MACROPRUDENTIAL POLICIES
IMPLEMENTATION AND INTERACTIONS
ARTICLES

Introduction
Macroprudential policy: from theory to implementation
CHRISTIAN NOYER, Banque de France 7

Macroprudential policies: rationale and objectives
Five questions and six answers about macroprudential policy
JAIME CARUANA and BENJAMIN H. COHEN, Bank for International Settlements 15
Governance of macroprudential policy
KLAAS KNOT, De Nederlandsche Bank 25
From tapering to preventive policy
CHARLES GOODHART, London School of Economics, Financial Markets Group
AND ENRICO PEROTTI, University of Amsterdam and Centre for Economic Policy Research 33
Collective action problems in macroprudential policy and the need for international coordination
JOSÉ VIÑALS and ERLEND NIER, International Monetary Fund 39
A macroprudential perspective on regulating large financial institutions
DANIEL K. TARULLO, Federal Reserve System 47
The impact of macroprudential policy on financial integration
ANDREAS DOMBRET, Deutsche Bundesbank 61

Experiences regarding macroprudential policies
European macroprudential policy from gestation to infancy
IGNAZIO ANGELONI, European Central Bank 71
Macroprudential policy in France: requirements and implementation
ANNE LE LORIER, Banque de France 85
Implementing macroprudential policies: the Swiss approach
JEAN-PIERRE DANTHINE, Swiss National Bank 97
The effects of macroprudential policies on housing market risks: evidence from Hong Kong
DONG HE, Hong Kong Monetary Authority 105
Macroprudential policies in Korea – Key measures and experiences
CHOONGSOO KIM, Bank of Korea 121
Framework for the conduct of macroprudential policy in India: experiences and perspectives
KAMALESH C. CHAKRABARTY, Reserve Bank of India 131
Learning from the history of American macroprudential policy
DOUGLAS J. ELLIOTT, The Brookings Institution 145
Macroprudential policy and quantitative instruments: a European historical perspective
ANNA KELBER and ÉRIC MONNET, Banque de France 151
Macroprudential policy interactions and transmission channels

Macroprudential policy beyond banking regulation
Olivier JEANNE and Anton KORINEK, Johns Hopkins University, Department of Economics 163

Principles for macroprudential regulation
Anil K KASHYAP, University of Chicago Booth School of Business,
Dimitrios P. TSOMOCOS, Saud Business School, St Edmund Hall, University of Oxford
and Alexandros VARDOUNAKIS, Federal Reserve System 173

Macroprudential capital tools: assessing their rationale and effectiveness
Laurent CLERC, Banque de France, Alexis DERVIZ, Czech National Bank,
Caterina MENDICINO, Banco de Portugal, Stéphane MOYEN, Deutsche Bundesbank,
Kalin NIKOLOV, Livio STRACCA, European Central Bank,
Javier SUAREZ, CEMFI, and Alexandros VARDOUNAKIS, Federal Reserve System 183

The housing market: the impact of macroprudential measures in France
Sanvi AVOUYI-DOVI, Remy LECAT, Banque de France
and Claire LABONNE, Autorité de contrôle prudentiel et de résolution 195

Three criticisms of prudential banking regulations
Vivien LEVY-GARBOUA, Sciences Po and BNP Paribas
and Gérard MAAREK, EDHEC 207

Macroprudential policy and credit supply cycles
Jose-Luis PEYDRÓ, Catalan Institution for Research and Advanced Studies, Universitat Pompeu Fabra 217

Interactions between monetary and macroprudential policies
Pamphil AntIPA and Julien MATHERON, Banque de France 225

Published articles 241
Introduction
Macroprudential policy: from theory to implementation

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The crisis has demonstrated the need to renew our approach to financial system regulation and notably to complement it with a macroprudential perspective.

There is no single definition of what constitutes “macroprudential” policy. There is, however, some consensus over its broad outlines.

First, it involves adding a macroeconomic perspective to the supervision of the financial system, which up till now has only really been addressed from a “micro” standpoint. As the crisis has shown, financial stability does not depend solely on the soundness of the individual components that make up the financial system; it also depends on complex interactions and interdependencies between these components. Moreover, the term “macro” refers to the interactions between the real world and the financial world, to the extent that a risk only becomes “systemic” once the imbalances or shocks affecting the financial system pose a significant threat to economic activity.

The second characteristic of macroprudential policy is that it is preventive.1 Its aim is precisely to prevent the formation of financial imbalances, procyclical phenomena or systemic risks by limiting excessive growth in credit and in economic agents’ debt levels, and increasing the shock-absorbing capacity of financial institutions or structures ex ante.2 Therefore, macroprudential policy is not designed to manage financial crises directly once they have erupted, but rather to prevent them from happening in the first place.

The implementation of macroprudential policy poses a number of major challenges, particularly as many countries have only just put in place the necessary operational frameworks. In Europe, for instance, the CRD IV/CRR3 banking regulation package only came into force on 1 January 2014, while the Single Supervisory Mechanism (SSM) is due to become effective in November. The two texts, CRD IV and CRR, list the macroprudential tools that national authorities can use. If deemed necessary, these tools can in turn be tightened by the European Central Bank (ECB), which also has macroprudential responsibilities in addition to its microprudential role.

Experience and analysis have shown that the successful implementation of macroprudential policy depends on three key factors:

- the governance of that policy;
- the identification of market failures and the selection of tools to combat them;
- a proper understanding of the channels of transmission and of the way these tools interact with other economic policies, notably monetary, fiscal and microprudential policies.

1 See the contribution by Perotti and Goodhart in this publication.
2 On the macroprudential regulation of systemically important banks, see the article by Tarullo in this publication.
3 Capital Requirements Directive/Capital Requirements Regulation.
4 On the issue of governance, see the article by Caruana and Cohen in this publication.
1|1 The policy mandate

The mandate should set out in a clear and coherent manner all the objectives, functions and powers assigned to the macroprudential authorities. The objectives must be precise, attainable and measurable. In the case of financial stability, this is where we hit the first stumbling block: it is hard to find a straightforward definition of financial stability, and even harder to actually measure it using a single metric. Financial stability is therefore a complex and multifaceted objective.

1|2 Institutional organisation

The organisation of macroprudential authorities differs from one country to another, in terms of the degree of integration between the central bank and the prudential supervision authority, the actual institution in charge of macroprudential policy, and the roles assigned to the central bank and finance minister within this institution. At this juncture, there appears to be no single dominant model.

In some organisational structures, such as those in the Czech Republic or in Ireland, micro and macroprudential functions are concentrated within the central bank, which remains fully independent, i.e. it does not interact with other authorities such as the finance ministry. In other structures, for example in the United Kingdom, the finance ministry is involved in a macroprudential policy committee, which is itself part of the central bank, but only has a passive role. A third type of structure is that used in the United States, France and Germany, where the finance ministry presides over a macroprudential authority, with the central bank playing a more or less active role, and in some cases assuming a power of veto. Lastly, in exceptional cases such as Sweden, the central bank has no macroprudential responsibility.\(^5\)

Regardless of the type of organisation adopted, the main challenges are the same: how to avoid undermining the independence of the central bank? How to avoid or limit conflicts of interest between micro and macroprudential policies?\(^6\) How to ensure coordination with other economic policies, especially monetary and fiscal policies? And how to avoid an "inaction bias" on the part of macroprudential authorities due to the complexity of the financial stability objective or of the decision-making process?\(^7\)

1|3 Governance of the macroprudential authority

The rules of governance, established internally or by law, specify how the macroprudential authority will function in order to meet these challenges.

First, for macroprudential policy to be effective, it has to be independent or autonomous. For example, a macroprudential tightening of regulatory requirements could prove unpopular during a period of exuberance, when economic agents are feeling the immediate benefits of a rise in asset prices;\(^8\) similarly, relaxing the requirements during a downturn could also spark opposition, as bank creditors, eager to avoid losses or defaults on their loans, could be reluctant to let financial institutions use their countercyclical capital buffers to recapitalise, despite the threat of a credit or capital crunch.

The rules of governance should therefore determine the relationships between the different institutions involved in safeguarding financial stability and thus in defining macroprudential policy. This also applies to institutions where functions are split between different committees; the rules should ensure that each committee is autonomous in its decision-making, but that information is circulated effectively between stakeholders, in order to prevent conflicts of interest and facilitate coordination.\(^9\)

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5 See also the contribution by Danthine in this publication which describes the framework adopted by Switzerland.
6 These conflicts are an inherent part of macroprudential policy as it is designed to tighten microprudential requirements deemed too weak during periods of financial exuberance, and ease them in the downturn phase of the cycle to avoid a sharp contraction in credit.
7 On this and macroprudential governance in general, see the article by Knot in this publication.
8 In the event of a financial bubble, borrowers can take advantage of the rise in asset prices to use those assets as collateral and ease their credit conditions. As a result, they can borrow more and use the funds to buy the very same assets that boosted their wealth in the first place, thus fuelling further rises in prices. At the same time, lenders can lend more as the loans are secured by assets that keep rising in value. This phenomenon differs from an inflationary rise in the price of goods and services, where resources are transferred from lenders to borrowers and borrowers’ real debt levels fall.
9 See the case of the Bank of England where three independent committees are in charge of monetary policy, macroprudential policy and microprudential decisions. The Bank’s Governor and Deputy Governor for Financial Stability are on all three of these committees.
The organisational structure is particularly important when it comes to keeping monetary and macroprudential policies separate within a single institution. This difficulty increases when the macroprudential authority consists of a committee overseen by the finance ministry and made up of various institutions in charge of safeguarding financial stability. In this case, it is essential to specify the respective responsibilities of the stakeholders to ensure the supervisors and the central bank remain independent and cannot influence each other's policy considerations. In France, for example, the Governor of the Banque de France has exclusive power to propose the implementation of certain macroprudential tools, and to withdraw his proposal at any time, giving him an implicit power of veto. In Germany, the Bundesbank plays an even more prominent role within the macroprudential authority and has an explicit power of veto.

Another important governance issue is the status of the members of the committee charged with macroprudential policy. Europe is a good illustration of this. In 2010, following the publication of the report by Jacques de Larosière, the European legislator set up the European Systemic Risk Board (ESRB). The ESRB's meetings are attended by representatives of the supervisory authorities for banks and financial markets, as well as by the governors of EU Member State central banks, who are the only attendees to have voting rights.

At the same time, however, certain European countries are setting up their own national macroprudential authorities, which are directly answerable to the finance ministry. How does this affect the status of participants in the ESRB meetings? Do they retain their status as independent authorities or do they become merely representatives of their respective national macroprudential authorities? Is there not a risk that finance ministers might exert an influence, directly or indirectly? The European texts that created the ESRB failed to anticipate this development. It is therefore vital that, at national level, the internal governance rules of the new macroprudential authorities preserve the independence of ESRB members. Moreover, at European level, it is equally important that the Commission's review of the ESRB, which is currently being finalised, guarantees the independence of all national representatives.

The governance rules should also specify the type of powers attributed to the macroprudential authorities and their decision-making process. In practice, some authorities have limited powers, consisting solely of issuing opinions or recommendations – as in the case of supranational authorities such as the ESRB – while others have binding powers, in that their decisions regarding national institutions carry a legal weight. This is notably the case of the Haut Conseil de stabilité financière (HCSF – High Council for Financial Stability) in France. As regards financial stability, however, we still need to find a balance between making decisions based on a set of rules to ensure transparency and legibility, both of which are vital for investors, and allowing a certain amount of discretion to avoid fuelling self-fulfilling prophecies on financial markets. Moreover, given the ability of the financial system to circumvent regulatory and prudential standards, we also need to give macroprudential authorities the power to adjust the scope of their supervision and regulation, to designate systemically important institutions or structures, to calibrate the tools at their disposal and, where necessary, to create new macroprudential tools.

2) IDENTIFYING MARKET FAILURES AND SELECTING INSTRUMENTS

Given that it is difficult to accurately define the objective of financial stability, in order to implement the mandate at the operational level, it is necessary to identify the market failures that justify the use of macroprudential policy and whose prevention could constitute its intermediary objectives.

This is the approach advocated by the ESRB. It is based on identifying a certain number of market failures that came to light during the financial crisis and that justify the use of a different method.

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10 For more details, see the article by Le Lorier in this publication, describing the French macroprudential framework.
11 This is the case in Germany, Austria, Bulgaria, France and Luxembourg.
12 See the article by Jeanne and Korinek in this publication, on the need to broaden the scope of macroprudential policy to all components of the financial system and not just the banks.
13 See Recommendation of the ESRB on the intermediate objectives and instruments of macroprudential policy, 4 April (ESRB/2013/1).
3 | Transmission Channels and Interactions

The financial crisis has generated a vast body of new economic research on financial stability issues. However, as decision-makers, we still do not have sufficiently sound and comprehensive frameworks for analysing the effectiveness of macroprudential policy and understanding its transmission channels, despite some recent advances. The main difficulty lies in integrating the above-mentioned market failures into models giving a key role to financial institutions, while taking account of arbitrage opportunities. We must therefore act on the basis of our understanding and our current knowledge of the functioning of the financial system while progressively integrating advances in research.

At the current juncture, where monetary policies have played their role in supporting economic activity and most fiscal policies have run out of leeway, macroprudential policy is often put forward as the only policy still capable of countering asymmetric shocks. This is one of the reasons why, in Europe, the legislator has conferred significant responsibilities on national macroprudential authorities.

Nevertheless, a minimum degree of coordination and supervision by supranational or even international authorities, may prove necessary to ensure that, on the one hand, these domestic macroprudential measures do not have unintended consequences for a country’s neighbours or its economic area and, on the other, that they do not conceal national protectionist measures or financial stability. In Europe for example, as regards the countercyclical capital buffer, domestic macroprudential measures are subject to an advisory opinion by the ESRB or even to ECB notification (solely for countries in the SSM).

For the other instruments (systemic buffer or the other instruments set out in Article 458 of the CRD), the procedure is more complex and involves the

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14 See the article by Pegoudi in this publication, on the role of credit cycles and the effect of countercyclical instruments.
15 As regards the economic costs of prudential policies, see the article by Levy-Garboua and Maarek in this publication.
16 See in particular the contributions by Clerc et al. and Kashyap in this publication.
17 See the article by Dombret in this publication, on the coordination of national and supranational responsibilities in a financial integration perspective.
18 As regards the importance of the international coordination of macroprudential policies, see the article by Vitis and Nier in this publication.
19 See the contribution of Angeloni in this publication, on the role of the ECB and its macroprudential functions in the framework of the SSM.
other supervisory authorities (European Banking Authority, European Commission) as well as the other relevant national authorities. In some cases, the European Commission or the European Council may reject domestic measures that do not appear justified from a financial stability or systemic risk prevention point of view.

The question of the interaction between macroprudential policy and other policies is also crucial. Given the involvement of central banks, it is of first importance to ensure that the implementation of macroprudential policy does not interfere with that of monetary policy. We have observed that a governance framework establishing an independence between the two policies, while ensuring the disclosure of information and a proper coordination of decisions, is likely to limit these interferences and reduce conflicts of objectives, especially since the transmission channels of these two policies are very close, or even congruent. We should however stress the possibility of a complementarity between these two policies: in the current European context, the European Central Bank has confirmed its decision to maintain an accommodative monetary policy stance for as long as necessary. Nevertheless, the risk entailed in this type of policy is that, in some euro area countries, financial imbalances may emerge in the form of asset price bubbles. The implementation of appropriate macroprudential policies in these countries should make it possible to prevent or contain such risks.

The interaction with fiscal policy stems from the quasi-fiscal nature of certain macroprudential instruments such as systemic or Pigouvian taxes, whose aim is to make financial institutions pay a tax proportional to their contribution to systemic risk. These instruments generate transfers or redistributions of resources between the different economic agents. Here, exchanging information with the fiscal authority is essential because it is important that the incentives given to economic agents be consistent and do not give rise to circumvention strategies and regulatory arbitrage or excessive risk-taking. Therefore a minimum amount of consultation is essential between these two policies.

Lastly, the coordination between micro and macroprudential is no doubt the most delicate point since conflicts are the most apparent in this area. However, the new core principles adopted by the Basel Committee in September 2012 recall the importance of applying a “macro” perspective, i.e. encompassing the financial system as a whole, to the microprudential supervision of banks to assist in identifying, analysing and taking pre-emptive action to address systemic risk. This is a fundamental shift in perspective for banking supervisors that should make it possible to minimise conflicts of objectives. Should such conflicts occur, the lesson that we have learned from the crisis leads us to favour macroprudential policy which, without prejudice to the individual stability of financial institutions, aims to contain the risks whose macroeconomic and social consequences would be serious.

In sum, complementarity, consultation and prioritisation of objectives are the three principles that must guide the operational implementation of macroprudential policy and its interaction with monetary, fiscal and microprudential policies respectively.

This 18th edition of the Banque de France’s Financial Stability Review, devoted to macroprudential policy, examines these different aspects by gathering together the various points of view, sometimes complementary and sometimes conflicting, of renowned specialists from international organisations, central banks and supervisory authorities, as well as representatives of the private sector and academia. It also benefits from the experience acquired by some contributors in activating macroprudential instruments over time or in response to specific situations of stress on asset markets or risks to financial stability.

We sincerely hope that this diversity of opinions will contribute to a better understanding of macroprudential policy and will be a reference for all persons interested in this subject.

20 See the article by Antipa and Matheron in this publication.
21 For a historical overview, see the articles by Elliott for the United States and Kelber and Monnet for Europe in this publication.
22 See, in this publication, the articles by He in the case of Hong Kong, Kim for Korea and Chakrabarty for India. Avouyi-Dovi et al. also present an assessment of the impact of certain macroprudential instruments in France.
Macroprudential policies: rationale and objectives
Five questions and six answers about macroprudential policy

This article provides six answers to the following five questions: when can we properly describe a policy as “macroprudential”? Is macroprudential policy in danger of being overburdened or misused? How can conflicts between monetary and macroprudential policy be resolved? Is independence needed for macroprudential policy? Is international cooperation a good idea when using macroprudential policy?
Before the outbreak of the financial crisis in 2007, discussions of macroprudential policy, especially in advanced economies, were largely in the realm of the hypothetical. Policymakers felt generally confident in the suite of monetary, fiscal and prudential policies that would ensure macroeconomic and financial stability, and believed that these would set the foundations for steady growth. There were debates about targets and instruments on the margins, but a broad consensus prevailed with regard to the overall framework. Financial systemic risk in the advanced economies was recognized as a possibility, but one that could be adequately addressed through sound microprudential regulation of financial institutions, supported by market discipline. Policy could work to "clean up" the consequences of episodes of financial instability, but would not be concerned with the build-up of pressures ex ante. Some authorities, especially among the emerging economies, had already been using essentially macroprudential tools to address systemic concerns before the crisis, but had not yet placed them in a broader, more holistic, analytical and policy framework.

The 2007-2009 global financial crisis and the subsequent sovereign and financial system strains in the euro area have led to a reconsideration of this consensus. In particular, it has become clear that developments in the financial system can be of first-order importance for macroeconomic stability, even when inflation is low and stable and fiscal positions seem to be sound. It has also become obvious that financial stability risks are as likely in advanced as in emerging economies. As a result, the recent crises have transformed discussions of macroprudential policy from the hypothetical to the practical.

A large number of advanced and emerging economies have accordingly started to develop macroprudential toolkits for addressing financial systemic risks, or have reconsidered and recalibrated existing tools in the light of their potential application at the systemic level. New institutional structures have been established, and new mandates assigned to existing bodies. At the global level, authorities have started to incorporate macroprudential considerations into international standards for bank capital and liquidity and into market rules.

This short essay reviews what we have learned about macroprudential policy in recent years. It starts by identifying the key elements in macroprudential policy. It then asks whether macroprudential policy is in danger of being overburdened and possibly misused, and addresses possible conflicts between macroprudential and monetary policy. The next two sections look at institutional questions, namely the relevance of independence for entities setting macroprudential policies and the role of international cooperation. A concluding section stresses that all areas of policy need to play their part in promoting the stability of the macroeconomy and financial system.

1| **When can we call a policy “Macroprudential”?**

Debates about the correct definition of “macroprudential” sometimes border on the theological. As with all such debates, it can be counterproductive to strive for too much precision. The note on “Macroprudential policy frameworks” produced jointly by the Financial Stability Board (FSB), the International Monetary Fund (IMF) and the Bank for International Settlements (BIS) in February 2011 usefully sought to establish a common language for policymakers. It defines macroprudential policy as “a policy that uses primarily prudential tools to limit systemic or system-wide financial risk, thereby limiting the incidence of disruptions in the provision of key financial services that can have serious consequences for the real economy.” Microprudential policies, by contrast, are aimed at ensuring the safety and soundness of specific financial institutions. Sound macro- and microprudential policies are both essential for mitigating systemic risk. As we discuss further below, other kinds of policies are also needed, and no class of policies is fully effective on its own. In some cases, the same policy instrument can have both micro- and macroprudential aspects, and its calibration will reflect considerations drawn from both policy frameworks.

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1 The origins of the term are obscure, but its first usage in an international context appears in the transcript of a meeting of the Basel Committee on Banking Supervision (BCBS) in 1979. See Clement (2010).

2 See FSB, IMF and BIS (2011).
The systemic risks addressed by macroprudential policy typically can be understood as emerging in two dimensions:

- the time dimension, i.e. the build-up of financial imbalances over time and the procyclicality of the financial system; and

- the cross-sectional dimension, across firms and markets, i.e. common exposures, risk concentrations, linkages and interdependencies across entities and sectors within the financial system at a given point in time.

Managing risk across each of these dimensions presents its own set of challenges, and calls for its own set of instruments.

Addressing systemic risk in the time dimension requires measuring, monitoring and, to the extent possible, mitigating extremes of the financial cycle. We are using the term “financial cycle” to refer to a systemic phenomenon whereby perceptions of value, risk, and financing constraints contribute to the slow build-up and (usually) more rapid decline in credit and asset valuations across the financial system. These cycles occur at lower frequency than conventional business cycles. While financial and business cycles are distinct phenomena, they are related and tend to amplify one another. Business cycle recessions that are also associated with downturns in the financial cycle tend to last longer and to run deeper.\(^3\)

Financial cycles generally are spurred by increases in leverage, particularly within sectors. For example, high leverage and valuations in the residential and/or commercial property sectors often lead to dangerous systemic imbalances. Policies targeted at the property sector, such as ceilings on loan-to-value (LTV) or debt-to-income ratios, exposure limits, and strengthened underwriting standards, can thus help to safeguard stability at the systemic level.\(^4\)

There are two possible objectives for macroprudential policy in the time dimension. A narrow aim would be to increase the resilience of the financial system. A broader, more ambitious one, would be to constrain the upswing of the financial cycle itself. To achieve the narrow aim, one would strive to build up buffers during the boom that can provide a cushion when risks materialise during the bust. For the broader objective, the build-up of the buffers should itself work to restrain the credit and asset price boom. The narrow objective would accept that financial cycles and imbalances could be material despite the best efforts of policymakers. At the same time, it would recognise that, by cushioning the bust, the macroprudential framework would limit the downside of the financial cycle. But it would remain more agnostic about its restraining impact during the boom.

Our view is that we should be modest in our expectations. The evidence strongly indicates that macroprudential tools strengthen the banking system’s resilience against the bust. At the same time, it suggests that their effectiveness in restraining the boom is more mixed and varies across instruments and financial structures. The best chances of mitigating financial cycles will materialise when monetary, fiscal and macroprudential policies work together and reinforce each other. We should also keep in mind the fact that there is much more to learn about how macroprudential policy influences the financial system and the real economy. We need to do more analysis and accumulate practical experience, both as to the impact of different policy measures and as to the interactions among them.

Whether one is seeking to build resilience or more actively to dampen the cycle, a variety of tools are available at the national level. Many of these tools are also used for microprudential objectives. Examples include LTV ceilings, sectoral exposure limits, dynamic provisioning rules, capital requirements and liquidity requirements. Supervisors might apply

\(^3\) See Borio (2012) and Drehmann et al. (2012) for further discussion.

\(^4\) Shim et al. (2013) examine policy actions targeted at housing markets in 60 economies worldwide from 1990 to 2012.
especially strong scrutiny to certain categories of assets, or implement harmonised stress tests across institutions, in order to monitor systemic exposures to certain kinds of risks. In principle, haircuts and margins on traded instruments might be adjusted in response to the build-up of risk in the corresponding markets, though this does not seem to have been done yet in practice.5

The Basel III framework includes tools for attaining these objectives. Along with strengthened common equity capital requirements, banks are required to maintain a capital conservation buffer that they can draw on in the event of a slowdown. The framework also envisages a countercyclical capital buffer to be built up in good times and to absorb losses in times of stress. Supervisors will be able to exercise judgment as to when and how to increase or reduce these buffers, depending on local circumstances. As we will discuss further below, the framework provides for international reciprocity in the application of the countercyclical buffer.

With respect to the cross-sectional dimension, macroprudential policy requires the measurement and monitoring of risks in systemically important financial institutions and sectors. Authorities can address externalities across institutions and sectors by applying stronger prudential standards and other appropriate tools in proportion to systemic relevance. Thus, they might subject larger, more interconnected institutions to higher capital requirements and more intensive supervision. This is not a form of punishment for being large; rather, it reflects the recognition that problems at these entities pose more severe threats to the system as a whole than similar problems at smaller, less complex firms. Measures can also be applied to specific sectors that feature high leverage, unrealistic valuations and close connections to other parts of the financial system and the economy.

