also exposed to non-financial reputational risks. Even a small financial loss of a central bank could harm its credibility. Furthermore,

there is much focus on the degree of success of central bank interventions, and any failures in this regard could also have negative implications for central bank functions, their credibility and their independence from government. For example, the BoE has been criticised for using extensive quantitative easing as a means to finance a fiscal deficit, with limited effect on the effectiveness of credit markets (Nixon, 2009).

There may be more emphasis on and critique of the governance structure of a public body charged with preserving financial sector stability and intervening in financial markets by using public funds. The degree of transparency of central bank intervention could also be affected (Stella, 2009; BIS, 2009b).

5.3.2. The monetary base, money-market liquidity and broad money supply

The relationship between narrow money supply (base money), broad money supply and inflation is a much debated issue. There is a lack of consensus, however, not only on the links between money supply, the exchange rate and prices, but also on the direction of causality. Monetarist theory proposes that there is a strong link between the money stock, output and prices (e.g. Friedman, 1956, Friedman & Schwartz, 1963), and that the chain of causality runs from the exogenous money supply to the price level and the exchange rate (as summarised by Verengo, 2006). Opposing the monetarist views are the more structuralist theories, which attributes inflation to income distribution disparities between various sectors or agents in the economy, developments in the supply side of an economy and balance-of-payments constraints (Verengo, 2006).

The role that monetary aggregates play in monetary policy formulation has diminished in importance, and central banks generally no longer have money supply as an operational target. In a recent study, Woodward (2007) failed to find any compelling reason to assign a prominent role to monetary aggregates in the conduct of monetary policy, and it has indeed been the practice among an increasing number of central banks to treat money supply as one of many possible factors that could influence inflation, and not necessarily the most important. A notable exception to this is the ECB, whose two-pillar strategy still allows for a monetary analysis to "exploit the long-run link between money and prices" (Verengo, 2006).

Although the strength of the link between money supply and inflation can be debated, there is little argument about the links between the monetary base, as reflected in a central bank's liabilities, and broad money supply. According to Lacker (2009), "even though the conventional measure of the stance of monetary policy is the central bank's interest rate target, monetary policy fundamentally is

always about the amount of monetary liabilities issued by the central bank – also known as the monetary base". The monetary base, and in particular bank reserves, provide "the foundation upon which banks are able to expand their liabilities and thereby increase the quantity of money", which could be inflationary in future (Laffer, 2009).

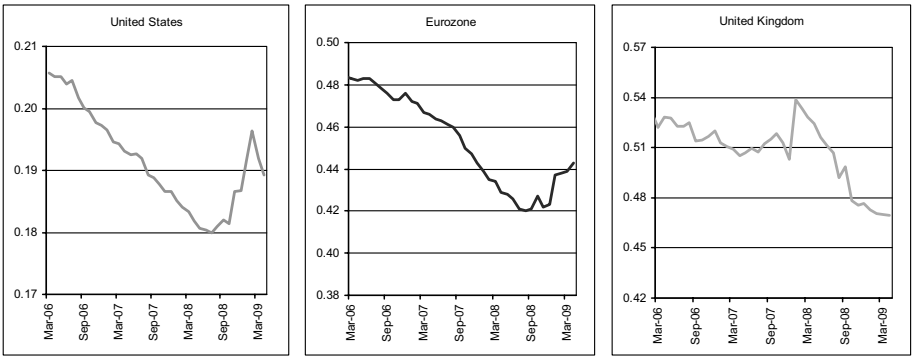
A complete picture of the extent to which recent central bank intervention could add to money supply growth incorporates three aspects, namely (i) the extent to which the monetary base has increased, (ii) the extent to which central bank actions have increased money market liquidity and (iii), the extent to which an increase in narrow money supply has transmitted itself into broad money supply. With regard to the first issue, it is clear from the liability side of the central banks' balance sheets that the monetary base (i.e., notes and coin in circulation, bank reserves with the central bank and vault cash) has expanded markedly between August 2008 and June 2009 in the US and the euro zone, by USD 784 billion and EUR 380 billion, respectively. The monetary base in the UK remained fairly stable until April 2009, but expanded by GBP 91 billion in May and June 2009.