The primary cross-sectional macroprudential tool at the international level is the framework for addressing risks at global systemically important financial institutions (G-SIFIs), as developed by the FSB, the Basel Committee on Banking Supervision (BCBS) and other international groupings. Within this framework, the rules for global systemically important banks (G-SIBs) are naturally the most prominent. These apply higher loss absorbency, more intensive scrutiny, resolution planning requirements and other measures to a population of G-SIBs (currently numbering 29) selected through a methodology that refers to size, interconnectedness, cross-border activity, the lack of available substitutes, and complexity.6 Supervisors have developed, or are developing, similar requirements for insurers,7 providers of financial infrastructure, and other institutional categories. Complementing the rules for global institutions, the BCBS has produced a framework for addressing the risks posed by banks that are systemic at the domestic level.8

Authorities are still acquiring experience in developing and implementing measures such as these to address systemic risks. Initial results are encouraging but the jury is still out.9

2) **IS MACROPRUDENTIAL POLICY IN DANGER OF BEING OVERRUNBEROSED OR MISUSED?**

As discussed above, macroprudential policy encompasses a set of powers and instruments intended to limit systemic or system-wide financial risk. It is the objective that characterises macroprudential policy; the instruments can be, and often are, also used for other objectives (especially microprudential ones) as part of other policy frameworks. Tinbergen (1952) demonstrated that policy can only achieve a specified number of targets with precision if it is endowed with the same or greater number of instruments. This does not necessarily mean that each instrument need be targeted at one and only one objective – only that an

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5 The Committee on the Global Financial System (CGFS, 2010a) examines the role of margin requirements and haircuts in procyclicality. FSB (2013b) proposes a regulatory framework for haircuts on non-centrally cleared securities financing transactions.
6 See FSB (2013c) for the most recent list and BCBS (2013) for the methodology.
7 See FSB (2013a) for the initial list of global systemically important insurers and IAIS (2013) for the assessment methodology.
8 See BCBS (2012).
9 See CGFS (2010b) for a review of experiences in the immediate post-crisis period.
adequate number of instruments must be available in order to achieve all of the policy objectives. Indeed, the optimal weights are generally not just zero and one. More instruments means fewer trade-offs.

While in principle authorities can use a combination of instruments to achieve any given objective, as a heuristic for sound decision-making it is sensible for them to dedicate specific instruments as far as possible to specified policy areas. At the same time, while focusing policies on the appropriate instruments, one must be alert to spillovers.

An important example is over-reliance on macroprudential policy to address macroeconomic challenges when more appropriate tools are available. Some economies have used macroprudential tools in recent years to address the challenges posed by volatile capital flows. Such action may be justified to the extent that capital inflows and outflows affect domestic credit conditions and systemic risks more generally; macroprudential policy can then be a useful way to attenuate the financial stability consequences of credit booms and busts. However, in some cases macroprudential tools have also been used to manage the impact of these flows on aggregate demand, even when more appropriate tools – monetary and fiscal policy, as well as exchange rate adjustment – were available. Macroprudential policy instruments are much less effective than these other tools in managing aggregate demand, and are generally ineffective in facilitating a necessary adjustment of relative prices. Moreover, using macroprudential policy for these purposes may distort its effectiveness in controlling financial system risks.

One can think about these issues in terms of the hierarchy of instruments that authorities can use for different purposes and objectives. Macroeconomic management should rely first and foremost on macroeconomic tools such as fiscal and monetary policies, before asking for help from macroprudential policy.

3| **HOW CAN CONFLICTS BETWEEN MONETARY AND MACROPRUDENTIAL POLICIES BE RESOLVED?**

While every effort should be made not to use policy instruments for the “wrong” objectives, it is important not to overstate the potential for conflicts among these objectives. This is especially the case with regard to interactions between macroprudential and monetary policy. Although most macroprudential tools will indirectly affect investment and consumption spending through their impact on the supply of credit, the control of aggregate demand is properly a task for monetary and fiscal policy. Sound monetary policy should reduce systemic risk, by ensuring price stability and reducing the likelihood that the financial system will be shaken by shocks to inflation or employment. Monetary policy sets the universal price of leverage, putting constraints on all market participants whether or not they fall within the regulatory perimeter. Meanwhile, a more stable, more resilient and less procyclical financial system will stabilise the real economy and improve the effectiveness of monetary policy transmission. Monetary and macroprudential policy should thus support each other most of the time.

Admittedly, as noted above, financial cycles tend to be longer than business cycles. Action to smooth the business cycle might thus conflict with macroprudential objectives under some circumstances, depending on the phase of the financial cycle. For example, while weak macroeconomic conditions might call for looser monetary policy to restore aggregate demand, such a policy, if prolonged, could have the side effect of spurring risk-taking in the financial system. This would call for countervailing action on the macroprudential side. A focus on spillovers and on the mix of direct and indirect impacts should permit the resolution of apparent conflicts such as these between macroprudential and monetary policy.10

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10 Hofmann and Bogdanova (2012) discuss ways in which macroprudential concerns in recent years may have led authorities to maintain monetary policy rates at levels below – perhaps excessively below – those that would have been called for by a conventional Taylor rule.
The longer duration of financial cycles also implies that monetary policymakers will need to keep an eye on longer-term trends if they are to take into account the gradual build-up of financial imbalances and their economic and inflationary effects. This longer-term perspective, in fact, relieves some of the possible tensions between monetary policy and macroprudential decisions. Imagine a situation in which a leveraged asset price boom occurs when inflationary pressures are falling. The apparent tension between a desire to cut interest rates and to tighten macroprudential standards disappears once a longer-run perspective on price stability is taken. Since financial crises can generate huge disinflationary pressure, a tightening of monetary policy will promote longer-run price stability.

Moreover, if macroprudential considerations do call for a different calibration of a policy instrument (such as the policy rate) than would be derived solely from monetary policy considerations, the size of this deviation need not be large. As noted, the financial cycle tends to have a longer duration than the business cycle. For example, this may mean that, if a build-up of credit pressures calls for macroprudential policy measures, the appropriate response could be to “lean against the wind” through a small but persistent increase in the policy rate as long as these pressures continue. This is unlikely to impose much of a burden on price stability which would continue to be the main driver of movements in the policy rate.

Finally, in the aftermath of a financial crisis, it is important to tackle decisively the root of the problems. When the problem is too much debt and private sector balance sheets need repair, the policy mix needs to rely more on repairs and reforms and not to overburden monetary policy. This is very important because as time passes the balance of risks of maintaining low rates for long worsens, and the costs grow in relation to the benefits.

4 | IS INDEPENDENCE NEEDED FOR MACROPRUDENTIAL POLICY?

Given the subtle interplay among instruments and objectives, it is appropriate to ask what governance arrangements would bring about the best outcomes across the many decisions needed to implement a sound macroprudential policy. A strong body of research has established that monetary policy works best if the political system assigns policymakers a clear mandate, such as an inflation objective, while providing them with independence from political interference in their choice of instruments and operational targets. Do similar considerations apply to the setting of macroprudential policy?

We would argue that they do. The instruments for achieving financial stability are diverse, and their effectiveness is likely to vary across countries and over time. Policy will need to rely on a significant degree of judgment. This means that tough decisions may need to be taken even if some indicators are ambiguous – the macroprudential authority cannot afford to err on the side of optimism or wait for more data. Furthermore, many instruments, for example those that are targeted at conditions in the residential housing market, are likely to have distributional effects across households and firms. This means that politically influential groups may exert strong pressure for or against certain policy measures. There may also be unwelcome political pressures if policy needs to balance short-term costs against longer-term benefits. Urgent actions that impose short-term costs might be delayed, ultimately imposing greater costs over the long run. Authorities should be free to make proactive decisions about using these instruments, and about the timing of their decisions, without political interference.

Central banks are well placed to perform this function, for a number of reasons. First, most of them already have independence from political authorities, along with arrangements to ensure public accountability. Second, central banks have experience and expertise in monitoring and measuring cyclical developments, as regards both business cycles and financial cycles. Third, central banks tend to have practical knowledge about financial market functioning and conditions, through their market operations and their oversight of financial institutions and payment and settlement systems. Fourth, many, though not all, central banks already have access to macroprudential instruments and direct knowledge of key institutions in the system, through their role as prudential regulators. Finally, central banks play an active role in mitigating and resolving financial crises, through their role as lenders (and sometimes market-makers) of last resort.

In any event, whether this role is assigned to a central bank, another agency, or a committee bringing
together several agencies, there needs to be ex ante clarity about roles, responsibilities and powers. This ensures effective, timely and proactive decisions, careful management of the inevitable trade-offs, and, ultimately, accountability. The macroprudential authority needs to have full control over the relevant instruments, and full access to market and supervisory information that will help it carry out its functions. Autonomy from the political process should help the macroprudential authority to carry out its responsibilities. If the authority (for example, a central bank) is already independent, it is essential that involvement in macroprudential policy does not compromise this independence.

At the same time, macroprudential authorities should be held accountable for their decisions. Accountability can be promoted through regular communication with the public, including through written reports, testimony to the legislature and disclosure of key decisions along with the reasoning behind them. During stable times, the authority should explain what can and cannot be expected of the policies, in terms of crisis prevention and promoting the resilience of the system, as well as its reaction function to adverse developments. Should financial stress materialise, it should communicate and justify its actions to stabilise the system, and its plans for cleaning up after a crisis.

5| IS INTERNATIONAL COOPERATION A GOOD IDEA WHEN USING MACROPRUDENTIAL POLICY?

Yes: these domestic institutional foundations need to be complemented by appropriate arrangements at the global level.

International cooperation and coordination are essential for sound macroprudential policy, for a number of reasons. Cross-border flows of credit and foreign direct investment have grown steadily over many decades, so financial conditions in one country inevitably will affect others through a number of channels. While cross-border flows generally promote the efficient allocation of capital worldwide, under some circumstances they can pose challenges to financial stability, tending to amplify financial cycles during both booms and busts. Since banks and other financial institutions are themselves increasingly global, a large share of these flows are internal to the firm. Effective macroprudential policy thus needs to address the effects of volatile flows involving independent domestic and foreign entities, as well as those cross-border flows that reflect the transactions across related subsidiaries of globally active banks.

Financial conditions can also spill across borders through other channels besides cross-border flows. For one thing, many asset prices, including government bond yields and equities, are strongly correlated worldwide, and these correlations tend to be higher than would be explained by movements in fundamentals. Second, domestic financial assets and liabilities, especially in emerging economies, sometimes are denominated in foreign currencies such as dollars or euros. The prevailing yields in these currencies can thus have a direct impact on domestic financial conditions in many countries.

Beyond the need to monitor and respond to spillovers, there is a benefit in authorities better appreciating and internalising the side effects of such spillovers, and sharing experiences and plans. As mentioned above, there is a great deal of room for learning about how these policies work, and about their intended and unintended consequences. This will require developing a better global analytical approach, one that seeks to factor in collective behaviour, interactions and feedback effects. This could help to better frame international cooperation.

Fortunately, international coordination on macroprudential policy has progressed quite a bit in recent years – and indeed has gone further in many ways than coordination in other areas of economic policy. Policymakers have been able to build on the existing framework of cooperation on setting prudential standards and monitoring their implementation. On the macroprudential front, we would mention, among other things, the provisions for international reciprocity in the application of the countercyclical capital buffer. The home supervisor of a foreign bank is obliged to require at least as high a surcharge on this bank’s exposures in the host

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11 See Avdjiev et al. (2012) for a discussion of how international credit enables domestic credit booms in emerging markets.
jurisdiction as the supervisor in the host jurisdiction demands of local banks. Another example of successful international coordination, this time in the cross-sectional dimension, is the joint development and implementation of the higher loss absorbency required of G-SIBs, as discussed above.

6 | Conclusion

We have posed five central questions about macroprudential policy, and have offered five answers. We would close with a sixth "answer". For macroprudential policy to be successful, all areas of policy need to play their part. Monetary policy needs to provide a stable price environment. Monetary policy also sets the price of leverage and thereby, in the words of Federal Reserve Governor Jeremy Stein, can "get in all the cracks" by influencing funding costs across all participants in the financial system. Fiscal policy needs to factor in how financial cycles affect public finances and to build up buffers in good times that can be run down in bad times, while ensuring that sovereign debt profiles are sustainable in the medium to long term. Exchange rates need to be flexible so that shifts in capital flows can be accommodated without distorting domestic financial balances. Microprudential policy needs to promote the soundness of individual institutions and markets. Structural policies need to facilitate the sectoral reallocation of resources in response to macroeconomic developments and technological change. Sound policies in all of these areas are critical for reducing the likelihood and impact of a financial crisis.

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12 See Stein (2013).
Five questions and six answers about macroprudential policy
Jaime Caruana and Benjamin H. Cohen

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This article proposes elements of a governance framework for macroprudential policy. First, a governance framework should be geared towards countering inaction. The difficulty of quantifying the final objective of financial stability and the large number of potential instruments blur the link between policy measures and their objective, making it harder to justify action. This creates a bias towards inaction that is strengthened by the fact that the benefits of macroprudential measures are invisible and uncertain and materialise only in the medium to long term, whereas they generally entail immediate costs for specific economic agents. Second, as this is a new policy area, authorities need sufficient discretion and flexibility to adapt to new insights and experiences. This flexibility should not, however, make authorities too passive or lead to too much uncertainty about authorities’ reaction function. Third, the governance framework needs strong accountability arrangements to ensure that the authority explains the reasons for its actions (or non-actions) and is held responsible for their consequences.

We propose the use of constrained discretion, based on pre-specified indicators of systemic risk and a clearly communicated policy framework. This can address the inaction bias and increase the predictability and transparency of decision making, while giving authorities flexibility to deviate from pre-specified rules when appropriate.
Financial crises involve huge economic costs in terms of output losses. For example, for the European Union (EU) as a whole, gross domestic product (GDP) in 2013 was still below its pre-crisis level and is currently around 13% below its pre-crisis trend. Since the onset of the crisis, the cumulative loss in output for the EU economy as a whole relative to its trend amounts to about half of one year’s GDP. Although financial crises are a fact of modern finance, limiting their adverse impact on the economy clearly is a key challenge for policymakers. This provides a compelling rationale for the development of macroprudential policy, which aims to strengthen the resilience of the financial system and reduce the build-up of systemic risks.

Over the past years, discussions on macroprudential policy have been to a large extent conceptual in nature. But this is rapidly changing as this new policy field is becoming more and more operational. Many countries have assigned a macroprudential mandate to an authority, and provided it with specific tools to address systemic risks, such as the countercyclical buffer and buffers for systemically important institutions. This implies that the discussion needs to shift from reflections on how macroprudential policy could potentially work, to how we can actually use macroprudential tools.

This article describes elements of a governance framework for macroprudential policy. Based on the main characteristics of this novel policy field, we propose the use of constrained discretion, which combines quantitative indicators and rules with qualitative assessments. Moreover, we argue that macroprudential authorities have to be transparent about both their policy framework and the considerations that lead them to their policy decisions, including decisions not to take measures.

1 | CHARACTERISTICS OF MACROPRUDENTIAL POLICY

To be able to make macroprudential policy operational, clarity is needed on its objectives, the tools that can be used to achieve these objectives, and the economic impact of these measures. These issues have attracted a lot of attention from academic economists and central bankers over the past years. In this section, we briefly summarise the issues that are relevant for the governance of macroprudential policy.

1 | Final and intermediate objectives

A clear objective is a necessary requirement for effective policy. Most economists and central bankers agree that the final goal of macroprudential policy is to promote financial stability, and that its main focus is to strengthen the financial system’s resilience and to counter the build-up of systemic risk rather than crisis management. But views differ on the effectiveness of macroprudential policy in dampening the build-up of risks. In our view, the aim of macroprudential policy is not to micromanage the financial cycle. The causes of financial imbalances are often beyond the control of the macroprudential authority. For example, they may originate abroad or from policy decisions of other authorities. Rather than actively trying to curb asset price bubbles and credit cycles per se, macroprudential policymakers should aim to ensure that the financial system is resilient in case the cycle turns or a bubble bursts. This is not to say that the financial cycle is completely exogenous. Macroprudential tools that are primarily used to increase the resilience of financial institutions or markets, will – as a side effect – also affect the incentives and behaviour of financial market participants. This may contribute to dampening the financial cycle. For example, the aim of the countercyclical capital buffer (CCB) is to increase the resilience of the banking system. But banks may respond to a higher buffer rate by tightening their lending conditions, which will contribute to reigniting in credit growth. In addition, macroprudential tools can be used to structurally dampen the cyclicity of the financial system, especially by reducing incentives for excessive risk-taking in the upturn. For instance, loan-to-value (LTV) limits on mortgages not only enhance the resilience of banks and households, but also restrict the tendency of banks to loosen credit norms in a boom.

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1 The pre-crisis trend was estimated excluding the 2005-2009 period.
3 Galati and Moessner (2011) provide an overview of the literature.
A second step is the identification of intermediate policy objectives that can serve as operational specifications of the ultimate objective of financial stability. A natural starting point for operationalising macroprudential policy are the market failures it aims to address, such as interconnectedness of markets and institutions, strategic complementarities that generate correlated exposures and risks, and fire sales of financial assets. These externalities can be translated into operational goals, which can guide the identification of systemic threats and the use of policy tools to enhance resilience against these threats (see Table 1). Moreover, identifying these objectives enhances transparency and accountability.

### Instruments

A wide range of (potential) macroprudential policy tools has been identified in the recent literature, ranging from capital and liquidity buffers for financial institutions, to margining requirements in financial transactions, to Pigouvian taxes on the use of short-term funding. The use of intermediate objectives is helpful in this respect, as it enables the authority to link these objectives to specific instruments. When the authority identifies a development that threatens one of the intermediate objectives, it can select a tool from the subset of instruments that are especially relevant for that objective (Table 1). In general, several instruments can be used for a single intermediate objective, reflecting the various ways in which a policy target may be pursued. Nevertheless, the limited experience in the use of these instruments poses a challenge to the macroprudential authority when selecting an instrument. For instance, it is not self-evident when price-based instruments such as risk-weights work better than quantity-based instruments such as LTV limits. Moreover, in many cases a combination of instruments may be most effective, e.g. to avoid arbitrage between different parts of the financial system.

### Economic impact and inaction bias

Given the huge costs of financial crises, macroprudential measures that reduce the impact and incidence of such crises potentially have large economic benefits. Nevertheless, making a convincing case in favor of a specific measure may prove difficult. First, systemic risks are hard to identify. Because they are tail events, historical experience is limited and the risks may not be adequately reflected in market prices. Second, the transmission of policy

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4 See, for example, Bank of England (2009) and De Nicolo et al. (2012).
5 This is reflected in an European Systemic Risk Board recommendation on intermediate objectives and instruments, see ESRB (2013).
6 See, inter alia, Kashyap et al. (2011) and Committee on the Global Financial System (2012).
7 See Shin (2012).

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**Table 1**

Intermediate objectives and policy tools

<table>
<thead>
<tr>
<th>Systemic risk</th>
<th>Excessive credit growth and leverage</th>
<th>Excessive maturity mismatch and market illiquidity</th>
<th>Exposure concentration</th>
<th>Misaligned incentives</th>
</tr>
</thead>
</table>
| Key Instruments | Counter-cyclical capital buffer | Capital instruments  
• leverage ratio  
• sectoral risk weights (e.g. real estate)  
• systemic risk buffer | Loan-to-value / Loan-to-income caps | Stable funding restrictions (e.g. net stable funding ratio, loan-to-deposit ratio) | Liquidity charges | Large exposure restrictions | Systemically important financial institution (SIFI) capital surcharges | Systemic risk buffer |
| Transmission channels | Resilience of banks; contribute to curbing excessive (sectoral) credit growth | Resilience of borrowers and banks; mitigate procyclicality mortgage credit | Resilience of funding base to stressed outflows | Resilience to counterparty and concentration to sectors | Lower probability and impact of failure of SIFIs; increased resilience of banks |

*Source: European Systemic Risk Board (ESRB)*
instruments to intermediate objectives is diffuse and uncertain. Third, the benefits only become apparent in the long term and cannot be easily quantified or attributed to the specific measure. By contrast, a macroprudential measure may generally be expected to have a direct and tangible negative impact on the profits of financial institutions and financial market participants. As a result, the authority may be under pressure not to take the measure (yet). The tendency to postpone policy action may also derive from the fact that macroprudential tools affect the financial system as a whole and may have a substantial impact at the macro level. For example, if the authority requires banks to hold additional capital this may temporarily reduce the availability of credit to the economy. Likewise, a substantial reduction of an LTV limit not only affects the ability of households to buy a house – especially for first-time buyers – but will also shift demand in favor of rental housing. In sum, the fact that macroprudential policy action has tangible and substantial short-term costs, but intangible and long-term benefits, may create an inaction bias.

2 | Governance frameworks

An important condition for making macroprudential policy operational is an appropriate governance framework, which stipulates which authority is responsible, how decisions are taken, and how the authority is held accountable. This governance framework should be tailored to the specific characteristics of macroprudential policy, the most important of which is the inherent tendency towards inaction. Recent experience in several countries illustrates that even when faced with a traditional systemic risk like a credit-fuelled house price boom, authorities may not be able to take decisive measures to strengthen the resilience of banks and households.

Therefore, governance frameworks should be geared towards countering inaction. Legislation should be clear about who is responsible for macroprudential policy, and should assign this authority specific tasks and adequate powers, which it can use independently from political pressure. A strong mandate not only enables the authority to take the necessary action, but, combined with transparency and clear communication, also creates a basis for accountability. This ensures that the authority is held responsible for the consequences of its decisions. Together, these factors are a prerequisite for a policymaker's ability and willingness to act and should form the basis of any macroprudential governance framework.

In general, accountability benefits from quantitative targets and benchmarks, such as an inflation target for monetary policy and a budget rule for fiscal policy. Similarly, defining quantifiable intermediate objectives for macroprudential policy can also strengthen the accountability of the authority. Accountability on the achievement of (intermediate) policy objectives needs to be combined with a requirement for the authority to report on the way it carries out the different elements of its task and to explain its decisions – to act or not to act. How does the macroprudential authority monitor and identify systemic risks, how does it respond to the identified risks, and how are its decisions expected to contribute to its policy objectives? Transparency on these issues will support the predictability, legitimacy and independence of the authority.

The governance framework should also reflect the system-wide nature of macroprudential policy. Decision making should take into account assessments of the financial system as a whole and the interactions between the financial system and the macroeconomy. This calls for a leading role of central banks in macroprudential policy because of their expertise and their existing responsibilities in the area of financial stability. This will also allow the interactions between monetary policy and macroprudential policy to be taken into account. Although they are used from a financial system perspective rather than an institution-specific perspective, many of the currently envisaged macroprudential tools are based on conventional banking supervision requirements for capital and liquidity. To avoid inconsistencies, the macroprudential authority should thus also coordinate with banking supervisors. Macro- and microprudential policy perspectives both contribute to a stable financial system and will in general reinforce each other. But the macro- and microprudential perspectives may sometimes lead to different conclusions, for example when the need to address the build-up of risk in the banking system

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8 See also Financial Stability Board, International Monetary Fund, Bank for International Settlements (2011).
during an upswing may contradict the perceived soundness of individual banks. In these situations, separate macro- and microprudential authorities may prove useful and a clear hierarchy of policy objectives can guide decision making.

Over the past three years, many countries have recognised the importance of a strong governance framework, and have implemented specific macroprudential mandates. In light of the above considerations on the governance of macroprudential policy, it is interesting to look at a number of characteristics of the frameworks that have emerged in European Union Member States (Table 2). Two models stand out: macroprudential mandates have been assigned either to a board, consisting of the relevant authorities, or to the central bank. Although the second model has a number of advantages in terms of accountability and expertise, there may be good reasons for creating a macroprudential board. Typically, financial stability is affected by different policy fields, and the identification of systemic risks may benefit from combining different fields of expertise – as long as the committee has a clear macroprudential focus. Nevertheless, the involvement of several authorities (three to five) may complicate decision making and weaken accountability, increasing the risk of inaction bias. For a board to be effective, its responsibilities and that of the participating authorities should be clear. Moreover, as argued above, central banks should have a leading role. This will most likely be the case if the central bank chairs the board (eight out of thirteen cases), although this is neither a sufficient nor a necessary condition. For a large majority of countries, it is the central bank who decides on the use of the macroprudential tools aimed at banks. In a number of cases, these tools are assigned to the supervisor or the government. Boards have only limited powers. Typically, they can issue non-binding recommendations to the respective authorities, but cannot decide on the use of macroprudential tools. As countries have different legal and supervisory frameworks, it is no surprise that they have created different frameworks. It remains to be seen which of these frameworks will create the institutional incentives and mechanisms to ensure that the authorities implement macroprudential tools in a timely and sufficient manner.

### 3] Rules versus discretion in macroprudential policy

When thinking about the appropriate governance framework for macroprudential policy, an important question is whether policymakers should use rules to guide their decisions or instead rely on discretion. In fact, this is an important question for many policy areas. Two economic arguments for the use of rules can be distinguished: first, the ineffectiveness of discretionary macroeconomic policies and, second, the inability of authorities to make binding commitments about future policy.

The first argument is especially relevant for monetary and fiscal policy, whereas the second argument also applies to other policy fields, such as financial regulation. Proponents of a more discretionary approach typically argue that mechanical rules cannot accommodate the special circumstances and unanticipated events that characterise real world policymaking. Moreover, adopting a strict policy rule would not be credible, since policymakers would always have the option to abandon the rule.

### Table 2

<table>
<thead>
<tr>
<th>Macropurudential authority</th>
<th>BE, CY, CZ, EE, GR, HU, IE, LT, PT, SK, UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central bank</td>
<td>BE, CY, CZ, EE, GR, HU, IE, LT, PT, SK, UK</td>
</tr>
<tr>
<td>Supervisor</td>
<td>FI, SE</td>
</tr>
<tr>
<td>Government</td>
<td>NO</td>
</tr>
<tr>
<td>Board</td>
<td>AU, BU, HR, DK, FR, DE, IT, LU, NL, PL, RO, SI, ES</td>
</tr>
<tr>
<td>Board chaired by</td>
<td></td>
</tr>
<tr>
<td>Central bank</td>
<td>HR, DK, IT, NL, PL, RO, SI, ES</td>
</tr>
<tr>
<td>Supervisor</td>
<td>–</td>
</tr>
<tr>
<td>Government</td>
<td>AU, BU, FR, DE, LU</td>
</tr>
</tbody>
</table>

**Source:** European Union Member States. For a number of countries the designated authority is not known yet.

<table>
<thead>
<tr>
<th>Designated authority</th>
<th>BE, BU, HR, CY, CZ, EE, GR, HU, IE, LT, NL, PT, SK, UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central bank</td>
<td>BE, BU, HR, CY, CZ, EE, GR, HU, IE, LT, NL, PT, SK, UK</td>
</tr>
<tr>
<td>Supervisor</td>
<td>AU, FI, FR&lt;sup&gt;a&lt;/sup&gt;, DE, SE</td>
</tr>
<tr>
<td>Government</td>
<td>DK, NO</td>
</tr>
<tr>
<td>Board</td>
<td>FR&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Designated authority differs for different instruments.

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<sup>10</sup> That is, central banks are the designated authority in terms of the Capital Requirements Regulation (CRR)/Capital Requirements Directive (CRD IV). For a number of countries, the designated authority is not known yet.

<sup>11</sup> The seminal papers in monetary policy for these views are Friedman (1960) and Kydland and Prescott (1977), respectively.

<sup>12</sup> See for example Pessina and Parijs (2009), with an application to prompt corrective action.
Pure rules based decision making, without any discretion, is of course a theoretical abstraction. In economics, policy areas have typically found a balance between the two extremes of ironclad rules and unfettered discretion. For example, fiscal policy may rely on automatic stabilisers until the budget deficit reaches a certain level. In monetary policy, inflation targeting regimes typically combine a commitment to price stability with discretion to take into account or respond to wider economic and financial developments.

What does this imply for macroprudential policy? Clearly, a rules-based approach could contribute to addressing the inaction bias, as instruments would be used more or less automatically when a pre-specified condition is met – for instance, when an indicator of systemic risk exceeds a minimum threshold. This would serve as a commitment device, strengthening the credibility and independence of the macroprudential authority. Given its macrofinancial nature, rules-based macroprudential policy is also likely to be more effective. Rules increase predictability and, by affecting the behaviour of market participants in anticipation of the authority's decisions, strengthen the expectations channel of policy. Moreover, predictable policy measures are less distortive, which may also reduce the resistance against them.

But a rules-based approach will only work if reaction functions are reasonably stable and the transmission of policy tools is broadly predictable. For macroprudential policy this is hardly the case. This calls for flexibility. The predictability and objectivity of rules-based decision making need to be combined with the flexibility of a more discretionary and qualitative approach in a model of constrained discretion. This approach uses principles, rules and quantitative indicators to guide policy decisions, for example by specifying which indicators or signals the authority should – as a minimum – take into account, which tools are linked to these indicators, and how frequent a decision on the use of an instrument should be taken. These principles limit the discretion of the authority and help to reduce the tendency to postpone action. Note that the constraint on discretionary behaviour is one-sided. It does not restrict the authority from taking action if it identifies a risk that is not (sufficiently) picked up by the indicators it uses.

In fact, different versions of this approach are already incorporated in macroprudential policy, and have even been included in relevant legislation. According to the European Capital Requirements Directive (CRD), when deciding on the use of the countercyclical buffer, authorities should follow a number of principles and publish a benchmark indicator of excessive credit. The CRD specifies that the deviation of the credit-to-GDP ratio from its long-term trend should serve as "a common starting point for decisions on buffer rates . . ., but should not give rise to an automatic buffer setting or bind the designated authority." Moreover, the authority must take a decision on activation of the buffer every quarter. Based on this, authorities are developing decision frameworks, which typically rely on a number of indicators in addition to the credit gap, but have an explicit discretionary component. The CRD also specifies a number of criteria for the identification of systemically important institutions (SIIs), such as size and interconnectedness, and the size of the buffers. Notably, the buffer for domestic SIIs follows a more principle-based approach than the buffer for global SIIs, allowing for a higher degree of national discretion.

Clearly, indicators have their limitations. They have performed well in the past, by construction, but give no guarantees that they will also perform well in signaling the next crisis. So we should be careful which indicators we use and how we use them. Research has shown that bank credit and house prices are good indicators of future crises, even though the specific channel through which a crisis eventually occurs may differ. These indicators may not tell exactly how and in which part of the financial system the risk is created, but they do give a reliable signal that financial imbalances are increasing. Based on this signal, authorities should decide whether general measures to increase the resilience of the financial system are needed.
Governance of macroprudential policy
Klaas Knot

system (such as the countercyclical buffer) are warranted. Moreover, a signal should initiate further analysis into the causes of this financial imbalance (possibly using other, more specific indicators). When the signal indicates elevated risk, there should be a presumption that the authority either takes action to mitigate the risk or explain why the risk is acceptable.

Constrained discretion works best if it is combined with a high degree of transparency and strong accountability. Publishing the policy framework is important even if the reaction function of the macroprudential authority is complicated and not fully predetermined. In addition to publishing the quantitative indicators and rules or thresholds that guide their decisions, authorities may also – to the extent possible – be transparent about the qualitative factors they take into account when deciding whether a quantitative signal should indeed lead to the activation of a policy tool. The policy framework may also include a description of which instruments the authority considers the most effective in addressing specific types of risk. Given that macroprudential policy decisions will to some degree be based on qualitative assessments, policy statements should describe the considerations that have led to those decisions. This not only helps to make the authority accountable for its decisions, thereby reducing the inaction bias, but also enables market participants to better understand the reaction function and infer the future behaviour of the authority. In this respect, simplicity is a virtue. By identifying a limited number of intermediate objectives, each of which comes with a limited number of indicators and potential macroprudential tools, the authority improves the predictability and effectiveness of macroprudential policy.

4 Conclusion

Given the difficulty of identifying systemic risks, the bias towards inaction and the limited knowledge of the use of macroprudential instruments, making macroprudential policy operational is an important challenge for central bankers and other authorities. Effective macroprudential policy calls for sound governance frameworks, that limit the inherent tendency to postpone action, provide the authority with sufficient flexibility to respond to new developments and insights, and support accountability and transparency. These elements can be combined in a model of constrained discretion.

But a strong governance framework is no guarantee that macroprudential policy will work. It can limit the risk of inaction bias, but cannot remove this inherent tendency altogether. This calls on macroprudential authorities to find the right balance between time-varying macroprudential policy tools and structural measures, which are less susceptible to inaction bias and less dependent on an accurate and timely identification of systemic risks. Finding this balance is not only important from a governance perspective, but also from an economic perspective. Structural weaknesses in the financial system played a crucial role in the 2007-2008 financial crisis. In reaction to this, international and national reform programs aim to strengthen the resilience of the system as a whole, by reducing the risk of contagion, mitigating procyclicality and ending too-big-to-fail, among other things. Time-varying macroprudential tools complement these structural measures, by enabling authorities to adjust requirements where warranted by changing economic and financial conditions. Which combination of structural and time-varying measures is most effective, is a key issue for further work.

Moreover, developing a framework for macroprudential policy that is both intellectually sound and practical will be a matter of learning by doing. Macroprudential policy is not about authorities using discretionary tools to micromanage the financial system. It is about using a transparent and simple policy framework, based on a number of principles, to promote a strong and resilient financial system. This requires a willingness of macroprudential authorities to learn from their own experiences as well as those of others and, indeed, to use macroprudential tools even if their effects are uncertain.

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From tapering to preventive policy

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At the start of the tapering process in the United States, it is necessary to anticipate what instruments may be used in the next phase. This note makes a strong case for preventive use of macroprudential tools to complement the Basel III buffer approach along the credit cycle. Instruments need to be recalibrated to check evolving risk incentives and regulatory arbitrage.

Timely tightening ahead of visible distress will meet fierce opposition and is likely to force delays. To address this tension and avoid forbearance, policymakers should initially prioritise low adjustment cost instruments, to activate upon early warnings rather than in response to shocks. These would minimise resistance, yet provide an immediate effect on risk incentives.

Flexible instruments may also be used to adjust the speed of transition towards more robust standards, such as future capital and stable funding norms.

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Basel III aims at strengthening resilience by a classic buffer approach, essentially raising ratios to a higher standards over a transition period. Yet regulators now recognise that fixed standards alone are not suited to contain risk evolution along the cycle, as norms soon become bypassed or obsolete. Recalibrating standards early along the risk cycle is needed to counter any deterioration of risk incentive over time.

The lesson from history (Goodhart and Perotti, 2013) is that preventing a build up in risk is more efficient than focusing on how to fight the fire once it spreads. While some ex post support may be inevitable, it has long-term costs, even besides its moral hazard effect on risk incentives. Support boosts illiquid or risky asset prices by transferring value from risk averse long-term savers or tax payers to risk-taking borrowers. Ultimately it undermines long-term savings (as well as pension funds and insurers), compromising recovery and growth. It is thus irresponsible to simply wait for risk to manifest itself.

The key challenge, we believe, is that the most effective measures (such as capital ratios or stable funding) are also those that meet the greater resistance. Measures that induce more risk bearing have the strongest preventive effect, but have higher adjustment costs, and may face political opposition because of fears of reduced credit. As a result, capital standards have historically been raised only after long deliberation and lengthy transition periods.

But if the most robust standards can be adjusted only with delay, what policy may be used in a timely fashion, that is once early indicators suggest excess risk incentives or attitudes (Borio and Drehmann, 2009)?

We here suggest prioritising early use of low adjustment cost instruments. As risk starts to build up, policymakers should activate instruments that offer less immediate resistance, and thus may be deployed with immediate effect. While introduced at moderate intensity, they should be recalibrated as needed along the risk cycle, to keep incentives and regulatory arbitrage in check. We also argue that flexible enforcement tools may be used for guiding the transition to stronger prudential standards.

1| WHAT MEASURES HAVE LOW ADJUSTMENT COSTS?

What tools may have a lower cost, when introduced at an early stage?

- Preannounced measures distributed over time, such as a countercyclical buffer policy.

- Closely related to the first are preventive conversions of pre-issued capital instruments (contingent convertible debt, or CoCo bonds). A preventive effect requires going-concern conversion, delivering equity capital precisely when leverage become excessive and incentives start to deteriorate.1 A high conversion trigger implies that they are costlier at issuance, but costless upon timely conversion. They are natural macroprudential instruments, but in some proposals their conversion is triggered by a macroprudential event.

- Most important are novel tools that rely on price effects rather than on quantitative norms, such as prudential charges. These are natural macroprudential tools to target risk externalities, aligning private and social costs.

We discuss next the countercyclical buffer, and more extensively the use of prudential charges.2

2| MACROPRUDENTIAL TOOLS IN EUROPEAN LEGISLATION

European legislation (the Capital Requirements Directive – CRD IV) introduced three forms of macroprudential measures. Next to introducing liquidity charges, and enabling national adjustment to the standards, it activated a single instrument, the countercyclical capital buffer (CCB). This is a time varying capital standard that redistributes capital strengthening over time in a predictable fashion, ensuring reserves are built when market conditions are favorable.

Will the CCB be sufficient, and used robustly for adequate prevention? It is too early to tell. In Box 1 we review

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1 Unlike bail in debt, going-concern conversion has a stronger risk prevention effect, as it dilutes risk shifting incentives at a stage when a bank is still solvent, but overleveraged. A number of technical issues remain on calibration and conversion trigger for bank convertible capital. A detailed discussion can be found in the Bank for International Settlements (BIS) consultative document of July 2011.
2 Some low cost adjustment tools (such as fractional liquidity buffers) achieve little risk absorption, and thus naturally have modest effects on risk incentives (Perotti and Suarez, 2011).
From tapering to preventive policy
Charles Goodhart and Enrico Perotti

Charges also enable a more dynamic policy, as they are arguably easier to adjust than quantitative standards. Toning down charges in times of stress appears safer than weakening ratios or postponing their enactment, as they allow the maintenance of the commitment to introduce robust standards. By inducing earlier adjustment, they can help break down incentives for collective inertia, enhancing the credibility of the standards.

The critical limitation of charges is that when risk incentives are extreme, such as when banks become undercapitalised, gambling incentives are not well constrained by price tools. In this case it is best to constrain exposures directly by fixing rigid quantitative ratios (Perotti and Suarez, 2011).

Flexible tools should not be used as a substitute for robust standards, but may complement them. They are useful as transitional tools to complement effective but high cost measures, such as stable funding and capital ratios. Combining an active use of flexible instruments with robust medium-term standards should minimise resistance to timely adjustment along the cycle with a direct effect on risk incentives. Flexible tools can thus help maintaining commitment to robust standards, helping to fine tune the transition with attention to market conditions. In a long transition period, slow adjustment is to be expected, and may undermine the goal. Thus credible implementation requires preventing collective avoidance or inertia, since the further are intermediaries from the standards as the deadline approaches, a softening or delaying of norms becomes more likely. So, announcing tough standards without any tools to nudge banks towards compliance may undermine their credibility.

Box 1
The Spanish experience with countercyclical provisioning

In response to extraordinary credit growth, Spanish authorities introduced a capital adjustment program based on the prescient principle that predictable credit losses need to be provisioned even before they have to be recognised.

Careful empirical work (Jimenez, Ongena, Peydró and Saurina, 2013) suggests that the program did create some temporary risk absorption capacity at the beginning of the crisis. With hindsight, however, the program was too limited in scale, and the buffers proved quite insufficient. The provisioning rule was weakened under industry pressure in 2004, at a critical juncture. But even more importantly, the program did not contain excess risk creation during the boom. Buffers were set according to a fixed, linear scheme that did not recognise the increasing risk profile and leverage of borrowers. The evidence suggests that the program was circulated as credit growth was reallocated via less constrained banks, while affected banks moved towards riskier borrowers. Yet markets were reassured by the provisioning program, which helped to ensure abundant foreign funding for the credit boom.

What are the lessons offered by this experience? Even a well conceived program faces the risk of inadequate scale, and the temptation of complacency. Even more critically, the lack of adjustable measures over time will undermine effectiveness and thus credibility. Future macroprudential policy has to avoid such pitfalls, adopting adjustment tools that may be easily activated and in case, escalated as required.

4| Flexible charges as transitional tools

Flexible tools should not be used as a substitute for robust standards, but may complement them. They are useful as transitional tools to complement effective but high cost measures, such as stable funding and capital ratios. Combining an active use of flexible instruments with robust medium-term standards should minimise resistance to timely adjustment along the cycle with a direct effect on risk incentives. Flexible tools can thus help maintaining commitment to robust standards, helping to fine tune the transition with attention to market conditions. In a long transition period, slow adjustment is to be expected, and may undermine the goal. Thus credible implementation requires preventing collective avoidance or inertia, since the further are intermediaries from the standards as the deadline approaches, a softening or delaying of norms becomes more likely. So, announcing tough standards without any tools to nudge banks towards compliance may undermine their credibility.
In Basel III there is no equivalent liquidity tool to the CCB. So far, only liquidity coverage ratios – LCRs (liquidity buffers) are to be introduced over a transition period. LCRs are traditional fractional reserves for small runs; they do not contain aggregate liquidity risk. Even at the microprudential level, they have little preventive effect as their implicit cost is countercyclical (Perotti and Suarez, 2011).

In contrast, the more structural stable funding norms (net stable funding ratio – NSFR) represent a major innovation and more robust standards, because of their effective impact on stability. They have been postponed, and in fact there is no clear commitment to their introduction.

A long transition to stable funding standards creates a regulatory vacuum. In addition, perceived sovereign risk in the European Union varies markedly across countries. As bank solvency is naturally linked through markets to domestic public solvency, it is obvious that the transition process to stable funding cannot be uniform across countries. Thus there is a need to manage the transition as well as to differentiate it across countries, in particular those in the euro area where there is no national monetary flexibility. Goodhart and Perotti (2013) propose in this case to use liquidity risk charges, in the spirit of Acharya, Krishnamurthy and Perotti (2011) and Brunnermeier, Gorton and Krishnamurthy (2011). Policymakers in Europe have been for the first time in history empowered to use such measures by the CRD IV (see Box 2), though to be fully activated they still require national or European definition of liquidity standards.

Because of their ease to adjust, charges enable a timely countercyclical liquidity policy. Charges can be lowered in hard times, and raised in good times for faster adjustment. They are meant to induce early adoption of standards, while giving banks the flexibility to plot their own path toward convergence. Adjusting the charges would be smoother than adjusting or postponing the ratios entirely. Surcharges can be better targeted than higher interest rates, which hit everyone and not just the gamblers.

### Consequences of the charges

The primary goal of surcharges is to induce a more stable funding maturity and contain contingent liquidity outflows. By creating a price wedge, they force market participants to internalise the risk externality.

Past evidence suggests that this wedge would not affect much the volume of bank credit, as it induces savers to take more term deposits. The key question is instead
the cost of credit. It will be raised in good times, at most by the amount of the charges, if banks were to pass the entire cost to investors. However, the cost and volume of credit would be more stable in bad times, for two reasons. First, banks will suffer less rapid outflows and would need to deleverage less, or less rapidly. Second, countercyclical charges will be lowered in times of credit crunch. On average, it may have little effect. Critically, since the crisis there is a consensus that volatile credit access is very costly for businesses and taxpayers.

**6| Other possible prudential charges**

In principle, charges may be adopted to target funding and speculative strategies that create external effects. Shin (2010) calls for measures, including charges, to target non-core funding. His contribution has been appreciated among emerging countries, long plagued by unstable capital flows. Prudential charges based on stable funding norms have parallels with some forms of capital controls adopted in emerging countries. Influential IMF reports (Ostry et al., 2010; 2012) have come to recognise their beneficial effect. For instance, there is evidence in terms of a change in composition of foreign funding flows towards longer maturities.

Recently, the Korean authorities adopted a macroprudential levy on banks’ non-deposit foreign currency liabilities, with increasing rates for shorter maturities. The measures appeared to be effective in reducing Korea’s sensitivity to global liquidity conditions.

Charges have also been proposed both to target unstable funding sources such as short-term wholesale and foreign funding and the build up in asset encumbrances caused by the increasing use of secured financial credit. For a review of the liquidity risk associated with the safe harbour privileges enjoyed by repo and derivative contracts, see Duffie and Skeel (2012) and Perotti (2010; 2013).

**7| Coordination of charges in the European banking area**

International coordination of rate-setting is desirable, but this does not imply they should be set at equal levels in all countries. A level playing field requires that riskier financial systems require higher charges, else competition is distorted.

While monetary union requires a common financial market, national rules are still needed to maintain its integrity. Country-based charges would enable some flexibility in the euro area, allowing marginal bank funding rates to vary across countries. It would have been desirable in 2005-2007 for Spain and Ireland to have had higher charges than Germany, where there was no foreign credit-fuelled real estate bubble. Such flexibility would actually reinforce cohesion in the euro area, reducing the rigidity imposed by the single monetary area. At present, there are no clear tools for this purpose: European countries run different prudential liquidity frameworks.

A final benefits of liquidity risk charges is that besides targeting risk creation, they contribute revenues for national financial stability funds.

**8| Conclusions**

Microprudential standards improve risk choices and resilience at the level of individual intermediaries. In contrast, macroprudential policy needs to target propagation risk, aiming at preventing and containing crises. Regulators now recognise that fixed prudential standards are not suited to contain risk evolution along the cycle, as norms soon become bypassed or obsolete. Recalibrating standards along the credit cycle allows the regulator to counter any deterioration of risk incentives over time. Timely macroprudential intervention is thus key to risk prevention. As Andrew Crockett (2000) said early on: “The received wisdom is that risk increases in recessions and falls in booms. In contrast, it may be more helpful to think of risk as increasing during upswings, as financial imbalances build up, and materialising in recessions.”

We have proposed a strategy on how to select and adjust instruments over the credit cycle. While there is some experience in relaxing standards in times of distress, the real challenge is how to design a preventive strategy in normal times. But forcing more risk absorption in a boom phase implies direct costs and slows down credit, leading to strong resistance. Thus prevention cannot credibly rely on rapidly escalating tough measures. We suggest defining robust standards for the medium-term, and guiding their implementation by nudging intermediaries with flexible tools. These must be easy to deploy and escalate rapidly, as well as easy to tone down without undermining the long-term targets.
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There is increasing recognition in the academic and policymaking communities that dedicated macroprudential policies are needed to reduce the frequency and severity of financial crises. The main theme brought out by this article is that in a globally interconnected world, a range of collective action problems lead to “too little” macroprudential policy action, from both a national and a global perspective. This reinforces inherent biases in favor of inaction or insufficiently forceful and timely macroprudential action at the national level. A combination of guidance by standard setters, international surveillance, and regional coordination mechanisms is needed to reduce collective action problems and enhance the effectiveness of macroprudential policy in the pursuit of global financial stability.
1| MACROPRUDENTIAL POLICY – BASIC RATIONALE AND CHALLENGES

The crisis has shown that the traditional combination of macroeconomic policies and microprudential supervisory policies is not sufficient to contain systemic risk in the financial sector. Systemic risk can build against the background of apparent macroeconomic tranquility. Meanwhile, a microprudential supervisory approach, geared to ensure the safety and soundness of individual financial institutions, is insufficient to address systemic risks resulting from feedback loops between the financial system and the real economy, and interconnectedness within the financial system. Dedicated macroprudential policies are needed to reduce systemic risks, and thereby both the frequency and severity of financial crises.

The crisis, as well as the experience since then has shown that monetary policy can have strong implications for financial stability, which in turn may need to be contained by appropriate macroprudential action. This applies both at the national level, when accommodative policy spurs excessive increases in domestic asset prices and credit, and at the international level, when changes in the monetary stance cause spillovers into international financial markets that may compromise financial stability. This calls for strong macroprudential policy frameworks to be put in place across all relevant jurisdictions, able to contain the side-effects of monetary policy for financial stability at both the national and international levels.

There is agreement that the policy framework needs to allow for action in both the cyclical (time) dimension and the structural (cross-sectional) dimension. Policies in the cyclical dimension seek to address risks from potentially excessive credit growth and the build-up of leverage in the upswing of the financial cycle, and build buffers that cushion the impact of adverse financial conditions when the financial cycle turns. Policies in the structural dimension seek to contain risks from increased interconnectedness within the financial system and reduce the risk from a failure of institutions that have become "too important to fail".

Ensuring effective macroprudential policy faces a range of challenges. Importantly, macroprudential policy is subject to inherent biases that favor inaction or insufficiently forceful and timely action. As set out in IMF (2011), Nier (2011), and Viñals (2011), at the root of these biases is the basic asymmetry in the trade-off faced by macroprudential policymakers. While the benefit of macroprudential action only accrues over time and is difficult to measure with certainty, the cost of such action is often felt immediately by both borrowers and financial firms. This makes it hard for the macroprudential policymaker to develop the resolve to take action. The resulting bias in favor of inaction or insufficiently timely and forceful action is often compounded by lobbying and political pressure, as well as the need for domestic coordination and a lack of clarity about who is responsible to contain systemic risks (IMF, 2011; Nier et al., 2011).

In a globally interconnected world macroprudential policy is further complicated by collective action problems that arise when macroprudential policy is conducted at the national level, but financial activity and financial stress can cross national borders. This article sets out the range of these effects and argues that these problems will on balance lead to "too little" macroprudential action, rather than "too much", reinforcing biases in favor of inaction at the national level. The article also describes the institutional mechanisms that are needed to address these problems.

2| THE RISE OF GLOBAL INTERCONNECTEDNESS

Before turning to a discussion of collective action problems, it is useful first to provide a sense of the increasing global interconnectedness witnessed over the past three decades. The rapid financial globalisation over this period has been reflected in an over six-fold increase in the external assets and liabilities of nations as a share of GDP (IMF, 2013). Just as striking is the sharp increase in cross-border lending and investment activities of banks until the onset of the global crisis (Chart). Gaining increasing momentum since the mid-1990s, this increase reflects a greater direct provision of loans and financial services by global banks, a greater share of foreign assets in banks’ trading books, and a proliferation of cross-border branches and subsidiaries, which in turn facilitate the cross-border provision of loans, investments and financial services.
Collective action problems in macroprudential policy and the need for international coordination
José Viñals and Erlend Nier

Collective action problems in macroprudential policy and the need for international coordination
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To be sure, financial integration, including both cross-border investment and the provision of financial services across borders, has brought substantial benefits. It has led to an improved allocation of capital and an expansion of opportunities for risk-sharing and risk diversification. The provision of financial services across borders has also unambiguously fostered competition, a more efficient intermediation of savings and greater access to financial services.

On the other hand, increased global interconnectedness that goes along with financial integration can contribute to the build-up of risks in both the cyclical and structural dimensions. Common intermediaries transmit global liquidity conditions across countries, thereby contributing to global financial cycles (Aziz and Shin, 2013). In the process, they can collectively become overexposed to risks in the upswing of the credit cycle and then become overly risk-averse in the face of adverse shocks. Moreover, the failure of global systemically important financial institutions (G-SIFIs) can send contagious shockwaves across national borders and lead to a seizing up of liquidity in key financial markets, with strong adverse effects on the provision of credit to the real economy, even in countries where the system was unexposed to the underlying risks.

Most important for the purposes of this article, global interconnectedness complicates both the ex ante assessment and the mitigation of systemic risks at the national and global levels. In a globally interconnected world, national authorities are likely only to have partial information on the build-up of systemic risks at the national and global levels, making it difficult for each jurisdiction to assess these risks. It is also unambiguously harder for nations collectively to implement a globally effective and efficient set of macroprudential policy actions; that is, a set of policies that is conducive to global financial stability, while mitigating costs and distortions to the efficient intermediation of savings at both the national and global levels.