An assessment of the second issue, namely the amount of liquidity that has been injected into money markets, requires analyses of both the asset and liability side of the central banks, that is, transactions that injected as well as drained liquidity. Such analyses indicate that none of the three central banks injected large amounts of liquidity on a net basis. In the case of the Fed, the liquidity that was created by outright purchases of securities and assistance to troubled institutions through various mechanisms was largely neutralised by increased bank and government deposits at the Fed. In the euro area, liquidity providing assets of the ECB increased by close to EUR 606 billion between August 2008 and June 2009, but liquidity draining liabilities increased by about EUR 455 billion as banks tended to deposit excess reserves with the ECB. The net effect on liquidity has therefore been much smaller. In the UK, short-term liquidity-providing repurchase transactions were replaced by longer-term transactions, and the increase in the amount of additional liquidity created between August 2008 and June 2009 (about GBP 90 billion) was neutralised by the draining impact of an increase in other liabilities and short-term OMO's until April 2009, and by increased bank reserves in May and June 2009.

Regarding the third issue, bank reserves with the central bank have the ability to fuel broad money supply and credit growth. One of the conventional objectives of bank reserve requirements is to constrain growth in credit and the monetary aggregates. It is, therefore, necessary to assess the extent to which the increase in the monetary base has been transmitted to broad money supply. Graph 5 shows that the ratio of narrow money supply (the monetary base) to broad money supply consistently declined until September 2008, but subsequently increased in the

US and euro zone. This indicates that the higher monetary base in these economies did not translate into broad money supply, and that the money multiplier effect has weakened significantly.

Graph 5. Relationship between narrow and broad money supply



Note: Calculated in domestic currency with country-specific definitions of money-supply. Sources: Central bank statistical databases, Reuters data.

Analyses by the BIS, published it its quarterly review (2009a: 19-24), confirm that commercial banks' balance sheets globally contracted in the fourth quarter of 2008, with the largest contractions observed among European banks. The BIS review also notes a decline of USD 880 billion in banks' claims on the US non-bank private sector. Most banks reported a shift from US non-bank private sector into holdings of US Treasuries and other government securities.

A slightly different trend is observed in the UK, where the ratio continued to decline. This was because the monetary base did not grow substantially, while growth in broad money supply accelerated. The growth in broad money supply was intended by the BoE, in order to stimulate domestic demand (BoE, 2009: 9). The annual growth in broad money supply (M4) accelerated from around 12 per cent in the fourth quarter of 2008 to around 18 per cent in the first quarter of 2009. However, the BoE explains in its June 2009 Inflation Report that the increase in M4 money supply wholly reflected strong growth in money holdings of institutions which intermediate between banks, such as settlement agents and special purpose vehicles, which is not related to nominal spending. Growth in a more economically relevant measure of broad money, which excludes such intermediate institutions, has slowed markedly, from around 10 per cent in the beginning of 2008 to below 4 per cent in the first quarter of 2009 (BoE, 2009b: 9,13).

It can be concluded that, until the first quarter of 2009 at least, the expansion in the monetary base in the US and euro area did not fuel broad money supply in a manner that could potentially be inflationary, and that money-market liquidity

did not increase excessively on a net basis in either the US, UK or euro zone. However, as soon as inter-bank lending and securities markets return to normality, markets recover and real economies move out of recession, growth in private sector credit extension and money supply is likely to accelerate, which could become inflationary over the longer term as output gaps narrow again. Therefore, it will be important for central banks to monitor the point at which the multiplier accelerates again, and to be able to reduce the size of the monetary base as markets recover. The exit strategies of central banks and potential implications are discussed in the next section.

5.3.3. Exit strategies and potential implications

Some tentative signs of recovery in financial markets were visible by June 2009. In the euro area, the use of the ECB deposit facility started to decrease and overnight unsecured interbank transaction volumes started to pick up since mid-February, which signalled that conditions in the euro money markets had improved (Papademos, 2009). Equity markets recovered somewhat, credit spreads narrowed and implied volatilities fell (BIS, 2009).