3| A CLOSER LOOK
AT COLLECTIVE ACTION PROBLEMS

In a globally interconnected world, collective action problems are likely to remain pervasive and strong mechanisms will be needed to counter these problems. This section discusses in greater depth four sets of issues that arise in such a world.

• A lack of timely macroprudential action can result in crisis and impose substantial costs across borders, through trade and financial linkages.

• Policies to contain excessive domestic credit can lead to an increase in credit provided across borders, a phenomenon known as international "leakage".

• Policies to strengthen the resilience of systemic institutions in one country can cause their activities to migrate to other countries, resulting in a "race to the bottom".

• Complex group structures can complicate risk assessment and effectiveness of risk mitigation for home and host authorities.

For each of these issues, this section will provide a closer description of the nature of the problem. This will draw out how they tend to be associated with "too little" macroprudential action, and discuss how a lack of coordination of national policies reduces the effectiveness of the overall policy response. For each of these issues we will also sketch the nature of the mechanisms that can address the issue.

3|1 Spillovers from a lack of action

A key issue is that a lack of macroprudential action in one country can result in crisis, thereby imposing negative externalities on other countries, both
through diminished opportunities for trade and more directly, through contagious financial spillovers that drag other countries into recession. Conversely, where a country takes timely and appropriately forceful macroprudential action, this will in general confer sizable positive spillovers on other countries.

A straightforward application of the "tragedy of the commons" implies that across countries, then, there will overall be "too little" macroprudential action, relative to the jointly welfare maximising level (see also Gaspar and Shinasi, 2010). This international collective action problem compounds a deeper lack of action problem at the national level, where already, and for the reasons set out above, macroprudential policy is subject to a strong bias in favor of inaction or insufficiently timely and forceful action as risks are building up (IMF, 2011).

The potential for spillovers from a lack of national action means that it is in our collective interest to ensure that strong institutional frameworks are established across all relevant jurisdictions, so that the authorities are enabled and willing to take the appropriate action. National macroprudential frameworks need to ensure clear objectives and accountability, an appropriate strength and breadth of legal powers, and the proper assignment of the macroprudential mandate to those agencies that have the incentives to take action.

Since strong national mandates can contribute to both domestic and global stability, and in line with its mandate to promote an effective international monetary system, the International Monetary Fund (IMF) is promoting the establishment of such national mandates across its membership, and is providing advice on appropriate institutional underpinnings for macroprudential policy through its surveillance, its Financial Sector Assessment Program (FSAP), and its technical assistance (e.g. IMF, 2012a).

National frameworks need to be buttressed by international guidance on and surveillance of appropriate macroprudential actions. In line with this, for instance, the Basel Committee has issued guidance for countries to monitor increases in the ratio of credit-to-GDP and to prepare to increase countercyclical capital buffers in response. And a joint report by the Financial Stability Board (FSB), IMF and Bank for International Settlements (BIS) to the G20 has outlined broader issues in the establishment of an effective macroprudential framework.

The IMF is in a unique position to help countries conduct an in-depth assessment of systemic risks, and to provide advice on the appropriate macroprudential actions in the light of this assessment, while also taking full account of macroeconomic imbalances and other policy settings that could have a bearing on systemic risks. The IMF's surveillance of national macroprudential policies, through Article IV consultations and FSAPs, can then strengthen the hands of national macroprudential authorities in the face of opposition from the financial industry and increase their resolve to take potentially unpopular risk mitigating action. Indeed, FSAPs have, since the crisis, become mandatory for countries with systemically important financial sectors, where spillovers from a lack of action can be particularly large.

### 3|2 Leakage of action in the cyclical dimension

In the cyclical dimension, national policies to contain risks from a rapid build-up of domestic credit can lead to an increase in the share of such credit that is provided across borders, a phenomenon that has come to be known as "leakage". This cross-border arbitrage can occur through direct lending by cross-border banks to domestic borrowers, lending locally by foreign branches, as well as a "rebooking" of loans, whereby credit is originated by subsidiaries, but then booked on the balance sheet of the parent institution.

Leakage effects have complicated the response to national credit booms in a number of countries in Eastern Europe ahead of the crisis (e.g. in Bulgaria and Croatia). More recent research documents that such leakage effects can be substantial for advanced countries as well. For the United Kingdom, Aiyar and others (2012) estimate that just under a third of the reduction in credit growth that could be achieved from increases in capital requirements on regulated banks is "undone" by an increase in lending by foreign branches that are not subject to the same requirements.

International leakage effects call for cooperative action in the form of "reciprocity" in the conduct of macroprudential policy, so that all national macroprudential authorities impose equivalent
Macroprudential constraints on financial exposures to a given country. In principle, it is in the interest of all authorities to reciprocate the local measures, since this will increase resilience to increasingly risky exposures for everyone.

In practice, however, a lack of reciprocity may hamper macroprudential policies for a number of reasons. For one, some countries may not even have established the macroprudential tool that is being applied at the level of the host country. And for those countries where the exposure to the host country is a small share of the total exposures of the home country financial system, or when domestic credit and profits are subdued, there may be little urgency from the national perspective to impose constraints on cross-border exposures, even though those exposures may constitute a sizable share of the total credit provided in the host country. There is a risk then that those countries that want to tighten macroprudential constraints, but whose efforts are stymied by increases in cross-border credit, will resort to the imposition of more distortive measures, such as the imposition of capital controls, to stop the inflow of credit.

This means that cooperation needs to be fostered by more formal international mechanisms. The Basel agreement on reciprocity in the imposition of the Basel III countercyclical capital buffer (CCB) is an important advance in this regard. This agreement stipulates that when the CCB is activated in any given country, all countries are meant to apply the same buffer to exposures into that country. However, there are currently no international reciprocity agreements that would apply more broadly to other important macroprudential tools, including, for instance, more targeted increases in capital requirements on exposures to specific sectors, such as residential real estate or the corporate sector. Moreover, even for the CCB, the strength of implementation of reciprocity remains untested and, in the European Union, is explicitly capped at 2.5 per cent.

More work needs to be done therefore to ensure that reciprocity is forthcoming and applies more fully and across the range of tools that are needed to contain systemic risks in the cyclical dimension. Specifically, international agreements are usefully complemented by further specific mechanisms in regions with highly integrated financial systems. The recommendations issued by the European Systemic Risk Board (ESRB) that call for reciprocity across the European Union in the imposition of measures to address foreign exchange risks are a good example. International surveillance of macroprudential action by the IMF may also be an important element in this effort going forward, since such surveillance can encourage the adoption of reciprocal action in the most relevant jurisdictions.

3|3 Race to the bottom in the structural dimension

In the structural dimension, policies to strengthen the resilience of systemically important financial institutions are subject to a race to the bottom among the national authorities. The authorities in each country may want to increase the resilience of systemically important institutions, including through the imposition of capital and liquidity surcharges for such institutions. However, each jurisdiction must fear that these institutions may relocate or that their activities are moved to other countries, reducing jobs and tax revenue for the local economy. This can lead to a race to the bottom in the application of such measures among national authorities. It can also lead to greater concentration of risky activities in less strictly regulated jurisdictions.

These effects have long been recognised in the academic literature (e.g. Acharya, 2003) and have also found empirical support (e.g. Karolyi and Taboada, 2013). Indeed, the race to the bottom problem has arguably played a major role in driving financial deregulation ahead of the crisis, especially among the large financial centers, and contributed in drawing risk concentrations into lightly regulated jurisdictions, such as Iceland, Ireland and Cyprus, each of which subsequently required international support.

Addressing the race to the bottom problem requires international agreements and guidance, which can usefully be complemented by international surveillance of national action. In this regard, an important recent advance has been the determination of capital surcharges for a set of G-SIBs by the FSB. In addition, and drawing on earlier work by the IMF, FSB and BIS (2009), the Basel Committee has issued guidance for national authorities to assess capital surcharges for domestic systemically important banks (D-SIBs) in an attempt to achieve some degree of consistency of approach.
Even so, such guidance leaves considerable room for national discretion in the application of a framework for dealing with risks from systemically important institutions and infrastructures. International surveillance can therefore usefully complement these efforts by helping the authorities conduct an in-depth assessment of structural risks and the need for mitigating action. The IMF’s existing program of FSAPs is well-placed to provide such advice, and structural risks have indeed become an important part of the assessment in a number of recent FSAPs (e.g. IMF, 2012b).

3|4 Complex group structures

Complex financial group structures can pose a range of additional difficulties in the assessment and mitigation of systemic risk, which can give rise to additional collective action problems.

First, where a complex group maintains affiliates in multiple countries, this can make it hard for any national authority to fully assess the risks that are bundled within the group. It can also reduce clarity over which national authority is responsible for taking action to address these risks, thereby giving rise to another collective action problem. A good example is American International Group, whose derivatives desk was run as the London branch of the group headquartered in the United States.

Second, a complex group may be headquartered in a country where its business activities are minimal, but maintain affiliates that are systemically important in the host countries. The host country authorities will then fear that the macroprudential constraints imposed on the group may not fully reflect the systemic impact that a failure of the affiliates may have on the host country. In turn, this can lead to the host country taking action to ring-fence the affiliates, with a potential loss of efficiency in the management of assets and liabilities for the group as a whole.

Third, the transmission of macroprudential action taken by the home country may have undesirable consequences for the host country. For instance, where capital or liquidity constraints are imposed by the home authority on the group as a whole, these may lead to excessive deleveraging effects in the host countries. This may be a particular problem in cases where the measures imposed by the home country are taken (too) late in the global financial cycle, such that deleveraging processes are already ongoing in some of the host countries. And it is a greater concern for host countries where the foreign bank affiliates make up a significant share of the total provision of credit.

These issues are difficult to resolve fully, but a combination of multilateral and regional mechanisms can be helpful.

- Supervisory colleges are an important multilateral mechanism that can facilitate information exchange among regulatory authorities and foster recognition and understanding of home-host interdependencies and adverse spillover effects.

- Regional coordination is essential for countries belonging to highly integrated regional financial systems. Examples of such regional coordination mechanisms are the ESRB and the Nordic-Baltic Macroprudential Forum.

- There can also be more ad hoc structures organised to deal with specific problems. An example is the “Vienna initiative” that was set up to encourage cooperative solutions that helped avoid excessive deleveraging in central and eastern European countries in the wake of the global financial crisis.

- In addition, initiatives by global and regional bodies to enhance the resolvability of G-SIFIs, such as through recovery and resolution plans and the adoption of effective resolution regimes, can facilitate cross-border resolution and reduce conflicts, whilst helping to maintain the benefits of financial globalisation.

4| Conclusion

In a globally integrated world macroprudential policy is subject to collective action problems. On balance, these tend to be associated with “too little” macroprudential policy action, relative to the level that would maximise global welfare. They can thus compound the deeper lack of action problem at the national level, that arises from uncertainty over the
benefits of macroprudential action, lobbying and political pressure.

Paradoxically, in a world where capital accounts are fully closed, and thus in the absence of collective action problems, each country’s contribution to its own financial stability, and hence to global stability, may be more efficient, but this solution would come at the cost of full financial fragmentation. If we are to reap the benefits of financial integration, it is essential that we establish and strengthen cooperative mechanisms that address collective action problems, so as to ensure global financial stability.

Strong national mandates are an important basis, and should ensure both the ability and the willingness to act at the national level. These mandates need to be complemented by international agreements and guidance by standard setters, such as the FSB and the Basel Committee, as well as international surveillance of risks and national macroprudential policy responses. Deeper regional cooperation is needed for countries and regions that are highly financially integrated, such as the European Union, where the ESRB is well-placed to continue its important role in this regard.

Setting up and strengthening these mechanisms is in our collective interest, since it will lead to a more effective pursuit of both national and global stability. Indeed, these mechanisms are essential for national macroprudential policies to “add up” to deliver global financial stability in a financially integrated world.

The IMF intends to make a strong contribution to the coordination of macroprudential action, by continuing to act as a global risk advisor, promoting the establishment of strong national mandates, and providing advice on the appropriate policy actions, in light of an in-depth assessment of risks in its ongoing FSAPs and Article IV consultations, and its multilateral spillover analyses.

To be sure, solving the international collective action problem will face a range of practical challenges. But the goal of ensuring global financial stability is well worth the efforts to overcome these.
Collective action problems in macroprudential policy and the need for international coordination
José Viñals and Erlend Nier

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A macroprudential perspective on regulating large financial institutions

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One of the many lessons to be drawn from the recent financial crisis is that a macroprudential perspective must be brought to bear on the regulation of large financial institutions. This macroprudential perspective suggests two kinds of policy measures, over and above the strengthening of capital and liquidity regulation applicable to all banks. First, the negative externalities that the distress or failure of such institutions can impose on the financial system as a whole should be addressed through progressively stricter regulatory measures to increase the resiliency of the largest firms. Capital surcharges, total loss absorbency requirements, and charges for use of large amounts of short-term funding are examples. Second, the collective impact of changes in the condition of these large institutions on the real economy should be taken into account in regulatory requirements and expectations. Thus, for example, supervisory stress tests should be constructed so as to reflect the potential macroeconomic impact of losses or balance sheet adjustments at large firms as a whole in the face of adverse scenarios. The international community has made a good start in developing regulatory measures motivated by macroprudential considerations. However, there remains considerable work to be done, particularly in addressing the potential for contagion presented by the use of short-term wholesale funding.
Real world crises have a way of shaking up the intellectual foundations of policy disciplines. Elements of received wisdom are undermined, while certain heterodox or less mainstream views are seen as more valid or important than had been widely recognised. The financial crisis of 2007-2009 was no exception. Some ideas, such as the efficient markets hypothesis, have been subject to further challenge and qualification, while others have risen to greater prominence. An example of the latter is the view that financial stability must be an explicit economic policy goal. A corollary of this view is that a “macroprudential” perspective – generally characterised as focused on the financial system as a whole, as opposed to the well-being of individual firms – should be added to traditional prudential regulation.

Macroprudential regulation is still in the early stages of development, in theory as well as in practice. A short essay cannot hope to touch on, much less do justice to, the many relevant issues. After a brief review of what is still a brief history of the concept, I will offer four broad propositions that I believe should guide the evolution of macroprudential policies over the next few years, particularly as they apply to the largest financial institutions. While many of these policies will doubtless evolve gradually, I argue that measures to address the macroprudential vulnerabilities associated with large-scale short-term wholesale funding should be an immediate priority.

1 | THE EMERGENCE OF THE CONCEPT OF MACROPRUDENTIAL POLICY

It is worth noting that the term “macroprudential regulation” can be found in Bank for International Settlements (BIS) documents beginning more than 30 years ago. It appears to have originated in specific contrast to traditional banking regulation, which a 1979 background paper at the BIS characterised as focused on “sound banking practice and the protection of depositors at the level of the individual bank.”

In fact, in the United States much of the New Deal legislation that would define the financial regulatory structure for more than 40 years was in direct response to what we would today call systemic concerns, including banking panics and excessive leverage in equity markets.

From the late 1970s onward, though, there was indeed reason for the development of an explicitly macroprudential perspective. The use of the term macroprudential – and, it would seem, the influence of the concerns lying behind the term – was somewhat irregular in the three decades after it was coined. In the United States, the New Deal regulatory system was breaking down in the face of profound changes in financial markets, most importantly the progressive integration of capital market and traditional lending activities. The forms of regulation that were evolving as substitutes – principally, though not only, minimum capital requirements – were largely based on what various BIS papers characterised as a microprudential approach to regulation. Although similar changes were taking place in other advanced economies to a lesser extent, local developments also highlighted the need for a macroprudential perspective on financial regulation.

In Japan, the asset bubbles in equities and property that contributed to the banking crisis of the 1990s grew to large proportions. In the euro area, and the European Union more generally, the consequences for financial stability of monetary union and financial integration were not addressed with new regulatory policies.

In short, discussion of macroprudential concepts and their implications for regulation was more likely to be found in the papers of a few academics and intrepid BIS researchers than in the pronouncements of senior regulators or other official sector representatives. One important exception is a speech delivered in September 2000 by the late Andrew Crockett, then the General Manager of the BIS.

For several reasons, that speech is a good point of reference for us today – as a nod to Sir Andrew’s foresight, as an occasion for regret that his words were not more closely heeded by regulators, and as a way of illustrating how the challenge of macroprudential financial regulation has grown in the years since.

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1 See Clement (2010).
2 The establishment of federal deposit insurance and the separation of commercial banking from investment banking – two key elements of New Deal financial reforms – were very much directed at what would today be characterised as systemic risks.
3 See Crockett (2000), also then the Chairman of the Financial Stability Forum.
4 Reading between the lines, one wonders whether Sir Andrew anticipated that his call for action might not be taken up by banking regulators. He styled his remarks as “provocative” and concluded by suggesting they were but “a small awareness-raising step in what, if pursued, is likely to be a long road.”
Sir Andrew’s speech contained much that is now familiar and broadly accepted, but was fairly uncommon at the time: he distinguished between the objectives of microprudential regulation – protecting against idiosyncratic risk in a bank – and macroprudential regulation – protecting against systemic risk. He set forth a description of the financial cycle that could be read as a loose paraphrase of Hyrnan Minsky’s theory of financial instability. He identified the procyclical and asset correlation concerns regarding large bank activities that have commanded so much attention in the past several years. And, again foreshadowing many recent discussions, he suggested macroprudential tools both to increase resiliency (as through capital regulation with a systemic perspective) and to lean against the wind in an effort to slow or limit the growth of unsustainable asset bubbles (as through maximum loan-to-value ratio requirements).

Although the crisis and its aftermath have created a broader consensus for the proposition that financial stability should be a more explicit objective of economic policy, there is considerably less convergence around theories of, metrics for, and policy prescriptions to promote financial stability. Policy and academic writing generally limits the term “macroprudential” to measures directed specifically at countering risks in the financial system that, if realised, can severely impact real activity. But adoption of consistent terminology does not itself resolve questions of whether, for example, increases in systemic risk are endogenous to the financial system and thus follow a somewhat regular cyclical pattern, or are instead somewhat randomised – albeit recurring – phenomena. Differences in views of the origins of systemic risk obviously affect views of the best ways to measure it and, of course, the best policies to contain it. One example, of particular interest to central bankers, is the ongoing debate about the circumstances under which monetary policy should be adjusted to take account of financial stability concerns. Lying behind the various positions in this debate are differing views on how systemic risk propagates, and thus on the relative efficacy of monetary versus macroprudential policies.

Progress in these debates is complicated by the fact that, by definition, financial stability policies are directed toward preventing or mitigating rare events, rather than outcomes such as inflation and unemployment that are continuously observable. This focus on tail risks raises important issues of accountability in the institutional design of macroprudential policies and also complicates the task of testing financial stability theories and proposed policies.

Yet even against the backdrop of what is still a comparatively underdeveloped understanding of financial stability, commentators and policymakers have compiled and, in some cases, developed so-called “toolkits” of possible macroprudential measures. These measures are thought available for use against one or both of two frequently identified dimensions of systemic risk – procyclicality and interconnectedness. Of course, the attractiveness of many of these tools will depend on one’s views of a variety of theoretical, institutional, and practical questions.

5 Sir Andrew summarised the financial cycle as follows: “A review of the instances of financial instability would reveal some shared stylised elements. There is first an over-extension phase during which financial imbalances build up, accompanied by benign economic conditions. In this phase, asset prices are buoyant and their surge tends to feed, and be fed by, rapid credit expansion, domestically or internationally. Leverage, in overt or hidden forms, accumulates in balance sheets, masked in part by the favourable asset price developments. The trigger for a reversal is essentially unpredictable. It can originate either in the financial sphere (e.g. an asset price correction) or in the real economy (e.g. a spontaneous unwinding of an investment boom). The process then moves into reverse. Ex post, a financial cycle is evident.” Compare Minsky’s conclusion to his essay “The financial instability hypothesis”, http://www.levyinstitute.org/pubs/wp74.pdf: “In particular, over a protracted period of good times, capitalist economies tend to move from a financial structure dominated by hedge finance units to a structure in which there is large weight to units engaged in speculative and Ponzi finance. Furthermore, if an economy with a sizeable body of speculative financial units is in an inflationary state, and the authorities attempt to exercise inflation by monetary constraint, then speculative units will become Ponzi units and the net worth of previously Ponzi units will quickly evaporate. Consequently, units with cash flow shortfalls will be forced to try to make position by selling out position. This is likely to lead to a collapse of asset values.”

6 Thus, for example, fiscal or tax policies would not be generally characterised as macroprudential tools, even though they could have implications for systemic risk in some circumstances. For useful overviews of macroprudential policy issues and debates, see International Monetary Fund (2013). Glaess and Muesener (2011).

7 For a recent study finding a correlation between the growth of credit aggregates and financial crises, and also suggesting a secular trend making such crises more of a risk, see Schularick and Taylor (2012).

8 There is actually quite a rich history of policy measures in the United States that we would today call “macroprudential”. See Elliott et al. (2013). It is notable that the enactment and use of a number of tools varied as the integration of capital markets with traditional lending functions accelerated in the last quarter of the 20th century, though even if there is a causal relationship between these two phenomena, it is not clear which way the causality runs (perhaps in both directions).

9 The terminology may differ among commentators. For example, “cross-sectional” is sometimes used in place of interconnectedness, a term that may have some appeal to the extent it moves away from the traditional domain usage of one failing firm knocking down another, and also embraces dynamics such as contagion across the financial system arising from correlated asset holdings and sources of funding.
The tools identified can be variously categorised. One useful distinction is between measures designed to prevent systemic risk from building – often termed “lean-against-the-wind” measures – and those designed to increase the resiliency of the financial system should systemic risk nonetheless build sufficiently that broad-based stress ensues. Another distinction is between time-varying and time-invariant measures, with the former based on a response – either discretionary or in accordance with a rule – to some measured increase in risk.

With this context, I offer these four propositions for taking the macroprudential regulatory project forward, with attention both to overall risks to financial stability and to the concentrated risks posed by the largest financial intermediaries.

2| A MACROPRUDENTIAL PERSPECTIVE SHOULD DOMINATE THE REGULATION AND SUPERVISION OF LARGE FINANCIAL INSTITUTIONS

Sir Andrew entitled his speech “Marrying the micro- and macroprudential dimensions of financial stability”, suggesting an equal partnership between the two regulatory dimensions, as he called them. My own sense is that at both the national and international levels we need to concentrate our post-crisis efforts to reshape the regulation and supervision of large financial institutions on measures reflecting the macroprudential dimension, at least for a time.

To be sure, idiosyncratic problems such as certain operational risks may threaten large institutions, and traditional regulation and supervision surely have an important ongoing role to play. But the dynamics observed during the financial crisis of highly correlated asset holdings, shared risks, and contagion among the largest firms suggest that the well-being of any one of these firms cannot be considered in isolation from the well-being of the global financial system as a whole. Severe problems at such institutions are far more likely to arise from vulnerabilities to common stresses, and severe problems at such firms are far more likely to exacerbate systemic weaknesses. Since the health of any one of these large institutions is tied to the health of these firms as a group, good microprudential regulation may itself require a macroprudential dimension.

The reorientation of the Federal Reserve’s supervision of large, complex financial firms is reflected organisationally in the Large Institution Supervision Coordinating Committee (LISCC). The LISCC was created three years ago to facilitate the execution of horizontal, cross-firm analysis of the largest firms and to centralise supervision of these firms so as to promote an integrated and consistent supervisory approach. The LISCC includes senior staff both from the supervisory staffs of the Board and Reserve Banks, and from the Board’s Office of Financial Stability, Division of Monetary Affairs, Division of Research and Statistics, and other relevant divisions. This “interdisciplinary” approach to large bank supervision not only fosters more rigorous microprudential regulation. It also facilitates and formalises a broader look at systemic risks by using quantitative methods to evaluate macroeconomic and financial risks, and how they could affect individual firms and the firms collectively. A comparable – though somewhat differently organised – horizontal, interdisciplinary supervisory approach was adopted by the Bank of England when it reacquired prudential regulatory responsibilities in 2013. The assumption by the European Central Bank of supervisory oversight of large euro area banks offers the opportunity for similar innovations.

3| BUILDING GREATER RESILIENCY IS CENTRAL TO THE MACROPRUDENTIAL REGULATION OF LARGE FINANCIAL INSTITUTIONS

In early 2009 there was widespread doubt about the solvency of the US financial system as a whole, given that so many large firms had directly or indirectly been deeply involved in mortgage markets and associated securitisations. When the Federal Reserve created the first supervisory stress test in the midst of the crisis, our aim was to stabilise, and restore confidence, in the financial system as a whole by ensuring that the nineteen largest bank holding companies were sufficiently capitalised that they could continue serving as viable financial intermediaries. Thus the focus on resiliency was initially a matter of necessity.

But there is also logic to making the resiliency of the largest firms the most important part of an ongoing macroprudential regulatory agenda. Just as a microprudential approach to regulation has come
to emphasise building up capital because it makes the individual firm better able to absorb losses from any source, including unpredictable ones, so an appropriately refocused set of macroprudential capital requirements can help make the financial system better able to withstand shocks from unanticipated, as well as familiar, sources. As mentioned by Andrew Crockett, a macroprudential perspective suggests two ways in which resiliency should be strengthened. One is to treat the financial system as a whole as the “portfolio” of assets subject to safety and soundness oversight, and the second is to apply stricter regulations on firms of systemic importance whose failure would carry a good chance of endangering the entire system. In the last five years, we have been developing measures to advance both forms of resiliency.

Following our use of stress tests of the nation’s nineteen largest bank holding companies in the midst of the crisis, Congress included in the Dodd-Frank Act a requirement of annual supervisory stress tests for a larger group of firms – all those with greater than USD 50 billion in assets. These stress tests, and an associated supervisory review of the capital processes and practices of the covered firms, have in just a few years become a core part of the oversight of large firms.

Stress testing provides a good example of how sound microprudential regulation of the largest banking firms can incorporate a significant macroprudential orientation. Conventional capital requirements are by their nature somewhat backward-looking, reflecting loss expectations based on past experience and loss recognition that often occurs well after the likelihood of loss has become clear. Rigorous stress testing helps compensate for these shortcomings through a forward-looking assessment of the losses that would be suffered under stipulated adverse economic scenarios, so that capital can be built and maintained at levels high enough for the firms to withstand such losses and still remain viable financial intermediaries. This forward-looking aspect of stress testing automatically builds capital – and boosts resilience – in the face of weakening loan-underwriting standards, because for any given adverse scenario weaker underwriting standards will imply higher losses.

Also, because the firms are stressed simultaneously, in setting loss parameters supervisors are able to identify and take account of correlated exposures and other common risks. The group of firms covered by the Dodd-Frank Act supervisory stress tests account for more than 70% of US banking sector assets, thus approaching Sir Andrew’s standard of a supervisory perspective that examines the assets of the financial system as a whole.

The effectiveness of stress testing as a macroprudential tool depends, of course, on how the tests are constructed. A macroprudential perspective must inform the construction of the scenarios against which the assets and revenues of the banks are stressed. Such a perspective argues for incorporating particular risks to the financial system even when there is some uncertainty regarding the probability of a particular risk being realised. For example, the scenario might include a sharp drop in house prices if analysis suggested – but did not confirm – that there might be overheating in the housing market, and if supervisors judged that large banks had correlated exposures to the housing sector. That is, the stress tests provide for resiliency in the event the risk comes to pass, without necessarily requiring other measures to restrict directly the lending or other activity lying behind the risk.

A macroprudential perspective also counsels against injecting more procyclicality into the financial system by, for example, simply assuming a standard deterioration in economic conditions from whatever the baseline projections might be. Such an approach would overlook the tendency of systemic risk to build during strong, prolonged expansions, when underwriting standards decline, rising asset prices make secured lending seem safer, and defaults wane. The approach we are instead taking is that, under such conditions, our severely adverse scenario would assume a level of unemployment during the stress period comparable to that observed in past severe recessions, not simply an increase in unemployment comparable to the increase observed during those recessions. Thus, the scenario’s unemployment rate would feature a larger and sharper rise in the unemployment rate as economic expansions proceed.

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10 It is important to emphasise here, as we do in our annual capital reviews of large banking organisations, that our supervisory stress testing of all covered firms simultaneously does not supplant the need for firms to develop, and make capital decisions dependent upon, their own stress scenarios that incorporate risks more specific to the activities and portfolios of each firm. That is, the necessary emphasis on macroprudential measures at the present time does not obviate the need for solid microprudentially inspired measures.

11 For a full exploration of the Board’s approach to scenario design, see Federal Reserve System (2012). See also Liang (2013).
Finally, stress tests must be modified so as to avoid incentivising firms to correlate their asset holdings or adopt correlated hedging strategies. This potential problem can be illustrated by reference to the market shocks we have applied to the trading books of the six largest financial firms in recent stress tests. The shocks, designed to be severe, consisted of instantaneous, hypothetical jumps in asset prices based on those observed over the entire second half of 2008. The resulting trading losses are – as one would expect – quite large. Even so, had we simply used the same shocks that we used in the 2009 exercise, unchanged from the historical experience, we would have underestimated the potential losses associated with subsequent developments. For that reason, we modified the market shock scenario in 2011 to take account of euro area stress and then further modified the hypothesised stress in 2012 and 2013 to include sharp moves in interest rates. We will continue to modify the market shock regularly to incorporate salient risks that were not necessarily present in 2008 and to ensure that firms cannot artificially improve their performance on the test through holding significant amounts of certain assets that happened to perform well in that period.

The second aim of a macroprudential approach to resiliency is to reduce the chances of distress or failure for financial companies of systemic importance to a greater degree than for other firms. A microprudential requirement is informed by asking what level of capital would be necessary to allow the firm to remain a viable financial intermediary even after absorbing losses that, within a fairly high level of confidence, might be encountered over some relevant timeframe. A macroprudential capital requirement should take account of the fact that there would be very large negative externalities associated with the disorderly failure of any systemically important financial institution, distinct from the costs incurred by the firm, its stakeholders, and the federal deposit insurance fund.

The failure of such a firm, especially in a period of stress, significantly increases the chances that other financial firms will themselves experience great stress, for two reasons. First, direct counterparty impacts can lead to a classic domino effect. Second, because losses in a tail event are much more likely to be correlated for firms deeply engaged in trading, structured products, and other capital market instruments, all such firms are vulnerable to accelerating losses as troubled firms sell their assets into a declining market. Enhanced capital requirements should take into account these costs. Thus, the aim of financial stability capital standards is to reduce further the probability that the firm might fail under stress through holding additional capital. These additional capital requirements can also help offset any funding advantage derived from the perceived status of such institutions as too-big-to-fail.

For all its important contribution in strengthening capital positions for all internationally active banks, Basel III was primarily motivated by microprudential considerations. A macroprudentially motivated capital rule is the set of surcharges on more than two dozen banks of global systemic importance (G-SIBs) that was agreed in 2011 by the Basel Committee on Banking Supervision.12 In discussions preceding that agreement, it became clear that the task of determining how much additional capital is needed to reduce the probability of a systemically important firm’s failure to more acceptable levels is not a straightforward one. In calibrating the surcharge, the Basel Committee began with what has been termed the “expected impact” approach, which calls for additional capital to reduce the probability of the firm’s failure sufficiently to equalise the expected impact on the financial system of the failure of a systemically important firm and the failure of a banking firm just outside systemic status.13 But implementing this concept was complicated by the fact that, despite some very useful metrics that have been developed in the past few years for measuring the systemic risk associated with a particular firm, there is certainly no generally accepted approach.14 Indeed, differences among reasonable assumptions in applying the expected

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12 The methodology originally announced has been updated, and can be found at Basel Committee on Banking Supervision (2013).
13 For example, if the loss to the financial system from the failure of a systemically important firm would be five times that resulting from failure of the non-systemic firm, then the firm would have to hold additional capital sufficient to make the expected probability of failure one fifth that of the non-systemic institution.
14 Among the useful efforts along these lines are a measure of conditional value-at-risk (CoVaR), see Adrian and Brunnermeier (2011) and a measure of systemic risk based on each firm’s contribution to the expected capital shortfall of the entire financial system in a crisis, see Brownlees and Engle (2011). The concept behind the latter measure is also described in Acharya et al. (2011). Updated systemic risk rankings are maintained by the authors at http://vlab.stem.ny.edu. A helpful review of the efforts to measure systemic risk is Billett et al. (2010).
impact approach led to a fairly broad range of potential surcharges. The 1 percent to 2.5 percent amounts negotiated within the Basel Committee are at the low end of that range, reflecting a good deal of caution – frankly, more caution than I think would have been desirable, even given the uncertainties. Regardless of one’s views on calibration, though, the motivation and methodology for what have become known as “systemically important financial institutions (SIFI) surcharges” are clearly macroprudential.

The establishment of the G-SIB surcharge was an innovation in international financial regulatory cooperation, which had generally made agreements applicable to “internationally active” banks. This project has raised the question of the extent to which similar macroprudential motivations should inform development of other agreements or frameworks applicable only to systemically important firms. In the United States, the Dodd-Frank Act requires such special regulations in a variety of other areas, including stress testing, single counterparty credit limits, risk-management, and resolution planning. Internationally, the Financial Stability Board (FSB) and the Basel Committee have begun initiatives in the areas of resolution planning and supervisory practices applicable to G-SIBs.

One last point on macroprudential resiliency measures is that they can have secondary effects that serve the lean-against-the-wind aim of macroprudential policies. For example, a supervisory stress test can assign a higher loss rate to a certain class of assets in a hypothesised adverse scenario because they are particularly vulnerable to potential shocks and thus susceptible to particularly sharp declines in a serious recession. To the extent that firms learn over time that such assets will be treated that way, there is at least a mild disincentive to hold them. As I will discuss in a moment with respect to countercyclical capital requirements, we should not overstate this lean-against-the-wind effect, but perhaps not dismiss it out of hand either.

### 4 | **Time-varying measures will play a more limited role**

Some discussions of macroprudential policy appear to contemplate a somewhat regular adjustment – up and down – of both resiliency and lean-against-the-wind measures. The idea is to proceed in an intentionally countercyclical fashion by attempting to restrain rapid, unsustainable increases in credit extension or asset prices and to relax those restraints as economic conditions deteriorate. This is a conceptually appealing approach, but, as various commentators on macroprudential policy options have noted, one that raises a fair number of significant issues: the reliability of measures of excess or systemic risk, the appropriate officials to be making macroprudential decisions, the speed with which measures might realistically be implemented and take effect, and the right calibration of measures that will be effective in damping excesses while not unnecessarily reducing well-underwritten credit flows in the economy.

Because of the significant variations that can exist in both local economic conditions and in domestic legal and constitutional arrangements of jurisdictions represented on the Basel Committee and the FSB, time-varying measures are much harder to coordinate internationally than ex ante structural measures to increase resiliency or mitigate the build-up of systemic risk.

If the measures are designed to be targeted, questions of efficacy may be raised by those who believe that suppression of excess credit or asset price increases in one sector will likely result only in the redirection of credit and speculation to other sectors until underlying macroeconomic and financial conditions have ceased enabling such activities. If, on the other hand, the measures are designed to be fairly broad-based, the more basic question of the appropriate role of monetary policy may be raised by those who are focused on reactive policies that “get in all the cracks” of the financial system, not just the heavily regulated portion occupied by large financial firms.

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16 See Financial Stability Board (2010).
Finally, we should probably be skeptical as to how effective a macroprudential relaxation of regulatory requirements can be on the downside of economic cycles. Market discipline, which may have been lax in boom years, tends to become very strict when conditions deteriorate rapidly. Even if supervisors were to announce a relaxation in regulatory requirements, in stressed economic conditions investors and counterparties may well look unfavorably on reductions in capital levels (even from higher levels) or relaxation of underwriting standards at any one firm, notwithstanding the potential benefits for the economy as a whole were all large firms to follow suit. Anticipating such a reaction, senior management of banks may thus have strong non-regulatory incentives to act as if microprudential regulation continued to dominate.

In short, the task of buffering the financial system against a tail event seems more tractable than that of moderating the financial cycle. But all these questions of economic knowledge and institutional capacities should be grounds for proceeding cautiously, not for eschewing time-varying measures entirely. It is true that the state of the art of financial stability risk assessment is still in a relatively early stage. But it is reasonable to think that the amount of effort being put into these efforts in governments, central banks, international organisations, and universities will produce some well-conceived and well-tested metrics over time. Certain deviations from historical patterns are, even under existing states of knowledge, surely clear enough to justify some action.

Moreover, in the absence of time-varying macroprudential tools, the burden of systemic risk containment will rest entirely elsewhere. For time invariant measures to bear this burden, it might be necessary to have through-the-cycle constraints that strengthen financial stability at significant cost to beneficial economic activity. For those who are reluctant to use monetary policy in pursuit of financial stability goals at the expense of more immediate employment and price stability goals, the burden on time invariant measures would be large indeed. Even for those who believe financial stability objectives should and can be effectively incorporated into monetary policy, monetary tightening will surely not be the correct response to all instances of increasing leverage or asset prices that raise macroprudential concerns. Those adhering to this second school of thought might regard targeted time-varying measures as effective in slowing the increase in systemic risk to give monetary policymakers more time to evaluate the need for a monetary policy response.

There are two obvious places to begin a considered development of time-varying tools. One is in the traditional supervisory oversight of practices at regulated institutions, as enhanced by the increasingly horizontal and interdisciplinary features of large bank supervision. Good supervision is always time-varying, in that it should respond to potential and growing problems in a directed fashion. The coordination engendered by the LISCC at the Federal Reserve and parallel efforts at other central banks can facilitate the identification of potentially risky trends in, for example, underwriting certain forms of lending. The greater use of data, both for the regulated sector as collected by supervisors and for the economy as a whole as analysed by our Office of Financial Stability, further increases the prospects of timely supervisory responses.

I do not want to overstate the significance of this evolution in supervisory practice, however. For one thing, as was shown by the US experience with commercial real estate lending guidance issued before the crisis, supervisory guidance is an imperfect tool. In addition to the issues surrounding real-time interventions mentioned earlier, that episode revealed the potential for substantial political resistance to supervisory actions directed at specific sectors. Still, with ongoing improvements in relevant analytic capacities, there is room to develop this tool further.

The second place to work on time-varying tools is found in another element of the new capital regime, the countercyclical buffer provision of Basel III, an explicitly macroprudential element of what was generally a microprudentially-oriented

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17 One should note that “time-varying” supervision should not mean excessively procyclical supervision.
capital framework. This provision envisions an increase in the applicable risk-weighted capital requirements of financial companies by up to two and half percentage points when “credit growth is excessive and is leading to the buildup of system-wide risk.” While stress testing has a built-in degree of time-variance (since macroeconomic scenarios must be constructed annually), the countercyclical buffer is intended to be purely time variant, in that it is to be activated when, and only when, there is “excess aggregated credit growth”, a condition that the Basel Committee anticipates will occur only infrequently.

The principal macroprudential rationale of the countercyclical buffer is one of increasing the resiliency of the banking system as a whole by ensuring that it will have enough capital to continue effective intermediation, even if a period of stress follows what turned out to be a period of unsustainable, rapid credit growth that leads to unusually high losses as asset prices plummet thereafter. The Basel Committee also noted that there could be a secondary, lean-against-the-wind effect if the higher capital requirements raise the cost of, and thus dampen, credit extension.

It is probably not surprising that the regulators represented on the Basel Committee have chosen capital requirements as a time-varying macroprudential tool. Capital regulation is central to prudential regulation and, as already noted, is being used in service of macroprudential objectives. Both regulators and financial institutions are accustomed to capital regimes (although the post-crisis changes have altered that regime quite significantly).

Still, it is uncertain just how useful this tool will be. In addition to some of the limitations affecting use of all time-varying instruments, such as judging when leverage or asset prices have become excessive, it is quite blunt. If “turned on”, it would apply to all large banks in all parts of a jurisdiction. So it would not be useful to deploy in response to asset bubbles or leverage in particular regions or sectors, since the additional capital required for lending in those sectors would be no greater than in less frothy parts of the economy. Indeed, it could in some circumstances have the unintended effect of encouraging banks to do more lending in the booming areas of concern, at the expense of lending in more stable areas. The precise impact on bank lending behaviour is further muddied by the one year period given to build the additional capital cushion.

These potential shortcomings notwithstanding, the tool is now available to jurisdictions represented on the Basel Committee. It could, in fact, serve as a complement to the more targeted actions available through the supervisory process. Fortunately, when those of us around the world do contemplate use of the countercyclical capital buffer (CCB), we should have the benefit of a good deal of thinking and experience at the Bank of England. The setting of CCBs is now committed to the Financial Policy Committee (FPC) under the reorganisation of regulatory functions effected in the United Kingdom on April 1, 2013. The FPC is required to set forth a general statement of its policy and to make quarterly determinations of whether to impose or change a CCB. I should note that Parliament extended the countercyclical power beyond the broad measure in Basel III and also granted the FPC authority to direct increases in the risk-weights applicable to specific sectors judged to pose a risk to the financial system.

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18 See Basel Committee on Banking Supervision (2011). Basel III introduced the concept of a capital ‘buffer’ to supplement the long-established concept of minimum capital requirements. In brief, the idea is that a bank’s distribution of capital to shareholders or employees will be progressively more restricted as capital levels fall below required buffers, but – unlike the case where capital levels fall below minimum requirements – a bank need not bring its capital levels above the buffer by shedding assets or raising new capital. Basel III introduced a “fixed” capital buffer of 2.5% of common equity on top of the 4.5% minimum capital requirement. The countercyclical capital buffer (CCB) would be placed on top of the fixed buffer. If applied at its maximum 2.5% amount, the CCB would thus require that a bank maintain equity capital of at least 9.5% of risk-weighted assets in order to remain unencumbered by restrictions on capital distributions. There is a view held by some that large banks would be under considerable market pressure to maintain their capital levels above the 7% total minimum requirement and fixed buffer (as well as the added systemic surcharge for those banks subject to it), even in stressed periods.
19 Idem.
20 See Basel Committee on Banking Supervision (BCBS) (2010).
21 For a useful discussion of the pros and cons of variants on CCBs, see Elliott (2011).
22 A draft policy statement was published even before the April 1 effective date of the new FPC authority. See Bank of England (2013).
5 | HIGH PRIORITY TO DEVELOPING MEASURES TO CONTROL THE STRUCTURAL VULNERABILITY PRESENTED BY SHORT-TERM WHOLESALE FUNDING

The shared vulnerabilities of large banking organisations as a whole are underscored by something omitted from Sir Andrew’s otherwise prescient speech – the potential for damaging fire sales, itself exacerbated by the prevalence of short-term funding. The use of short-term wholesale funding was hardly unknown among major financial firms in the 1990s, but broadened significantly thereafter, both within large firms and in sponsored entities such as the now infamous structured investment vehicles (SIVs) used to fund asset-backed securities. This trend was a dramatic example of the ways in which traditional lending and capital market activities had become increasingly integrated and another example of how prudential regulation had not quickly enough adjusted to that trend.

Last fall, as we observed the five-year anniversary of Lehman Brothers’ failure, numerous retrospectives on the crisis reminded us of its multiple causes. But the practice of many firms, including all those with sizeable broker-dealers, of funding large amounts of assets with short-term wholesale funding was an accelerant of the problems that had grown within the financial system. When questions arose about the quality of some of the assets on which short-term funding had been provided, investors who had regarded short-term secured lending as essentially risk-free suddenly became unwilling to lend against a wide range of assets. Then ensued the classic adverse feedback loop, as liquidity-strained institutions found themselves forced to sell positions, which placed additional downward pressure on asset prices, thereby accelerating margin calls on leveraged actors and amplifying mark-to-market losses for all holders of the assets.

Although the amounts of short-term wholesale funding have come down from their pre-crisis peaks,23 this structural vulnerability remains, particularly in funding channels that can be grouped under the heading of securities financing transactions (SFTs).24 The use of such funding surely has the potential to increase again during periods of rapid asset appreciation and ready access to leverage. While SFTs are an important and useful part of securities markets, without effective regulation they can create a large run risk, and can thus increase systemic problems in various asset and lending markets.

As emphasised by Jean Tirole in his important analysis of the role of illiquidity in the recent crisis,25 the risks associated with short-term funding are as much or more macroprudential as they are firm-specific. From a microprudential perspective, SFTs are low risk, because the borrowing is short-dated, overcollateralised, marked-to-market daily, and subject to remargining requirements. Capital charges are low because credit risk is low. The liquidity coverage ratio (LCR) recently adopted by the Basel Committee is an important step forward for financial regulation, since it will be the first broadly applicable quantitative liquidity requirement for banking firms. But it, too, has a principally microprudential focus, since it rests on the implicit premise that maturity-matched books at individual firms present relatively low risks.

While maturity mismatch by core intermediaries is a key financial stability risk in wholesale funding markets, it is not the only one. Even if an intermediary’s book of securities financing transactions is perfectly matched, a reduction in the intermediary’s access to funding can force the firm to engage in asset fire sales or to abruptly withdraw credit from customers. The intermediary’s customers are likely to be highly leveraged and maturity transforming financial firms as well, and, therefore, may then have to engage in fire sales themselves. The direct and indirect contagion risks are high.

23 In 2006, just before the onset of the stresses that eventually led to the financial crisis, the largest US financial firms relied on short-term wholesale funding for about half their total funding needs, and deposits for just over a third. Today (as, more precisely, as of the end of the second quarter of 2013) those proportions are almost exactly reversed. Some of the change is likely due to changes in risk assessment and supervisory expectations. But it is also true that deposits were a safe haven for many households and non-household investors during the crisis. It may be that, as financial and economic conditions continue to normalise, households and other investors will move more deposits into other investment vehicles.

24 Included in this grouping are repo, reverse repo, securities lending and borrowing, and securities margin lending.

The dangers thus arise in the tail and apply to the entire financial market when normally safe, short-term lending contracts dramatically in the face of sudden and significant uncertainty about asset values and the condition of counterparties. Macropurulential regulatory measures should force some internalisation by market actors of the systemic costs of this intermediation.

There are two kinds of policy options that can be considered, individually or together, in responding to the financial stability vulnerabilities inherent in firms with large amounts of short-term wholesale funding, whether loaned, borrowed, or both. The first would impose a regulatory charge calculated by reference to reliance on SFTs and other forms of short-term wholesale funding, whether the firm uses that funding to finance inventory or an SFT matched book. The second would directly increase the very low charges under current and pending regulatory standards applicable to SFT matched books.

Among the first set of options, the idea that seems most promising is to tie capital and liquidity standards together by requiring higher levels of capital for large firms that substantially rely on short-term wholesale funding. The rationale behind this policy option is that, while there is need for solid requirements for both capital and liquidity, the relationship between the two also matters. For example, a firm with little reliance on short-term funding is less susceptible to runs, and thus to the need for engaging in fire sales that can depress capital levels. A capital surcharge based on short-term wholesale funding usage would add an incentive to use more stable funding and, where a firm concluded that higher levels of such funding were nonetheless economically sensible, the surcharge would increase the loss absorbency of the firm.

The second kind of policy option is to address head-on the macropurulential concerns arising from large matched books of securities financing transactions. A capital surcharge is in some respects an indirect response to the problem of short-term wholesale funding runs and, as earlier noted, current versions of capital and liquidity standards do not deal with the matched book issues discussed earlier. One might choose either to increase capital charges applicable to SFT assets or to modify liquidity standards so as to require firms with large amounts of these assets to hold larger liquidity buffers or to maintain more stable funding structures.

It is important to note that requirements building on any of the foregoing options would by definition be directly applicable only to firms already within the perimeter of prudential regulation. The obvious questions are whether these firms at present occupy enough of the market that standards applicable only to them would be reasonably effective in addressing systemic risk and, even if that question is answered affirmatively, whether the imposition of such standards would lead to a significant arbitrage through increased participation by those outside the regulatory perimeter. It does not seem farfetched to think that, with time and sufficient economic incentive, the financial, technological, and regulatory barriers to the disintermediation of prudentially regulated dealers could be overcome.

For this reason, there is a need to supplement prudential bank regulation with a third set of policy options in the form of regulatory tools that can be applied on a market-wide basis. That is, regulation would focus on particular kinds of transactions, rather than just the nature of the business model of a firm engaging in the transaction. To date, over-the-counter derivatives reform is the primary example of a post-crisis effort at market-wide regulation. Given that the 2007-2008 financial crisis was driven more by disruptions in the SFT markets than by disruptions in the over-the-counter derivative markets, comparable attention to SFT markets is surely needed. Over the past two years, the FSB has been evaluating proposals for a system of haircuts and margin requirements for SFTs. In its broadest form, a system of numerical floors for SFT haircuts would require any entity that wants to borrow against any security to post a minimum amount of excess margin that would vary depending on the asset class of the collateral.

One reason I place a high priority on measures to address the vulnerability created by short-term wholesale funding is that the development of these measures does not depend so heavily on identifying when credit growth or asset prices in one or more sectors of the economy have become unsustainable. Instead, an externality analysis can help identify the points of vulnerability and guide the fashioning of appropriate regulations. Indeed, time invariant policies may be better suited to containing certain kinds of risks than would policies requiring regular adjustment. Obviously, judgment will still be needed to determine the degree of
constraint to be imposed on relevant activities of large banking organisations. But unlike real-time measures – where quick but not precipitous action will be of the essence if those measures are to be useful – the adoption of structural constraints can proceed with the full opportunity for debate and public notice-and-comment that attends rulemaking processes.

6| CONCLUSION

The four propositions I have presented here are generally intended to outline the contours of a macroprudential approach to the regulation and supervision of large financial institutions, not to identify or elaborate specific policies. But I will close by saying that specific policies to counteract the structural vulnerabilities created by short-term wholesale funding are a priority, not just for the stability of our large prudentially regulated institutions, but for the financial system as a whole. A macroprudential reorientation of our bank regulatory policies will require a range of continuing work on resiliency, on other structural measures, and on the effective blending of macroprudential with traditional microprudential regulatory and supervisory policies. Even as we make more progress in these areas, our efforts will not be adequate or complete without measures addressing what I have termed an accelerant of systemic problems.
A macroprudential perspective on regulating large financial institutions

Daniel K. Tarullo

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The impact of macroprudential policy on financial integration

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Welfare effects of cross-border cooperation are well understood today. The European Union provides clear evidence of how successful economic integration can also pave the way to a deeper political and social community. However, the financial crisis that began in 2007 has put at risk the achievements made over the preceding 60 years of European integration. It has underlined the fact that integration and contagion are two sides of the same coin. To prevent such a severe crisis from happening again, financial regulation has to be broadened through the addition of a macroprudential approach. Moreover, the impact and persistence of the financial crisis were also a result of insufficient financial integration, leaving room for national maneuvering which proved unsustainable for Europe as a whole. The forthcoming European banking union, which empowers the European Central Bank with both micro- and macroprudential competencies, is thus a major step toward safeguarding financial stability. At the same time, national competencies are, to some extent, indispensable to account for heterogeneity among EU Member States. They are an essential factor in contributing to the respective country's stability as well as in assuming responsibility for the well-being of its peer countries. Deeper integration and national responsibilities are thus not mutually excluding. However, the two-layer structure of the European regulatory framework entails the risk of elevated complexity and will come with a need for intensified cooperation.
1| Economic, political and social integration in Europe

It is almost 240 years now since Adam Smith was the first observer to recognise how cross-border cooperation fosters the wealth of nations. Bolstered by subsequent ground-breaking academic works in this field, in particular the insights provided by David Ricardo, the conviction that international cooperation from a welfare point of view was superior to the prevailing mercantilist policy of that time gained in recognition. Today, the European Union, home to more than 500 million people, provides clear evidence of how successful economic integration can also pave the way for a deeper political and social community that – without any doubt – helped to maintain peace across a continent that was previously ravaged by barbarous wars. The introduction of the euro ultimately highlighted Europeans’ sustained commitment to further expedite the integration of our countries. However, the achievements made over the preceding 60 years of European integration were put at risk by the resulting complex financial networks that appeared to stoke financial tensions. One of the most important challenges to be faced in the future will be how we can prevent this from happening again. The answers to this challenge are complex and they concern public as well as private entities, both at the national and the European level.