Bernanke (2009a) stated that "we [the Fed] have taken care to design our programs so that they can be unwound as markets and the economy revive. In particular, these activities must not constrain the exercise of monetary policy as needed to meet our congressional mandate…". The central banks have a number of tools available to exit from their support interventions and to drain bank reserves in due course, such as wounding down lending programmes, selling securities and conducting reverse repurchase transactions. More specifically, effective exit strategies would have to absorb liquidity and 'reverse quantitative easing' in an orderly manner with a combination of the following measures:

- increasing interest rates;
- slowing down and eventually ceasing further asset purchases;
- holding assets to maturity and/or selling the assets with a concomitant reduction in central bank reserves and the redemption of government debt;
- reversing the swapping of bank assets for government securities;
- refraining from entering into further foreign exchange swaps and letting existing swaps mature;
- rermitting the repayment of dedicated rescue funding subject to conditions such as demonstrating the ability to raise equity and non-guaranteed debt;
- ceasing the extension of further government guarantees;
- returning to normal central bank refinancing operations;
- temporarily increasing banks' statutory reserve requirements to reduce 'excess' reserves; and
- paying interest on reserves.

However, throughout the winding down process it is crucial that inter-bank lending and credit extension to the private sector return to normality. Furthermore, the secondary market for affected securities must be functional in terms of price formation, as the market has to resume its role as provider of liquidity, which had been taken over by central banks in extraordinary crisis conditions. The price-adjustment process in the financial markets is unlikely to be smooth, and a number of complications are possible.

While the corporate and banking sectors have de-leveraged their balance sheets significantly since 2007, fiscal deficits in most major economies have ballooned. The supply effect and possible impact on credit ratings could affect the price of government debt relative to private sector debt. The focus will shift to fiscal discipline and how sales of securities by central banks and governments could be managed without damaging the securities markets and the real economy.

The bond market could also be subjected to a disorderly adjustment. Sharp increases in bond yields from their very low levels reached in the beginning of 2009 would reverse capital gains and could undermine central banks' low interest rate policies. Government bond yields are set to increase at a time when governments are heavily indebted. Higher bond yields will also raise the cost of mortgage debt at a time when household financial positions are still fragile. The winding down of central bank interventions could also be in conflict with government debt management operations, as central banks will be selling bonds while governments are issuing significant amounts of new debt. This could result in an oversupply of bonds. In these circumstances, central banks could be tempted to continue purchasing government bonds in an attempt to keep bond yields low. In this way they would effectively be funding governments and monetising government debt. Alternative approaches could be for central banks to lend short-term money to banks with which to purchase government bonds, or for governments to reduce the real cost of debt by accepting high inflation. These approaches will undermine the exit strategies by increasing money-market liquidity and inflation, respectively.

The extraordinary central bank interventions did not infringe the capacity of central banks to maintain interest rates at target levels, as central banks conducted transactions offsetting changes in reserve balances. Therefore, the unwinding of these positions and shrinking of the central banks' balance sheets to an appropriate level should have a neutral effect on the target interest rates.

The desired outcome ought to be a more resilient market-based economy with markets that can function without central bank assistance and governments that can fund themselves in the bond markets in a benign inflation environment with sustained economic growth, facilitating progressing out of their higher levels of fiscal debt. To accomplish this, governments should pursue policies that will

enhance their credibility and convince markets of their ability to reduce their fiscal deficits once their economies have recovered. With regard to central banks, it is unlikely that they will resume their pre-crisis characteristics. Central banks will have to re-establish and re-define their independence, approaches to monetary policy, financial stability, regulation, governance, risk management and the preservation of balance sheet integrity. They would "need to strike a balance between short-term stimulus and well articulated exit strategies that ensure long-term sustainability. They need to allow the financial sector to shrink as borrowers reduce their leverage. And they need to promote a shift in production patterns away from export and leverage-led growth models towards more balanced ones." (BIS Annual Report, 2009).

In conclusion, it seems that the main challenges to central banks' exit strategies is not so much the mechanics thereof, but the timing and the related consequences to the market and governments. Exiting too soon and suddenly may disrupt economic recovery and affect long-term interest rates. Exiting too late may have unintended consequences, as banks will enjoy the benefits of cheap liquidity longer than necessary or justified. Exit strategies will also have to be coordinated among countries in order to avoid further distortion of markets.

5.3.4. Safety net measures and moral hazard

Central banks' unconventional interventions during the crisis that started in 2007 were unprecedented when compared to lender-of-last-resort (LOLR) facilities that they have granted in the past. Central banks provided LOLR (or emergency liquidity assistance) to a financial system rather than to individual institutions, and in a concerted and cooperative manner. In addition, interventions taken extended beyond the conventional concept of reducing bank funding liquidity risk, to encompass market liquidity risk and its interaction with funding liquidity against a background of heightened credit risk (Davis, 2008). It is not only banks that have been bailed out, but also large non-bank financial institutions and even non-financial corporates.