With regard to the regulatory dimension, the lessons learnt from the financial crisis are broadly threefold. First, to freely adapt a comment made by Aristotle, the whole is more than the sum of its parts. In the context at hand, it follows that once there is any cooperation between two or more entities, it is not enough to restrict the scope of regulatory focus to checking the soundness of individual institutions. Rather, financial regulation has to be broadened through the addition of a systemic perspective, by which I mean a macroprudential approach. Second, the impact and persistence of the financial crisis did not result from excessive integration in Europe. Quite on the contrary, insufficient integration left room for national manoeuvring which proved unsustainable for Europe as a whole. This issue has already been addressed, notably by the discussions and agreement on setting up a banking union. Lastly, while it may seem surprising given my previous statements, national competencies are, to some extent, a prerequisite for a stable financial system across Europe. Heterogeneity among EU Member States has turned out to be more persistent than originally expected, even in those countries that introduced the euro as their shared single currency. It is necessary to respect this diversity but there is an equal need to forestall its misuse as a Trojan horse for protectionist policies.

Attempting to tackle these three issues in parallel might be regarded as tantamount to wanting to square a circle. Indeed, it is foreseeable that the regulatory environment will become increasingly complex in years to come. Moreover, given that the macroprudential approach is relatively new, many questions remain unanswered, one of which relates to the interaction between macroprudential policy and financial integration. This article aims to shed some light on this matter.

2| The merits of financial integration in Europe: simply a fallacy?

When the euro was founded under the Maastricht Treaty in 1990, its founding fathers were convinced that more financial integration and a single monetary policy would foster convergence among initially heterogeneous countries. Up to 2007, when the first phase of the financial crisis unfolded, they seemed to be right. Indeed, financial integration was borne out by a significant convergence in interest rates that mirrored declining risk premia and inflation expectations. Overall market liquidity seemed to have been enhanced, resulting in improved information processing and higher quality asset prices. International risk sharing advanced as securitisation enabled creditors to sell risk while investors were provided with additional investment opportunities deemed to have no correlation with the risk and return of established instruments. Moreover, such innovations were believed to pave the way for improved diversification of investors’ portfolios – as indicated by a gradual decrease in investment funds’ home bias, for instance. Added to this, cross-border capital mobility seemed to promote the stability of the euro area financial system.

The merits of these developments were manifold. Public and private debtors benefited from a larger investor base that enabled them to issue their securities.
at lower interest payments. This, in turn, encouraged investments and thus contributed to economic growth. Financial investors availed themselves of more capital assets and risk management tools. Last but not least, the close interconnectedness of banks both domestically and across national borders within the euro area ensured that monetary policy’s transmission channels were effective and efficient in safeguarding price stability.

The onset of the financial crisis, however, served to underline the fact that integration and contagion are just two sides of the same coin. Against the backdrop of experience gained since 2007, the former merits of financial integration might appear to be nothing more than a fallacy. The convergence in interest rates would then seem to be the result of a negligence of risk, governed by herding and an intensive search for yield. As a consequence of all this, pre-crisis asset prices would now appear to be the result of a mispricing of risk rather than a reflection of improved information processing. Fungibility of risk and the so-called “originate-to-distribute” model, once hailed as major innovations geared to increasing the supply of credit to non-financial sectors, created moral hazard and reduced creditors’ incentives to closely monitor their debtors. Moreover, financial products’ complexity left many investors overstrained and with risk concentrations of which they were not (fully) aware. At the same time, the then regulatory framework was inadequate for coping with the complicated nature of financial interconnectedness and thus unable to account for systemic risk. As a consequence, the close and widely ramified architecture of international financial networks, both within and beyond European borders, ultimately acted as an accelerating force once a negative shock hit.

The consequences of that perceived fallacy were tremendous. Given the opaqueness of financial products and networks and the resulting uncertainty about banks’ financial soundness, interbank markets dried up, leaving many banks at the brink of collapse and monetary policy facing strong impediments to its transmission process. Financial institutions that were previously considered “too-big-to-fail” were seen to actually be “too-big-to-be-rescued”. Massive capital injections by governments into the financial sector that were initially aimed at stabilising the industry in fact contributed to public finances coming under pressure. Together with increased risk aversion and many borrowers’ need for balance sheet adjustments, this led to significant funding restrictions for numerous public and private debtors and thus to a deep recession in many EU Member States that in turn amplified the economic challenges.

Against this backdrop, financial stability would seem to be a prerequisite for financial integration if it is to be successful over the long term. While most observers would undoubtedly associate the financial crisis with a situation of instability, it is less immediately obvious that there also was a lack of financial stability (even) prior to 2007. At the Bundesbank we define financial stability as the financial system’s ability to perform its key macroeconomic functions at all times, especially in periods of stress and upheaval. These functions include, in particular, the capacity to allocate financial resources and risks efficiently and provide a sound financial infrastructure. With the benefit of hindsight, it is evidently the case that financial resources were sub-optimally allocated during the run-up to the crisis, resulting in unsustainable leverage, maturity transformation and risk taking. Economists usually attribute such outcomes to negative externalities which are characterised by marginal costs at the private level that are lower than marginal costs at the social level, resulting in excessive output. In the context of this analysis, this amounts to an “overproduction” of financial intermediation services. Negative externalities can therefore put the welfare gains achieved via financial integration at risk.

The existence of externalities justifies a form of financial regulation that seeks to align marginal costs at the private and the social level in order to achieve a sustainable level of financial intermediation. Moreover, the financial crisis made it clear to policymakers that there is next to no alternative to regulation wherever externalities are involved. The euro area, boasting the highest degree of financial integration among EU Member States, was to feel the particular impact of this fact. For instance, given interbank markets’ malfunctioning and the resulting doubts regarding monetary policy transmission in the euro area, the ECB’s Governing Council was frequently faced with decisions that brought it close to the borders of its mandate. In future, macroprudential policy will be equipped with specific tools that enable it to contribute to financial stability more efficiently than when using monetary policy instruments. Macroprudential policy will thus provide monetary policy with room for manoeuvre to focus on its primary objective, i.e. to maintain price stability.
3| MACROPRUDENTIAL POLICY AND FINANCIAL INTEGRATION

While the essence of the short narrative above is relatively simple, its consequences are far-reaching and complex. The merits stemming from financial integration come at the expense of higher contagion risk. Hence, the closer international financial systems become integrated, the greater the importance attached to financial stability as negative shocks will spill over more quickly and with a presumably stronger impact.

It may be considered reasonable for national regulators to intensify their cooperation in the light of increased cross-border interlinkages. It is nonetheless foreseeable that any such closer cooperation will bring about an increase in the complexity of the regulatory framework.

At this point, the institutional framework for cooperation in Europe is already characterised by a considerable degree of complexity: there are national microprudential supervisors for banks, insurers, financial infrastructures and markets which are coordinated by three European microprudential authorities, i.e. the European Banking Authority (EBA), the European Insurance and Occupational Pensions Authority (EIOPA) and the European Securities and Markets Authority (ESMA). These microprudential institutions share information and knowledge with the European Systemic Risk Board (ESRB), the macroprudential authority at the European level, via the Joint Committee of the European Supervisory Authorities. Together, these institutions comprise the European System of Financial Supervisors (ESFS). Following the ESRB recommendation on the macroprudential mandate of national authorities, additional macroprudential institutions were established at the national level. Soon, the European Central Bank (ECB) will also take centre stage when it assumes the reins as the competent oversight authority behind the largest and most important European financial institutions in the form of the Single Supervisory Mechanism (SSM). This, however, is by no means a purely microprudential issue. The SSM Regulation (SSM-R) also assigns macroprudential competencies to the ECB, empowering it to tighten macroprudential measures taken by national authorities, including an initial activation of the instruments available under the Capital Requirements Directive (CRD IV) and the Capital Requirements Regulation (CRR).

The European financial oversight framework thus has two layers, a national and a European one. Against the backdrop of the notion of a single market and regulatory body, as promoted by the forthcoming banking union, the national layer would seem counterintuitive at first sight. Indeed, the establishment of a banking union in Europe in general and the SSM in particular, characterised by a single rulebook for all European banking institutions, aims at achieving more even-handedness in the field of financial regulation. It will foster a level playing field for banks in Europe and will help to objectify risks that stem from individual financial institutions. The banking union is thus a key prerequisite for reducing the risk of severe financial crises in the future. At the same time, national authorities will have the benefit of their long and detailed experience in both microprudential supervision and macroprudential oversight. Once heterogeneity prevails in economic and legal structures among euro area Member States, it will be necessary to exploit these competencies in order to achieve a comprehensive and powerful regulatory environment.

Although CRR, CRD IV and SSM are at the forefront of public debate, macroprudential policy’s contribution to financial stability is not restricted to the banking sector. It has to take into account any source of systemic risk, regardless of the sector in which it initially emerges. Indeed, the banking sector is the most apparent candidate when it comes to sources of systemic risk. Moreover, CRD IV and CRR provide for numerous macroprudential instruments to be applied by the respective national authorities.

When it comes to macroprudential measures for the banking sector, Article 5 of the SSM-R is of particular importance. It defines the macroprudential tools that are to be applied at the national level. Accordingly, national authorities can adjust the countercyclical buffer rate or use any other measures aimed at addressing systemic or macroprudential risks provided for by CRD IV and CRR. Article 5 of SSM-R is of crucial significance because credit institutions under the SSM are only affected by macroprudential measures taken by national authorities if and when the respective instrument is covered by this regulation. Applying instruments that are not macroprudential tools within the meaning of Article 5 of SSM-R thus...
The impact of macroprudential policy on financial integration
Andreas Dombret

bears the risk of regulatory fragmentation, not just among different Member States but also within a given jurisdiction.

That said, one might conceive situations requiring the application of a regulatory instrument that is not covered by Article 5 of SSM-R. In this case, the ECB is allowed to impose stricter requirements for macroprudential instruments than those applied by national authorities.Attributing the ECB with such asymmetric power in macroprudential policy is essential to ensuring that necessary macroprudential steps are taken when they are in line with the interests of the remaining EU Member States. At the same time, national authorities can informally propose to the ECB that it apply regulatory measures to those credit institutions that are covered under the SSM, while a formal recommendation by a national authority addressed to the ECB is not possible. Even this provision might result in regulatory fragmentation within a Member State. In fact, the risk of regulatory fragmentation arises wherever the national definition of credit institutions is not aligned with the respective SSM definition. The ECB would then apply the necessary instruments to credit institutions covered under the SSM while the national competent authority would apply respective measures to those institutions that are deemed credit institutions only under national law. Either way, there is no denying that intense coordination and cooperation between the ECB and the national authorities will be necessary. Therefore, Article 5 of SSM-R requires national authorities to inform the ECB ten working days prior to taking a decision on the application of macroprudential tools covered by Article 5 of SSM-R. The ECB can object within five working days and its reservations and annotations have to be duly taken into account at the national level.

Supplementing SSM-R, CRR and CRD IV also envisage closer cooperation between national and European authorities. For instance, national authorities are required to inform the European Parliament, the Council, the Commission, the ESRB and EBA, partly depending on the instrument to be applied, as well as the competent authorities of the Member States concerned, when cross-border spill-over effects are to be expected from macroprudential measures. As spill-overs tend to increase with the degree of integration of financial systems, deeper financial integration should be accompanied by intensified regulatory integration as well as increased cooperation.

No single national regulatory institution will be able to fully cope with systemic risks originating in a highly complex international network. Cooperation between national and pan-European regulatory authorities will be vital to adequately address the kind of externalities that originate in such an environment.

The macroprudential instruments available to credit institutions today usually commit banks to hold own funds in addition to their "usual" regulatory capital requirements, thus strengthening the resilience of the banking sector by increasing its loss absorbing capacity. In addition, higher demand for capital potentially contributes to curbing the risk cycle over time through its impact on interest on credits. Take, for instance, the countercyclical capital buffer, a macroprudential instrument under Article 5 of SSM-R. From 2016 onwards, at the latest, credit institutions will be required to hold additional common equity Tier 1 capital for their risk-weighted assets. The buffer rate applies to significant risk positions with respect to the jurisdiction it can be attributed to. This means that there will be a country-specific buffer rate for significant risk positions located in that particular jurisdiction, so credit institutions may possibly have to apply numerous different rates to calculate their individual capital requirement.

The foreseeable increase in the regulatory framework's complexity for both public and private entities is justified only if the gain in financial stability from the European two-layer regulatory framework exceeds the burden associated with higher complicity. Quantitative evidence on this issue is, unfortunately, not available. Nevertheless, given the potential costs of financial crises, intense efforts to avoid such situations in future seem to be appropriate, justified and necessary. As mentioned earlier, given heterogeneity in financial cycles among EU Member States and their varying vulnerability to adverse shocks, national authorities are in a position to provide valuable input for a comprehensive regulatory framework. They have a head start in analysing and assessing domestic developments in and characteristics of their financial markets. The two-layer architecture of today's European financial framework in general and the forthcoming introduction of the SSM, in particular, are (therefore) clearly helpful tools as they make it possible to benefit from national competencies while simultaneously objectifying and balancing regulatory practices among Member States.
National competencies are not only an essential factor in contributing to the stability of the respective country. Integration also gives rise to responsibility for the well-being of one's peers and every single Member State is requested to act in the interest of the community as a whole. In the case of financial integration, Member States assume responsibility to ensure that their country will not be the source of a financial crisis that could put the merits of integration at risk. This responsibility has several dimensions. First, it calls for stability of the respective national financial system. Second, it requires national micro- and macroprudential authorities to take cross-border contagion of – originally – national financial crises into account. Third, authorities also have to consider international spillovers stemming from their actions at the national level.

The European regulatory framework already provides a basis for dealing with these three issues. National competencies and macroprudential responsibilities, together with the asymmetric power of the ECB via the SSM, will contribute to financial systems at the national level becoming more resilient. In addition, the ESRB is given a prominent role in all of the above three aspects. It fosters the mutual exchange among Member States of experience gathered from the application of macroprudential instruments and expedites theoretical and empirical research in the field. Besides this, the ESRB has a prominent role regarding cross-border issues in as much as it assesses international financial spillovers from adverse economic shocks as well as the respective effects of regulatory measures at the national level. It also provides a forum for Member States to coordinate and calibrate their actions.

Doing so is a key prerequisite in addressing the risk of regulatory fragmentation amid national responsibilities that might give rise to regulatory arbitrage. Avoiding regulatory arbitrage has both a national and a European dimension. At the national level, it is necessary to ensure that each and every financial sector is appropriately regulated. For instance, regulatory measures in the banking sector, aiming at increasing its resilience and curbing systemic risk, might result in that sector’s business being shifted into the insurance sector or to another financial intermediary. In view of this fact, it is incumbent on national authorities to above all assess three questions before making any macroprudential decision. First, how much business volume is likely to be shifted into another financial sector as a result of the application of a specific macroprudential instrument? Second, are risk management capacities in other financial sectors appropriate for dealing with risks stemming from the business that is shifted into the respective sector? Third, what systemic consequences are to be expected in the event that risks materialise in the sector receiving such relocated business?

These three questions also apply at the European level and require a comprehensive assessment of the pan-European dimension of risk rotation following the application of a macroprudential instrument. The challenge is thus to animate the subsidiarity principle in financial regulation while further fostering financial integration and safeguarding a level playing field for financial institutions across Europe. The ESRB, mandated with the explicit task to stimulate coordination and cooperation among its Member States, is consequently a key institution in the European financial architecture.

4] **Need for further integration and cooperation**

It is obvious that the challenges ahead for financial regulators are indeed significant. However, the experience garnered over recent years has illustrated that further economic and regulatory integration and expanded cooperation are needed to ensure that the benefits emanating from financial integration can be realised. This is particularly apparent in the highly integrated euro area. Although financial stability is a major determinant of monetary policy’s effectiveness and efficiency, the adjustment of the policy rate is hardly suited to ensuring financial stability. In actual fact, given the importance of the European financial system in general and the banking sector in particular, the effect of monetary policy measures has been hampered by banks’ needs for balance sheet adjustments. Moreover, additional and even greater challenges would arise if there was a conflict of interest between monetary policy’s primary objective, i.e. the safeguarding of price stability, and measures necessary to achieve financial stability. Macroprudential policy, whether nationally or at the supranational level, is equipped with powerful tools to address financial stability issues more effectively and efficiently than has been the
The impact of macroprudential policy on financial integration
Andreas Dombret

The impact of macroprudential policy on financial integration cannot be regarded as a fallacy. What did prove a fallacy was the notion that non-coordinated economic and regulatory policy across Member States would be sufficient to curb negative externalities and systemic risk, a scenario that clearly proved not to be the case. Certainly, the need for intensified cooperation among European regulators parallel to national responsibilities is one of the main lessons learnt from the financial crisis.

Another lesson learned is that cooperation should not be limited to financial regulation. Responsibility of every single Member State for the well-being and stability of the community as a whole also extends to other policy areas, in particular public finances. Unsustainable public finances contributed to an amplification of the financial turmoil once its associated risks became apparent. Moreover, the importance of banks for the financing of their respective home-governments caused a vicious circle between unsustainable public finances and vulnerabilities in the banking sector. Hence, regulators will need to elaborate how this risk can be mitigated in future.

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Experiences regarding macroprudential policies
European macroprudential policy
from gestation to infancy

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The launch of the Single Supervisory Mechanism and the new European legislation on micro and macroprudential instruments (Capital Requirements Directive IV and Capital Requirements Regulation) open important new prospects for banking supervision in Europe. This article reviews opportunities and challenges created by these changes. The new policy framework should decisively contribute, over time, to financial stability in the continent, also by providing tools to address country-specific macrofinancial developments that are not easily tackled in a single currency area. For this to happen, it is essential that actions by the European Central Bank and by the national authorities be effectively coordinated. Micro and macroprudential instruments should coherently focus on promoting financial stability. Credit micro-management, influencing the sectorial allocation of credit or reintroducing a national dimension in monetary control, should be avoided. Moreover, the analytical base of macroprudential policy is still partially developed; more work and experience are needed before macroprudential policy can occupy a central role in the European economic policy landscape.

NB: The author thanks Lorenzo Cappiello for skilful assistance in preparing this text. The opinions expressed here are his own and do not involve the ECB.
The Single Supervisory Mechanism (SSM), whose Regulation entered into force in November 2013 and which will become fully operational later this year, establishes a new banking supervisory authority in the European Central Bank (ECB), and confers on it macroprudential policy powers with the goal of contributing to “the stability of the financial system within the Union and each Member State” (Art. 1 of the Regulation). The importance of this step should not be underestimated. For the first time, Europe has direct authority and instruments to control systemic risks in the financial sector. This broadens the scope of the Union’s policy architecture and responds to a central lesson of the recent crisis, namely that the financial sector can affect the real side of the economy in ways that endanger general economic stability. It also recognises that those risks cannot be effectively dealt with by the existing instruments (monetary policy; microfinancial regulation and supervision), but require specific policy arrangements.

The institutional set-up chosen for the SSM by the European legislator, though initially controversial, seems ex post well-chosen and promising. First, locating the new policy-maker in the ECB allows exploiting synergies with the expertise the central bank has gained, in the fifteen years of its existence, over the two relevant fields, macroeconomics and financial sector analysis. Second, the linkage with the ECB, with its strong independence and decision-making capability rooted in the Treaty, gives the new authority strength from the outset. Third, injecting the provisions on macroprudential policy in a legislative text otherwise devoted to establishing a micro-banking supervisor emphasises the crucial complementarity between the two prudential policies. The crisis experience in fact suggests not only that the safety of individual financial institutions or markets is insufficient to ensure the stability of the system as a whole, but that policies aimed at promoting that individual safety may on occasion contribute to destabilise the system as a whole. In today’s banking sectors, characterised by large and interconnected players, the repercussions and feedbacks between micro-banking policies and the rest of the economy should constantly be kept in sight. Furthermore, though the SSM is open to the membership of all European Union Member States, whether they have adopted the euro or not, it is clear that in an initial phase the “SSM area” will largely coincide with the euro area. When launching the banking union in June 2012, the political leaders stated that a central purpose of it was to break the links between banks and sovereign finances and the ensuing risks for the stability of the euro. If properly coordinated, the macroprudential function can indeed go a long way to mitigate problems arising from cross-border transmission of national credit cycles within the monetary union, which the absence of exchange rate flexibility may make more difficult to control. From this viewpoint, a close integration with the ECB is an advantage.

Though the premises look good from all these angles, more work and time will be needed before the new European policy-maker becomes well-functioning and tested. Several complexities in the construct require reflection and experience to be resolved. One is in the interplay between the ECB and the national designated authorities responsible for the macroprudential function within the participating states. Here the SSM Regulation foresees a shared responsibility between the ECB and the national authorities, each enjoying privilege to act after consulting the other, with the ECB authorised to impose higher (i.e. more restrictive) requirements than those applied nationally. Another area is the relation between central banks and supervisory authorities, which will need to play a complementary role both within the Member States and in the SSM central structures. More fundamentally, macroprudential regulation is a new policy area, which lacks both a well-developed doctrine and concrete experience. The classic paradigm of policy instruments and objectives separated by a transmission mechanism is largely underdeveloped here, and the very definition of the goal – financial stability – is debated. Experiences of using macroprudential instruments are few and refer mainly to emerging economies, with very different financial and economic structures. While analytical groundwork is piling up quickly, European macroprudential policy is still in a state that I like to define of “gestation”: it is not born yet,

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1 The first step in setting up a macroprudential framework in Europe was the establishment of the European Systemic Risk Board (ESRB) in 2011. The ESRB is responsible for the macroprudential oversight of the financial system within the Union. For this purpose it may issue warnings where systemic risks are deemed to be significant and issue recommendations for remedial action in response to the risks identified. The ESRB closely cooperates with the ECB which provides analytical, statistical, administrative and logistical support to it.
but is being prepared for future life. This is bound to change soon: the transition from gestation to infancy is a matter of months. When the ECB becomes an active banking supervisor later this year, it needs to be ready to act also as a macroprudential authority.

With this in mind, this paper reviews some concepts and problems inherent in this transition. We start in the next section by reviewing some basic definitions and concepts, including that of financial stability. In the following section, the main available macroprudential instruments are reviewed. This exercise is not easy; many instruments that in principle fall in the realm of macroprudential policy coincide with tools routinely used by micro-supervisors. Sections three and four review, respectively, the main opportunities and challenges that the start of this new policy function at the ECB will involve, examining also the interaction between macroprudential and monetary policy. The last section concludes.

1) Delineating Macroprudential Policy and Financial Stability

Before the financial crisis surfaced in 2007, banking regulation and supervision were traditionally based on a microprudential approach. Regulators took a partial equilibrium perspective focusing on the soundness of individual financial institutions, considering the financial system and the economy as a whole as given. Fundamentally, the role of microprudential regulation and supervision can be rationalised as the necessary counterpart of the safety nets that in all countries protect banks, explicitly or implicitly, at the expense of the taxpayer. To correct this inherent market imperfection a policy intervention is required. In practice, however, banking supervision has often been interpreted (or misinterpreted) as a generic effort to guarantee “as much safety as possible” to all banks individually. In the absence of a sufficient understanding of the transmission mechanisms in the financial sector and beyond, the micro-regulator and supervisor often focused on books and internal arrangements of individual bank, intervening where needed, in the assumption that the rest of the system would remain stable and unaffected by their actions. The crisis, however, taught us a different lesson: the stability of individual financial institutions taken in isolation is not sufficient to ensure the stability of the whole financial system. It is not sufficient because actions to ensure safety of individual banks can harm others through interconnection and contagion effects. Moreover, individual banks not having systemic relevance should be allowed to fail when they are unable to withstand sector competition – if not, this would jeopardise the efficiency and ultimately the very stability of the system. In this sense the stability of individual financial institutions is neither necessary nor sufficient. That said, if the soundness of a systemically important financial institution (SIFI) is at stake, then systemic risk may arise. From this perspective, the stability of systemically relevant financial firms may be necessary to ensure financial stability.

The existence of another market imperfection, stemming from the externalities each bank can exert on others and on the economy as a whole (network, or systemic externalities), directly calls into question the definition of financial stability. If macroprudential policy has financial stability as its goal, and if it is rationalised by the existence of systemic externalities, then it seems natural to define financial stability as a state in which those externalities are absent or negligible. This notion actually connects well with the definition of financial stability adopted by the Eurosystem: “a condition in which the financial system – intermediaries, markets and market infrastructures – can withstand shocks without major disruption in financial intermediation and in the effective allocation of savings to productive investment”. Major negative externalities in the economy as a whole arise, evidently, if the savings-investment link is severed or hampered.

Following this reasoning, a holistic, macroprudential approach to financial regulation and supervision has increasingly gained ground in recent years. By taking a general equilibrium perspective, the goal of macroprudential regulation and

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2 The point is made clear in Hanson et al. (2011).
3 See ECB (2013).
4 The idea of complementing micro-supervision with a macroeconomic perspective actually predates the crisis, being credited to Crockett (2000).
supervision is to protect the financial system as a whole against systemic risk.\(^5\) Externalities, which give rise to market failures, can generate systemic risk. De Nicolò et al. (2012) identify three externalities which are responsible for market failures. First, externalities associated to strategic complementarities. These externalities refer to the fact that financial firms tend to take on excessive or correlated risks during the upturn of a credit cycle, more often than not operating with too thin capital buffers. Second, externalities related to fire sales. During a downturn of a credit cycle, financial firms tend to shrink their balance sheets by shedding assets. This generalised asset shrinkage brings about a reduction in asset prices, which in turn impairs the balance sheet of firms holding similar assets. The consequences are credit crunches and asset fire sales. Third, externalities related to interconnectedness. Financial networks or systemically important institutions are responsible for these externalities, since they facilitate the propagation of shocks.

Macroprudential supervision permits to address market failures by internalising the impacts of these externalities on the whole financial system and by taking into account the social costs they entail in terms of severe real activity impairment. By contrast, microprudential supervision typically does not internalise such externalities. For instance, if a bank shrinks its balance sheet, this action, taken in isolation, could sound appropriate. But if all banks simultaneously shed similar (illiquid) assets or decrease their lending, fire sales or a credit crunch will likely ensue. The banks’ collective behaviour may result in excessive deleveraging and produce an undesirable outcome, which is not internalised by individual credit institutions.

These considerations should in no way be read as suggesting a ranking between micro- and macroprudential supervision, with a superior role assigned to one or the other. Good microprudential supervision over banks is essential in itself, as already noted, to maintain stability and efficiency of the financial sector. This is especially true in Europe, where banks have a dominant role in the intermediation of savings. Moreover, micro- and macroprudential policies are actually close complements, first and foremost because the macroprudential instruments largely coincide, as we shall see in the next section, with those of the micro-supervisor. It can be hardly imagined that macroprudential instruments – which typically involve applying microprudential instruments to aggregations of banks appropriately defined in relation to the nature of the risk – can safely be activated without judgement from the micro-supervisor, who assesses the impact of those instruments on individual banks. Without such links, macroprudential instruments actually risks being de-stabilising. But conflicts can also arise. For instance risk-based capital requirements demanded by microprudential supervisors can be procyclical, while macroprudential requirements on capital tend to be countercyclical. To exploit synergies and minimise conflicts, it is essential to ensure close cooperation and a proper flow of information from microprudential (bank) supervisors to macroprudential authorities and vice versa, from the latter to the former. By the same token, it is important to clarify the mandate, functions and instruments available to the two supervisory authorities (see Osiński et al., 2013).

To achieve their objective, macroprudential policies should aim at preventing or mitigating tail risks, i.e. risks that have a low probability but a major impact if they occur. But by nature, since tail risks occur rarely, the experience regarding the implementation and assessment of macroprudential policy measures is relatively limited, at least in major advanced economies. Examples concerning these experiences are reviewed in a later section, but before that, an overview of the main macroprudential tools that will be available to the ECB is in order.

### 2| Overview of Macroprudential Tools

This section provides an overview of the main macroprudential tools, both in general and casting them in the European institutional context. Two papers (2010 and 2012) produced under the aegis of the Committee on the Global Financial System (CGFS) and two International Monetary

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Fund (IMF) documents (both published in 2013), provide some general background and offer complementary analyses. The CGFS papers discuss criteria concerning the selection of macroprudential instruments, how to determine the appropriate timing for their activation or deactivation, their effectiveness and efficiency, i.e., the cost of the regulation relative to the benefits of intervention. The IMF documents explore five key aspects of macroprudential policy, including its definition and scope, its interaction with monetary and fiscal policies, how to make operational the macroprudential instruments, its institutional arrangements and finally issues concerning inaction, leakages, spill-overs, and the need for cross-country coordination. Arregui et al. (2013) propose an analytical framework to assess costs and benefits of macroprudential policies, while Galati and Moessner (2013) provide an overview of recent developments in the field.

At the centre of the SSM, the ECB will design and implement the macroprudential policy using instruments that are embedded in the EU legal acts, i.e., at present the Capital Requirements Directive (CRD IV) and the Capital Requirements Regulation (CRR). In particular, the SSM will be empowered to tighten the policy measures decided by national authorities, regarding the instruments set out in the CRD IV and the CRR. The macroprudential policy instruments not included in the EU legal texts remain under the full control of the national authorities. A synthesis of the relevant provisions contained in the SSM Regulation is contained in Box 1.

**Box 1**

**Macroprudential policy provisions in the SSM Regulation**

Article 5(1) of the SSM Regulation provides that national competent or designated authorities may apply the macroprudential measures provided for in the CRD IV and CRR with respect to credit institutions. They shall notify the ECB in advance of taking such measures. Where the ECB objects to such measures, they shall duly consider the ECB’s reasons prior to proceeding with the decision as appropriate.

Article 5(2) of the SSM Regulation provides that the ECB may adopt, instead of the national competent or designated authorities, higher buffer requirement or take stricter measures provided for in the CRD IV and CRR. The ECB shall cooperate closely with the national authorities. It shall notify the national authorities in advance of taking such measures. Where national authorities object, the ECB shall duly consider their reasons prior to proceeding with the decisions as appropriate.

Article 5(3) of the SSM Regulation provides that any national competent or designated authority within the SSM may propose to the ECB to apply stricter capital buffers or measures in order to address the specific situation of the financial system and the economy in its Member State.

Article 5(5) of the SSM Regulation provides that the ECB shall take into account the specific situation of the financial system, economic situation and the economic cycle in individual Member States.

Article 9(1) of the SSM Regulation provides that for the purpose of carrying out these macroprudential tasks, the ECB shall be considered, as appropriate, the competent or the designated authority. Article 4(3) of the SSM Regulation provides that the ECB may adopt guidelines and recommendations, and take decisions to exercise its supervisory tasks, including its macroprudential tasks.

As stipulated in Recital 24 of the SSM Regulation, national competent or designated authorities and the ECB shall act in respect of any coordination procedure provided for in CRD IV and CRR after they have followed the procedures provided for in the SSM Regulation.

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7 Specifically, whenever deemed appropriate, the national competent or designated authorities of the SSM participating Member States shall apply the CRD IV and CRR measures, subject to the requirement of prior notification of their intention to the ECB. Furthermore, the coordination mechanism set by the CRD IV vis-à-vis the ESRB also applies.
the box, while the table illustrates the most relevant macroprudential tools included in the EU legal texts and, as such, available to the SSM (first two columns) as well as those not included, which remain in the remit of national authorities (third column).

By and large, macroprudential instruments seek to address two dimensions of systemic risk, a time dimension and a cross-sectional dimension.8 The time dimension reflects the tendency of financial firms, households and non-financial corporations to increase their risk exposures during the expansionary phases of the credit cycle. In these phases, incentives to take on relatively high risks grow. By contrast, during phases of contraction, economic agents tend to be "excessively" risk-averse and to rapidly unwind risk. Under this perspective systemic risk is endogenous and is characterised by procyclicality. To illustrate, in good times exuberance can lead investors to finance assets with cheap but volatile sources of funding, which may dry up in bad times, thereby impairing asset liquidity. This example shows how risks can build up over time. Financial firms facing funding constraints may be forced to sell assets at a distressed price. Specifically, asset liquidity depends on whether these assets are financed with stable or volatile sources of funding and is not a constant, intrinsic characteristic of the asset itself. This discussion also suggests that the calibration of macroprudential instruments should change over the cycle, and that time-invariant rules can be arbitraged away. Conversely, the cross-sectional dimension denotes the distribution of risk at a given point in time. Should a shock occur, such dimensions of risk can be characterised by domino effects. Such effects, in turn, can arise when financial firms are highly interconnected, whether because of direct linkages operating via cross exposures or because of indirect linkages owing to vulnerabilities to common shocks. For instance, liquidity stress in one firm can produce a liquidity seizure or fire-sales in the whole financial system, if firms are significantly interconnected.

Macroprudential instruments can be classified into three broad categories.9 (i) capital-based tools (for instance, countercyclical capital buffers – CCBs – or sectoral capital requirements, leverage ratios), (ii) liquidity-based tools (for instance, liquidity requirements), and (iii) asset-based tools (for instance, caps on loan-to-value – LTV – and loan-to-income – LTI – ratios).10

Generally speaking, the three categories aim at increasing resilience to different types of shocks, in different ways. By and large, the first group aims at enhancing the solvency of the bank, the second at enhancing its ability to withstand temporary liquidity shortages or dry-ups, the last to improve the quality or safety of the bank’s asset side.

More specifically, the idea behind CCBs is to require banks to build buffers in good times, which they can draw down in bad times. Such buffers go beyond the minimum capital requirement, and serve the purpose to absorb losses which could materialise in downturns, thereby increasing the resilience of banks to shocks.11 Moreover, such buffers contribute to mitigate the economic fluctuations by lessening the excessive procyclicality of credit. During upturns

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9 See CGFS (2012).  
10 It is envisaged that, in the future, the leverage ratio may become part of the macroprudential toolkit of the CRD IV/CRR.  
11 See, for instance, Drehmann et al. (2010).
the build-up of capital buffers is expected to slow down credit-fed booms, while their release during downturns should decrease the likelihood that banks cut down lending dramatically. In an insightful paper, Jiménez et al. (2013) estimate the impact of dynamic provisioning – which, according to the paper, can be assimilated to CCBs – on the supply of credit and real activity in Spain. The study finds that countercyclical dynamic provisions contributed to smooth out the credit cycle, by decreasing credit supply in good times and supporting firm financing in bad times.

Liquidity requirements can contribute to contain systemic vulnerabilities stemming from over-exposures to cheap but unstable sources of finance. In times of financial exuberance, risk incentives grow and lead credit institutions to increase leverage and expand their balance sheets. Such expansion is typically financed with volatile funding via the wholesale market. By requiring banks to finance assets with stable sources of funding and to hold sufficient high-quality liquid assets to withstand significant liquidity outflows, the net stable funding ratio (NSFR) and the liquidity coverage ratio (LCR) measures should reduce the likelihood of adverse funding shocks, and increase the banks' shock absorption capacity. Therefore, such measures, by mitigating excessive maturity mismatch, should shield financial firms against runs – the modern version of the bank runs of Diamond and Dybvig (1983) – and against pressures to shed assets at fire-sale prices in distressed times. In addition, they should contribute to limit excessive credit growth by reducing the possibility of balance sheet expansions via volatile sources of funding.

Asset-based macroprudential instruments contribute to enhance the resilience of the banking system by improving the quality of its exposures, either by reducing the probability of default of the borrowers, or by reducing the expected loss given default, or both. Prominent examples are caps on the LTV ratio or on the LTI ratio. Such measures can serve both risk prevention and risk management purposes. On the one hand, caps on LTV and LTI ratios can help mitigating the risk that credit-fuelled bubbles in the housing (and in general real estate) market pop out. On the other hand, if the bubble has already formed, they can help manage the ensuing risks by cooling off exuberance. A cap on the amount which it is possible to borrow is tantamount to increasing the down-payment that a potential home buyer has to put forth. Down-payments are inversely related to real estate prices. When down-payments decrease, real estate prices and leverage go up, and, conversely, when down-payments increase, real estate prices and leverage decline, because some potential home owners are cut off the market.

3 | Opportunities

This section analyses the effectiveness of the main macroprudential instruments. Experience in advanced economies is quite scant, not least because credit controls grew out of fashion following the deregulation process of the 1980s and 1990s. Elliot et al. (2013) show that credit control measures in the United States have been quite successful in steering the credit cycle, while restrictions on reserve requirements aimed to impact liquidity were less effective. In a comprehensive cross-country study, which mainly focuses on emerging market economies, Lim et al. (2011) find that, by and large, macroprudential instruments are effective in reducing procyclicality.

While broad-based macroprudential tools (say, applied to the whole banking sector) contribute to increase the resilience of the banking system and to smooth out the credit cycle, they are likely to be less suited to address the insurgence of credit-fuelled bubbles in specific sectors of the economy. There could be circumstances where, for instance, there is no need to cool off credit growth for the whole economy, since overheating occurs in a particular sector. Targeted macroprudential instruments (say, by sector or a particular class of banks or regional location) can be more effective.

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12 The goal of dynamic provisions is to cover banks’ future losses which could materialise on their assets. As such they are a special type of general loan loss provisions and, from a prudential perspective, the above mentioned study argues that they are akin to a capital buffer. The formula used for their calculation determines their countercyclical nature: dynamic provisions are built up in good times from retained profits, while they are drawn down in bad times. This implies that dynamic provisions “generate countercyclical bank capital buffers”. See Jiménez et al. (2013), p. 34. See also Saurina (2006a, 2006b).

13 See Grammatikos (2010).

14 Lim et al. (2011) provide a comprehensive empirical study of the effectiveness of macroprudential instruments. The paper shows that macroprudential policies have been used more extensively in emerging market economies than in advanced countries.
to achieve this objective than broad tools and have the advantage that would not lead to a generalised reduction in economic activity. The targeted nature of macroprudential tools is one of their main strength. Moreover, it could render them useful also in the current economic landscape, characterised by a fragile recovery and weak credit growth. In such an environment macroprudential instruments can be used to stimulate credit supply to some sectors of the economy. When cast in the euro area context, in pursuing their objective of ensuring financial stability, macroprudential policies can also address country specific excesses, thereby contributing to reduce the heterogeneity in financial and business cycles across Member States. But probably the biggest advantage of macroprudential instruments is that they contribute to increase the resilience of the financial sector to shocks, and as such reduce the ensuing social costs in term of output losses. The rest of the section elaborates on these concepts.

In principle, capital-based tools such as sectoral capital requirements or increases in the risk weights entering the capital adequacy ratio can cool off lending in a particular sector and address localised financial risks. Similarly, asset-based instruments such as caps on LTV or on LTI ratios can contain over-heating in the housing market. The Korean example is useful in this respect. In Korea, in the first half of the 2000s, the rapid house price increase and the significant expansion in mortgage loans raised concerns regarding overheating in the house market and the possibility that financial vulnerabilities could ensue. To stave off systemic risk, caps on LTV and LTI ratios were introduced in 2002 and 2005, respectively, and repeatedly adjusted. The instruments were calibrated differently according to the loan structure, the geographical location of the property, and the characteristics of the borrowers, thereby exhibiting “surgical” precision and high flexibility. Preliminary evidence shows that the use of caps on LTV and LTI ratios were effective in curbing house price increase and stabilise credit growth. 15

The targeted nature of macroprudential tools makes them also particularly useful in a macroeconomic environment characterised by a fragile recovery with weak credit growth, which are the distinguishing features of the current euro area macroeconomic landscape. In such an environment, macroprudential policies can contribute to restore sound credit conditions, mitigating the likelihood that a creditless recovery materialises. According to Abiad et al. (2011), when a downturn is preceded by a credit boom and a banking crisis, the recovery which follows is very likely to be creditless. Against this background, the regulator can put in place countercyclical measures. The reduction of the risk weights for loans granted to small and medium enterprises (SMEs) entering the calculation of capital adequacy ratios is a case in point. Since the risk weights for SME loans are defined in the European Union by the CRR, which sets uniform rules that are directly applicable to all Member States, authorities will have no scope to deviate. However, EU legislators have acknowledged the need to support SME lending via regulatory measures and therefore introduced a provision in CRR which temporarily reduces the risk weights of SME loans (up to 1.5 million euros) by approximately 25%. 17 This provision will be revised in 2017 on the basis of a detailed analysis by the European Banking Authority of the evolution of lending trends and the effective riskiness of SME loans over a full economic cycle.

The possibility of employing targeted macroprudential policies to address sectoral or regional imbalances can turn out useful in a monetary union. In the euro area, when Member States face non-synchronous credit or business cycles, and financial conditions show country-specific developments, standard monetary policy is not in a position to address this heterogeneity. For instance, during the boom phase between 2003 and 2007, some euro area Member States experienced an economic growth and a rate of inflation higher than the euro area average. As a consequence, in these countries, real interest rates turned out to be lower than could have been warranted by the local economic conditions, which contributed to inflate the economy and to fuel the real estate sector bubble. The single monetary policy could not calibrate policy rates to address different inflation rates in each Member State and, 15 In 2010 and 2011 Korea imposed further macroprudential measures to address foreign exchange (FX) risks, including leverage caps on banks’ FX derivatives positions and a macroprudential stability levy on non-core FX liabilities. See Kim (2013)
16 Abiad et al. (2013) define creditless recoveries ‘as episodes where real credit growth is negative in the first three years following the recession’ (p. 4).
17 For a model rationalising such a process and its outcome, see Bossmay et al. (2013). See also Aoki and Nikonov (2012).
18 See Article 501 of the Capital Requirements Regulation.
at the same time, to deal with financial imbalances. Neither was it supposed to do so, since it was designed to be the same for the whole euro area and did not have the mandate or the tools to ensure financial stability. Similarly, when the bubble burst, although non-conventional monetary policies have in part addressed heterogeneity among countries, macroprudential policies could have been used more effectively to tackle different developments among Member States. This discussion suggests that, within the framework set by CRD IV/CRR, macroprudential policies can be used countercyclically, to smooth out local or sector-level credit cycles within the euro area.

The objective of macroprudential policy is not to fine tune differences in credit cycles among Member States, but to ensure financial stability. Yet, in some circumstances, macroprudential instruments can smooth out heterogeneities within the euro area. For example, in a given Member State, macroprudential authorities could seek to improve the resilience of the banking system in periods of excessive credit growth by increasing the CCB requirements.\(^\text{19}\) If effective, this measure will moderate credit growth in that country thereby attenuating credit and business cycle asymmetries across Member States. But even if the action is not fully successful, by increasing the capital buffers and therefore the resilience of the banking system in that country, the policy measure could, nevertheless, help synchronise the different credit cycles. When the bubble bursts, the increased capital buffers could avoid a meltdown in the local banking system, which in turn can support the supply of credit to that economy. As a consequence, this could contribute to align possible differences in credit and business cycles among Member States.

### CHALLENGES

Macroprudential instruments also pose challenges. First, as noted already, theoretical models and evidence backing up macroprudential policies are still underdeveloped. Second, since the transmission channels need to be fully explored, this implies that macroprudential instruments can be circumvented or generate undesired effects. Third, it is important not to underestimate the risk that national authorities, even while pursuing the objective of financial stability, could (re-)introduce a domestic dimension to credit and, indirectly, to monetary policy. To avoid inefficient outcomes, the coordination of macroprudential policies is particularly important in the euro area.

Providing analytical foundations to macroprudential instruments require models that effectively integrate the banking-financial sector (including, ideally, its microstructure and network properties) with the real side of the economy. In addition, it is crucial to understand the endogenous formation of risks and the transmission channels responsible for their propagation. A proper comprehension of endogenous risk-formation can help policy-makers in selecting the macroprudential tools and calibrate their timing and intensity. However, these aspects have only recently been incorporated in macro-models, and still in a rudimentary way. For example, though such models permit to capture how financial shocks amplify credit cycles and recessions, in most of them such shocks remain exogenous. Angeloni and Faia (2013) model endogenous bank risk and bank runs as a result of high leverage, and characterise the effects of bank risk on the macroeconomy, providing a general equilibrium rationale for countercyclical buffers. Boissay et al. (2013) model endogenous real business cycle reversals even in the absence of adverse exogenous shocks. Clerc et al. (2013) take a different approach; while still operating in a framework where crises occur due exogenous fundamental shocks, their model emphasises default (and in particular widespread bank default) as the source of amplification and inefficiencies during crisis episodes.

The targeted nature of macroprudential instruments could render them also prone to circumvention. For example, the introduction of caps on LTV and LTI ratios in Korea, discussed in the previous section, moderated the expansion of bank mortgages, but at the same time determined a rapid surge of non-bank mortgage lending.\(^\text{20}\) Aiyar et al. (2012) provide another example which documents leakages in macroprudential policies in the United Kingdom. Employing data on individual banks active in United Kingdom from 1998 until 2007, the study

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\(^{19}\) The example is derived from Tucker (2011).

\(^{20}\) See Kim (2013).
estimates the impact that the Financial Services Authority (FSA) had on the supply of credit when setting bank-specific, time-varying capital requirements. The authors find that, when the FSA tightened capital requirements, regulated UK banks reduced their lending, while banks not subject to the FSA capital requirements (in particular foreign bank branches operating in the United Kingdom) picked up the slack by increasing their supply of credit. Turning to the dynamic provisioning measure introduced in Spain in 2000, Jiménez et al. (2013) also show that such tool failed to avoid the insurance of a credit-fuelled bubble in the real estate sector and the ensuing banking crisis partly because firms substituted credit by borrowing from the banks least affected by dynamic provisioning.

The key lesson here is that the effectiveness of macroprudential measures depends on two factors. The first is the ability of financial intermediaries to circumvent such policy measures. The second relates to the extent to which non-targeted financial institutions can pick up the slack and acquire those market segments which were served by the affected firms. Ideally, macroprudential regulation and supervision need to be coordinated internationally and across a wide range of financial institutions. This would avoid that domestic regulation is arbitrated away by credit institutions which either lie outside the regulatory perimeter – as is the case of shadow banks –, or depend on a different jurisdiction even when they operate at home, – as is the case of foreign bank branches. The issue of coordination is particularly relevant in the euro area. The rest of the section discusses this aspect.

There is a degree of substitutability between tools which are part of the EU legal framework, i.e. the CRD IV and the CRR, and those which are not, and as such remain under the control of national authorities (see Table). On the one hand, this substitutability can justify why some instruments remain in the realm of domestic authorities. Indeed, the SSM does not need to use all the tools to achieve its goals. On the other hand, however, this substitutability can also justify why the use of those instruments should be coordinated by the SSM. Precisely because the instruments available to national and centralised macroprudential authorities are to a certain degree substitutable, one authority could potentially offset the measures taken by the other. But since the substitutability is not perfect, the use of offsetting instruments would likely create more distortions than sheer inaction.

To illustrate, consider caps on LTV and LTI ratios, which are left to the discretion of national macroprudential supervisors due to their alleged superior knowledge of local housing and real estate markets. Instruments like LTV and LTI ratios are highly politically sensitive, as they aim at limiting the borrowing and spending capability of classes of society potentially of high social relevance (examples are young couples; middle classes; low-income population segments or regions). Since they may have a key impact on house prices, they may affect (say) local economies and fiscal revenues of local governments. To make the argument, assume that for the fear of jeopardising a nascent, fragile recovery, national supervisors are overly lenient despite signs of overheating in the domestic real estate market. But, if a credit-fuelled bubble emerged, it would have detrimental consequences on financial and macroeconomic stability, and spill-overs to other Member States might ensue. Faced with this scenario, a “centralised” macro-supervisor would likely tighten the instruments at its disposal, e.g. by increasing countercyclical capital buffers. In turn, the local supervisor, which still may aim to ease access to credit at home, can react by softening the tools under its control, triggering a further tightening at a central level. In extreme cases, the process could assume a self-reinforcing dynamic, precisely because there is a degree of substitutability between the tools under the discretion of the domestic and the centralised supervisors. Even worse, since the substitutability between the two sets of instruments is not perfect, additional distortions would ensue: CCBs are too broad tools to control for sector imbalances related to real estate only. In the euro area, it is therefore desirable that the SSM, in close cooperation with national competent or designated authorities, coordinates the use of macroprudential policy measures, including those instruments which are in the remit of domestic authorities.

A further improper use of macroprudential instruments is that national or designated authorities in the euro area could (re-)introduce a domestic dimension to credit, and indirectly, to monetary policy. This is due to the fact that macroprudential tools directly or indirectly influence the amount of credit which flows to the real economy. To illustrate, caps on LTV and LTI ratios are instruments to impose...
a constraint on the demand of credit. A levy on non-stable funding, caps on loan-to-deposit (LTD) ratios, and margin and haircut requirements are all measures that aim to mitigate the volatility inherent to short-term funding and therefore the likelihood that vulnerabilities due to liquidity distress (and the possible ensuing fire sales) morph into solvency issues. But these instruments could also be binding to credit supply. These examples show that while monetary authorities control policy rates and thereby affect the supply of credit by altering the opportunity costs, macroprudential authorities can influence the supply of credit directly, hence affecting the structure of yields and returns indirectly. An inappropriate use of macroprudential policies may turn out to be overly intrusive, end up micromanaging and distorting the allocation of credit, to the detriment of financial integration.

Generally speaking, although monetary and macroprudential authorities pursue two distinct objectives, i.e. price stability and financial stability respectively, inevitably one policy will have (unintended) effects on the objective of the other. There are many examples showing that monetary policy can affect financial stability, while macroprudential tools can have an impact on inflation. On the one hand, changes in policy rates can affect asset prices and therefore the value of the collateral pledged, thereby impacting the net worth of borrowers and lenders. Moreover, variations in policy rates can influence the ex ante risk-taking behaviour of credit institutions, while liquidity injections can decrease the incentives to recapitalise banks and increase those to evergreen non-performing loans. On the other hand, by affecting the lenders’ and borrowers’ behaviour, macroprudential policies can influence credit growth and therefore aggregate demand, which in turn will have an impact on inflation. Against this background, it is clear that an institutional design aimed to coordinate monetary and macroprudential policies would avoid sub-optimal outcomes.