Any safety net intervention by central banks and governments, whether in the form of emergency liquidity assistance, guarantees, credit or solvency support, faces an inherent dilemma. On the one hand, safety net intervention helps to sustain confidence in a financial system and financial stability. On the other hand, it contributes to moral hazard. As Greenspan had already explained in 2001 in an address on the topic of safety nets, the belief that large systemic banks or financial institutions will not be allowed to fail makes both investors and depositors less sensitive to a bank's risk exposures and the effectiveness of its risk management processes. The safety net enables banks to accumulate larger, riskier

asset portfolios than would be possible in an intermediation process driven solely by market forces. With the safety net, lower interest rates and higher credit availability are accorded to riskier borrowers, benefiting speculative and riskier ventures at the expense of sounder ones (Greenspan, 2001). By inducing greater risk taking, the ultimate cost of providing safety net protection could increase significantly.

Moral hazard is even higher for large, complex or highly interconnected firms, because the failure of such institutions poses a serious threat to financial stability. As such, market discipline tends to be even lower for such systemically significant firms, and excessive risk-taking is encouraged by safety net considerations. Ironically, these large and complex institutions are often rewarded in terms of the Basel II regulatory framework for their sophisticated risk measurement and mitigation systems, by having lower capital requirements. This contradiction may require refinement of the regulation of systemically significant institutions that are regarded as "too big or too complex to fail". For example, such institutions may have to be subjected to a more consistent and more conservative regulatory regime. They may have to maintain higher capital requirements or penalties to restrict growth, reflecting the greater risk that they pose to financial stability. They may also require the development of special failure resolution mechanisms (Bair, 2009; Bernanke, 2009; Geithner, 2009; Rajan, 2009).

Nevertheless, moral hazard must be dealt with during the good times and not in the bad times, and the speed with which the global financial crisis evolved left little time to ponder the moral hazard effects of central bank intervention. This issue will have to receive attention alongside central banks' exit strategies, and the boundaries to safety net measures will have to be redefined.

5.3.5. A broader role for central banks

The extensive interventions by central banks during the crisis beyond their conventional scope of influence (i.e. beyond the banking sector) have elicited much debate and comment about their roles regarding financial stability relative to price stability. Various central banks are in the process of restructuring their functions and redefined their objectives as a result of the crisis, reflecting more explicitly their roles in protecting financial stability. In some cases, legal mandates have also been strengthened. In various respects, however, this is unchartered territory and central banks will have to re-define the relationship between their financial stability and price stability mandates. However, there seems to be little doubt that financial stability will become a much more integral central bank objective than in the past. As was recently stated by the head of the monetary and economic department of the BIS: "From now on, central bankers are going to think much

more about systemic risk, about taking a macroprudential perspective and about how it is that financial stability is the foundation of macroeconomic stability. […] There are two lessons. First: you've got to take much more care to worry about financial stability. The second is that worrying about financial stability means much more than writing a financial stability report" (Cecchetti, 2009).

5.4. CONCLUSION

Central banks form the core of financial systems. They have a fairly common set of goals, of which the key ones are to preserve monetary stability, promote financial stability, issue banknotes and coin, provide settlement services to banks, manage all or part of a country's gold and foreign exchange reserves and provide banking services (to varying degrees) to government.

The current financial crisis has vastly expanded the role that central banks played in the major economies, both in terms of magnitude and in terms of their range of activities. Central banks had to act fast and in innovative ways in order to contain the damage of a significant loss of confidence in banks, other financial institutions and financial market securities. As a result, the composition and size of their balance sheets have changed significantly and, in some cases, they have taken on additional financial and reputational risk.

The interventions of three central banks that have been most active in restoring financial stability has been analysed in the paper, covering the period from August 2008 to June 2009. The analyses indicated that the interventions of these central banks have a number of potential implications for future policy, relating to the risk exposures of central banks themselves, monetary policy objectives and their safety net activities. Exit strategies will have to be well planned and executed, in respect of processes, coordination and timing.

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- aims for smooth, reliable and efficient settlement of payments;
- ensures that financial institutions have adequate financial buffers to meet their liabilities as well as sound corporate governance;
- contributes to good national and international decision-making in these areas by providing economic advice.

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