Another challenge concerns the unintended effects that changes in macroprudential policies in one country can have on output and lending not only at home but also abroad and thus exert themselves externalities. The reason is that some regulatory measures, for instance higher capital requirements, are similar to shocks on a financial firm and therefore may produce analogous effects. High financial integration typical of a monetary union can amplify these effects. To illustrate, take two countries, A and B. Let us assume that in country A the recovery is well established, while in country B the economy is only slowly healing. If the supervisor in country A fears that negative shocks from banks in country B may affect the banking system at home, she may react by requiring that domestic banks reduce their exposures towards banks or subsidiaries in country B. As a consequence, country B will experience a negative funding shock, which may endanger both its financial stability and its still fragile recovery. This example sheds lights on the importance of coordinating macroprudential policies at a euro area level. National macroprudential authorities will typically not internalise the spill-overs that their policies may generate on other countries. When business cycles are not synchronised, these spill-overs can be even more detrimental since a downturn in a given country can be exacerbated by the impact of restrictive macroprudential policies in countries experiencing instead an upturn.

5) Conclusions

The main strength of macroprudential instruments seems to be to allow targeting specific sectoral or national or local imbalances, helping mitigate difference in credit and business cycles and ultimately fostering financial stability and also relieving some burden from the single monetary policy. A problem is that the theoretical and empirical foundations of the new policy area are still underdeveloped. Even more seriously, macroprudential instruments, precisely due to their targeted nature, may easily be prone to circumvention or spillover effects, especially within the euro area. To mitigate them, careful coordination will be necessary between the central level and national authorities. Such coordination

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21 See, for instance, Blanchard et al. (2013).
22 See, for instance, Jiménez et al. (2011). See also Maddaloni and Peydró (2011).
23 It can happen, for instance, that branches of the banks in country A may lower lending in country B, or that subsidiaries may repatriate capital or liquidity to banks in country A.
is in principle foreseen in the SSM regulations, but modalities remain to be defined.

Like many new things, macroprudential policy has its own share of enthusiastic believers. Sometimes it is portrayed as a panacea capable at a time of achieving systemic financial stability and resolving certain strictures that the crisis has uncovered in the policy architecture of the euro area. It is unlikely to turn out that way, at least in the early years of the new supervisory regime. More realistic ambitions will help avoid later disappointments and exploit the real and significant potentials inherent in this new and fascinating area of policy-making.
European macroprudential policy from gestation to infancy
Ignazio Angeloni

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Macroprudential policy in France: requirements and implementation

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In France, the Law of 26 July 2013 on the Separation and Regulation of Banking Activities established the Haut Conseil de stabilité financière (HCSF – High Council for Financial Stability) and conferred on it the conduct of macroprudential policy. The aim of macroprudential policy is to safeguard financial stability, and prevent and contain systemic risk. The Law explicitly entrusts the Banque de France with the task of ensuring the “stability of the financial system” together with the HCSF. In France, the central bank is therefore at the heart of this system.

This article describes the main features of the French financial system that must be taken into account for the conduct of macroprudential policy. It explains how the new French institutional framework should make it possible to ensure an efficient surveillance of the risks inherent in the financial system and thus safeguard the financing of the economy. Lastly, it sets out the coordination challenges related to the conduct of macroprudential policy in France.
For a long time, the oversight and regulation of the financial system were two tasks carried out in a microprudential perspective. They aimed to ensure the stability of financial institutions, infrastructures and markets considered individually and in isolation, without taking into account the interconnections and interactions between the different components of the financial system. However, the recent financial crisis has brought to the fore the failings of this method. A holistic approach, which considers the whole ecosystem of players, services and infrastructures of the financial sphere, is now essential. This is the aim of macroprudential policy.

In this article, we recall the requirements that the macroprudential policy framework must satisfy to take account of the specific features of the French financial system. We show how the institutional framework was adapted to these features. Lastly, we highlight the coordination challenges related to the conduct of macroprudential policy.

1| The specific features of the French financial system

1|1 A concentrated banking system and a highly intermediated financing of the economy

The financial system plays a key role in the economy, by ensuring the mobilisation and transfer of the resources required for investment. In continental Europe and in France in particular, this transfer of resources mainly takes place through the banking system. Only large financial and industrial groups opt, and generally only partially, for direct market financing. This model creates especially close links between the stability of the financial system, the soundness of banks and economic growth.

Furthermore, in France, the banking system is highly concentrated. It comprises banks whose weight in the national and international financial system is significant. In 2012, the total assets of French banks of global systemic importance represented 92% of the French banking system (Chart 1), which means that regulation must be adapted to these institutions.

This concentration of major banking groups is a significant factor for financial stability. It entails a risk of failure whose consequences would be devastating for the financial system as a whole as well as for the real economy. Nevertheless, large banks have the means and the duty to invest in tools to detect risk at an early stage and manage it, and the universal banking model can make them more resilient to shocks thanks to the diversification of their activities and hence of their risks. The strong resilience of French banks during the recent crisis tends to corroborate this.

1|2 A French ecosystem of players, services and infrastructures at the heart of the euro area financial system

Beyond the banking system alone, changes in the financial system as a whole have given rise, in France, to a rich and complex ecosystem

After having been a highly regulated bank-based economy until the post-war years, in the past half century the financial system has undergone major financial deregulation characterised by (i) a globalisation of markets; (ii) a shift to electronic trading; and (iii) continuous financial innovation.
These three factors have no doubt led to a more efficient allocation of resources, a reduction in financing constraints and international portfolio diversification. However, they also give rise to a number of risks. The resulting financial ecosystem for the euro area and its French component is complex, at times opaque, and exposed to the contagion of shocks via new transmission channels. More specifically, these transmission channels stem from the linkages between a combination of financial markets, infrastructures and services often based in the Paris financial centre.

Market infrastructures and payment systems are systemically important players, essential to the smooth functioning of the French and euro area financial system. The development of the financial ecosystem has given rise to new market infrastructures particularly present in France such as the clearing house LCH.Clearnet SA, the central securities depository Euroclear France, the payment systems CORE\(^1\) and Target2,\(^2\) on which the proper execution of transactions and the robustness of the financial ecosystem as a whole depend. Beyond the banking system alone, all of these components taken individually must be robust enough to prevent the propagation of shocks and all systemic crises.

LCH.Clearnet SA is the clearing house for transactions in equities, bonds and equity derivatives on the main Paris securities markets. It also clears OTC trades in French, Italian and Spanish government bonds and repos, and in credit default swaps (CDSs). In 2013 (figures at 30 November 2013), LCH.Clearnet SA cleared 2.5 million trades in government securities with a total value of EUR 62 trillion, 276 million trades in equity derivatives with a value of EUR 5.6 trillion and 10,200 trades in European CDS with a value of EUR 334 billion.

\(^1\) COMPensation REtail

\(^2\) Trans-European Automated Real-time Gross settlement Express Transfer system.
Macroprudential policies: implementation and interactions

Anne Le Lorier

The central securities depository Euroclear France is another infrastructure essential to the smooth functioning of the French financial system. It ensures the integrity of securities issues, settles transactions carried out on Paris financial markets (via the ESES France settlement system), and provides the central custody of securities. Moreover, this infrastructure has an international dimension: since 2008, the ESES settlement platform is jointly used by three central securities depositories Euroclear France, Euroclear Belgium and Euroclear Nederland, belonging to the same group. In 2013, 21 million trades were settled by ESES France, with a total value of EUR 79 trillion. The three central securities depositories in the ESES will join the common securities settlement platform Target2-Securities, developed by the Eurosystem, in March 2016.

Lastly, payment systems process high volumes. The CORE system, for retail payments processed 13.76 billion trades in 2013 with a value of EUR 5.41 trillion and the Target2-Banque de France system, for large-value payments, processed 9 million trades in 2013 with a value of EUR 87.57 trillion.

Market infrastructures and payment systems in France are therefore of systemic importance because, on the one hand, they process considerable volumes and, on the other, their functioning has repercussions on all players in the French and euro area financial system. This means that great vigilance is required on the part of regulatory and supervisory authorities.

The weight of post-trade service providers and asset managers

French custodians (known as custody account-keepers) account for a predominant share of activity in Europe and the world. Three French institutions are among the largest ten in the world and the largest in Europe, in the areas of the custody of securities (assets under custody worth EUR 11.5 trillion in cumulative terms), investment fund management (EUR 2.6 trillion in assets under administration in cumulative terms), and services to issuers.

Similarly, asset management is a key component of the French financial system. Over 600 asset management companies conduct their business in France. Assets under management amount to over EUR 2.9 trillion in France (4th in the world) of which almost EUR 1.5 trillion in investment funds (1st in Europe). Four French groups are in the top 20 in the world, testifying to their international dimension.

1|3 Banks are at the heart of this ecosystem

The complexity of the French financial system, its weight in the euro area financial system, and the linkages between the different players call for the greatest vigilance with regard to the close ties that have developed between:

- financial institutions;
- financial institutions and markets;
- financial institutions and market infrastructures;
- lenders/borrowers and their sources of savings/funding;

both at the national and the international levels.

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3 *Euro Settlement for Euronext-zone Securities.*
4 *Source: globalcustody.net*
5 *Source: afg.asso.fr*
Major French credit institutions are at the heart of these connections and their activities give rise to strong interdependencies with euro markets and infrastructures. This is also the case at the international level since they participate in a number of market infrastructures and payment systems used by large foreign banks operating globally.

These linkages call for even closer oversight since their international ramifications are numerous and strong and are fuelled by the infrastructures themselves. For example, the French clearing house LCH.Clearnet SA is “interconnected” with the Italian clearing house Cassa di Compensazione e Garanzia (CC&G) through an interoperability link that enables its clearing members, in particular French banks, to clear their Italian government securities trades directly without having to be a member of the Italian clearing house.

Global asset management firms also contribute to the European and international interconnections of the French financial system. Their preference for domestic assets decreased substantially, outside crisis episodes, even though some information asymmetries persist due to the fact that they belong to different jurisdictions. For instance, financial institutions are particularly active on capital markets whose original geographical boundaries have been greatly extended (e.g. NYSE-Euronext), on OTC markets and via largely unregulated entities in the shadow banking sector.

One of the features of the French financial system is therefore that it relies heavily on systemically important international banks, which contribute considerably to the financing of the economy. They are the nerve centres of the financial ecosystem, like the infrastructures allowing transactions to be carried out and completed. It is nevertheless important not to overlook smaller institutions, which could play a key role in this complex network of interconnections or whose failure could jeopardise the system as a whole. The consequences of the failures observed on the US subprime market for the global financial system or the Greek public finance debacle for the European financial system illustrate such amplification of systemic risk.

In addition to the microprudential supervision applied to banks, infrastructures and markets, macroprudential policy must therefore be implemented to prevent systemic risk and ensure, ultimately, the smooth financing of the economy. Since 2013, these requirements have been taken into account by the French macroprudential framework.

2] A MACROPRUDENTIAL FRAMEWORK ADAPTED TO THE FEATURES OF THE FRENCH FINANCIAL SYSTEM

2|1 An institutional framework that guarantees a robust and cross-sectional surveillance

The legislative framework

The relevant provisions of the Banking Law of 26 July 2013 in France are based on the recommendation of the European Systemic Risk Board (ESRB) on the macroprudential mandate of national authorities. These provisions establish an institutional framework for the definition and implementation of macroprudential policy in France.

In particular they establish the Haut Conseil de stabilité financière (HCSF – High Council for Financial Stability) and confer on it the conduct of macroprudential policy in France. As a collegiate body, the HCSF brings together all the institutions involved in the oversight of the French financial ecosystem.

The HCSF, chaired by the Minister of the Economy, Finance and Industry, is composed of the Governor of the Banque de France, the Vice Chairman of the Autorité de contrôle prudentiel et de résolution (ACPR – Prudential and Resolution Supervisory Authority), the chairman of the Autorité des marchés financiers (Financial Markets Authority) and Autorité des normes comptables (Accounting Standards Authority), and three qualified experts. The Banque de France provides the secretariat, jointly with the Directorate General of the Treasury. The HCSF therefore allows for a holistic approach to financial stability. Its work started in the first quarter of 2014.

The HCSF’s task is to monitor systemic risk and prevent it from materialising

The HCSF has a broad financial stability mandate, with two intermediary objectives. The first is to ensure that the financial sector is able to absorb...
shocks in order to prevent the risk of spillovers. To do this, the HCSF must mobilise the expertise of its members on the interactions, transmission channels and the risks of spillover between the different individually regulated entities in the system (banks, insurance firms, markets, payment systems, etc.). The second is to prevent the amplification of business and financial cycles, by anticipating turnarounds that could destabilise the system as a whole.

To this end, the HCSF meets quarterly in order to monitor a set of indicators relevant for financial stability. These indicators make it possible to identify in particular credit dynamics, leverage in the economy (in the household, corporate and financial sectors), the smooth functioning of markets (their efficiency, their liquidity, their volatility), the concentration of investor exposures in certain asset classes as well as the risk of bubbles.

2|2 Macroprudential instruments available to the HCSF

The HCSF’s oversight mandate is supplemented by regulatory powers that enable it to activate the tools necessary for correcting financial sector imbalances. The Governor of the Banque de France is empowered to make proposals on the activation of these macroprudential instruments.

A systemic buffer to stave off structural risks

The vulnerability of the whole financial system to a small number of systemic players is a major risk, in particular in France. With a view to internalising the cost of a potential failure of any such players, the systemic buffer aims to act as a capital protection within the financial system, in the form of a capital surcharge for the institutions concerned. If the concentration of the French banking system presented a risk for the economy, the activation of the systemic buffer would make it possible to address, at least partially, this structural risk. Moreover, this buffer could also be imposed on a specific group of institutions or a particular sector of the economy in which financial imbalances appear and could develop to the extent that they become systemic. In this respect, the central counterparties recognised as credit institutions by the Monetary and Financial Code are covered for example by the scope of the regulation.

Instruments for preventing credit bubbles

In addition, while the risk of a bubble in some sectors requires a moderation of price and credit dynamics, a more restrictive and targeted policy could be implemented. These preventive measures aim to tighten the credit standards applied by the entities subject to ACPR supervision. They make it possible to prevent asset prices from rising excessively, by reducing supply and/or demand, and to contain excessive private debt. These measures may take the form of limiting debt-to-income ratios for example and thus curbing leverage for household or corporate investments.

In particular, Article 458 of the Capital Requirements Regulation (CRR) provides that, when addressing macroprudential or systemic risk at the national level, Member States may impose standards that are stricter than those set at the European level, in terms of requirements related to own funds, large exposures, public disclosure, the level of capital conservation buffer, liquidity, risk weights to target property bubbles and inter-financial sector exposures.

A buffer against the procyclicality of the financial system

Lastly, the countercyclical capital buffer makes it possible to impose a capital surcharge on financial institutions in order to limit the excessive amplification of cycles. During upswings, characterised by low risk, this surcharge aims to prevent the formation of bubbles, herd behaviour or the poor assessment of risks. During downswings, the buffer, built up in good times, could be used by banks and help to correct imbalances by avoiding large-scale fire sales and accelerated writedowns, thus limiting the amplification effects of cyclical downturns.

6 Note that the systemic risk buffer that the HCSF can implement and the buffers for systemically important institutions defined in CRD IV/ CRR will not be cumulative, and the highest shall be applied.

7 Art. L440-1 of the Monetary and Financial Code: “…They [clearing houses] are authorised to operate as credit institutions by the Autorité de contrôle prudentiel et de résolution, after consultation of the Autorité des marchés financiers and the Banque de France.”
2|3 The Banque de France at the heart of the framework

The Law of 26 July 2013 gives the Banque de France an explicit mandate to maintain financial stability. Moreover, in the framework of the HCSF, the Governor of the Banque de France has the exclusive right to make proposals to the Chairman of the HCSF on the activation of macroprudential instruments. The Governor may also, at all times, withdraw his proposals, giving him an implicit veto right.

A guarantee of credibility

First, macroprudential policy benefits from the credibility afforded by the Banque de France’s independent authority status. Since the communication of the HCSF is a useful instrument for containing systemic risk, the Banque’s credibility strengthens the weight of the opinions or recommendations issued by the HCSF.

Sound ability to analyse the financial system, the real economy and their interactions

The Banque de France benefits from a long-standing experience in implementing monetary policy, at the national level and within the Eurosystem, supplemented by its responsibilities in the area of financial stability. Furthermore, over the past few years, it has developed an expertise in analysing systemic risk, its determinants and its transmission and contagion mechanisms, which are at the heart of the HCSF’s mandate.

Moreover, the Banque de France can exploit the information stemming from all its activities relating to the economic fabric, from the Companies Observatory to the services provided to households experiencing financial difficulties. In addition to the oversight of the banking system by the ACPR, the Banque also has important responsibilities in terms of monitoring and managing infrastructures (clearing houses, securities settlement systems, payment systems) essential to the smooth functioning of the financial system. In this respect, the Banque benefits from expertise in the setting of standards applicable to the activity of central counterparties, as well as the oversight of these entities and the establishment of payment infrastructures at the European level (e.g. Target, Target2, or Target2-Securities). Therefore, thanks to these different competencies and oversight activities, the Banque has at its disposal comprehensive information that is essential to form an overview of the financial and economic system.

A European and international role

In a world where crises and the consequences of imbalances no longer stop at national borders, international dialogue is one of the cornerstones of macroprudential policy.

As the central bank of a founding member of the European Union and the euro area, the Banque de France, member of the Eurosystem, actively participates in all the European bodies that address financial stability issues. Furthermore, the Banque has been and remains an active contributor to the setting of the international standards applicable to the different players in the global financial system. Since it belongs to the international central bank network and through its permanent relations with the International Monetary Fund (IMF), the Bank for International Settlements (BIS) and the Financial Stability Board (FSB), the Banque participates in the oversight of the global financial system.

3|3 A major coordination challenge

3|1 Interaction between national, European and international decision-making bodies

A need for cooperation that takes into account national specificities and measures

In order to be effective, macroprudential policy needs to strike a subtle balance between maintaining national prerogatives, for the purpose of tackling specific financial risks, and ensuring a minimum degree of consultation to limit side-effects or unexpected consequences for the rest of the economic and financial system. This challenge is particularly important in the European Union, where ensuring the integrity of the single market is an additional constraint. A number of pitfalls need to be avoided.

• Competitive distortions: it is important to ensure that measures introduced at national level are targeted...
Macroprudential policy in France: requirements and implementation
Anne Le Lorier

at clearly identified systemic risks, and do not conceal a desire on the part of national authorities to introduce measures that penalise the competition. This risk is heightened by the fact that there is no commonly accepted definition of macroprudential policy and of the tools it entails. For example, in certain countries, capital controls are considered to be a macroprudential policy tool. In Europe, to limit the risk of competitive distortions, the list of available tools and the respective powers attributed to national and European authorities are set out in the European texts (the Capital Requirements Directive – CRD IV and the Capital Requirements Regulation – CRR). However, one downside of this is that it can make procedures long-winded and complex (see below).

• “Free-riding”: the actual cost of implementing a macroprudential policy is still difficult to determine due to a lack of experience or of an appropriate analytical framework. In an integrated zone or globalised financial system, it is important to prevent the risk that one country might fail to implement the macroprudential firewalls needed to safeguard its financial stability, in a bid to avoid the associated costs, while at the same time trying to reap the benefits of the policies implemented by its neighbours. To help counter this threat, European texts include a reciprocity requirement, which is automatically applicable when any one country implements a countercyclical buffer up to 2.5%.

• “Inaction bias”: due to the complexity involved in identifying systemic risk and its channels of transmission, as well as the uncertainties over the cost and efficiency of macroprudential policies, national authorities might be tempted not to apply additional regulatory constraints, or simply to take no action at all. For this reason, the CRD IV and CRR grant the European Central Bank (ECB), as a single supervisory authority, the power to tighten certain microprudential instruments if it considers them insufficient.

• Incomplete knowledge: in order to effectively mitigate systemic risk in a globalised financial world, each country needs to be aware of the individual exposures and dependencies of its own financial system. However, up till now, national regulators have only had access to a small portion of this information. Recent studies of interdependencies and financial contagion have shown that financial networks and transmission mechanisms are extremely complex. In particular, they have highlighted that indirect transmission mechanisms, associated with information channels or risk and portfolio correlation, are at least as important in propagating shocks as direct channels linked to contractual exposures. To counter this problem of incomplete information, the FSB has launched a major international data collection project, called the Data Gaps Initiative. Additional information is being provided by the IMF, through its publication of the Global Financial Stability Review and Financial Sector Assessment Programmes, by the FSB’s Standing Committee on Assessment of Vulnerabilities, and by the BIS Committee on the Global Financial System. These institutions also contribute to the ongoing supervision and oversight of the global financial system.

Sharing of responsibilities between national and European bodies in the implementation of macroprudential tools

As France’s national macroprudential authority, the HCSF is charged with implementing the majority of the macroprudential tools specified in the CRD IV and CRR, including the countercyclical buffer, the systemic risk buffer and the national flexibility measures described in Article 458 of the CRR, known as the “flexibility package”.

However, as France is a member of the Single Supervisory Mechanism (SSM), the ECB has the power to tighten French macroprudential requirements if it deems them insufficient. The ESRB, set up in 2011, is also authorised to issue recommendations and opinions on some of the macroprudential measures introduced at national level (see Box).

Cooperation between national and European authorities is therefore vital. This is particularly understandable in the case of France, where close to 92% of banking sector activity (see Chart 1) is subject to European supervision, while the macroprudential supervision of interactions between credit institutions and French financial infrastructures and services still falls largely to the national regulator.

The procedures put in place in Europe are designed to ensure information is adequately disseminated to all stakeholders, both at national and European levels, and to allow these authorities to exercise their respective powers of supervision. In practice, one of the main challenges will be how to make this complex
Regarding the implementation of macroprudential tools, the decision-making process has been specifically designed to ensure that all measures are validated at European level. The process differs according to the type of tool:

- For the countercyclical capital buffer (Art. 136 CRD IV), if France initiates a project to activate or relax the constraint, it must notify the ECB at least ten days before the measure is adopted. The ECB then has five days in which to issue a positive or negative opinion. However, its response is not binding. The process also works the other way: if the ECB initiates the project, the national authority can issue an opinion, but again its response is not binding. In either case, the ESRB must be informed of the decision.

- For the systemic risk buffer (Art. 133 CRD IV), the notification and non-binding opinion system for the ECB and national authority is similar to that for the countercyclical capital buffer. However, the European Commission, the ESRB and the European Banking Authority (EBA) all need to be informed of the decision. If the size of the buffer is between 3% and 5%, a negative opinion from the European Commission means the measure has to be abandoned. For buffers above 5%, the EBA, the ESRB and the European Commission must issue an opinion within two months; the EBA's opinion is non-binding, but if the ESRB and the European Commission issue a negative opinion, the measure has to be abandoned.

- For the so-called “flexibility” measures outlined in Art. 458 CRR, the decision-making process is similar to that for the systemic risk buffer, except that the ESRB and the EBA have one month in which to issue a binding opinion. This is then transmitted to the European Commission which either approves the measure or drafts a proposal for rejection and sends it to the EU Council which has ultimate power of decision. The EU Council has one month to reject or approve the measure.

3|2 Interaction between micro- and macro-supervision

Close collaboration with the Prudential and Resolution Supervisory Authority

France's macroprudential system groups together all the country's financial supervision authorities. While all share the same objective of preserving financial stability, each approaches the issue from a different angle: some take a microprudential approach, focusing on the soundness of the individual institutions under their authority; others take a macroprudential stance, which takes into account the overall financial system. In the case of some instruments, the boundary between the two spheres is blurred: certain tools, particularly those applying to systemically important banks, are microprudential (capital surcharge), but at the same time have a macroprudential dimension in that they aim to contain domino effects and prevent the collapse of the overall financial system.

It is therefore vital to coordinate between these macro and micro viewpoints, to ensure their objectives are compatible and to limit potential conflicts of interest. For instance, the macroprudential regulator might be tempted to lower capital surcharges during a crisis in order to reduce constraints on bank financing, whereas the microprudential regulator might want to increase banks' resilience by raising their capital requirements. The participation of the ACPR in HCSF meetings should ensure a continuous exchange of information, and optimal coordination between micro and macro viewpoints, particularly as the Governor of the Banque de France is Chairman of the ACPR.

system operational, and avoid imposing a long and laborious process of coordination each time a macroprudential tool needs to be activated or relaxed. The asymmetric nature of financial cycles and the conditions of use of these macroprudential tools should help to limit this risk: financial imbalances generally take a long time to form, while measures to absorb them are usually rapid. Thus, European banks will have twelve months to meet any countercyclical increases in their regulatory capital requirements, while decisions to lower this requirement will be effective immediately. Unlike fiscal policy, therefore, macroprudential policy cannot be used specifically to stabilise the economic environment, but is instead designed to correct the excesses of the financial system.

8 In France, global or domestic systemically important institutions are identified by the ACPR.
Securing the full involvement of the market regulator

Ensuring cooperation between the authorities in charge of the oversight of market infrastructures is one of the five core responsibilities assigned to regulators in the Principles for Financial Market Infrastructures (FMIs) published by the CPSS and IOSCO. "Central banks, market regulators, and other relevant authorities should cooperate with each other, both domestically and internationally, as appropriate, in promoting the safety and efficiency of Financial Market Infrastructures." This cooperation between authorities is also addressed in the European regulation on central counterparties, known as the European Market Infrastructure Regulation (EMIR): the supervisory college for central counterparties (CCPs), the body in charge of cooperation, comprises the authorities responsible for the currencies in which financial instruments are cleared (the central banks issuing the most relevant EU currencies), the supervisors of the clearing members established in the three Member States with the largest contributions to the default fund of the CCP and the market regulator, as the competent authorities supervising the market infrastructures served by the CCP or with which it has links.

By securing the involvement of the market regulator, the macroprudential approach maintains this principle of cooperation. It also ensures the participation of the authorities responsible for on-site supervision, and guarantees dialogue and the exchange of information between the micro and macroprudential stances. This dialogue facilitates the detection of structural problems, for example, in the execution of transactions, or problems linked to the economic climate, such as the incorrect valuation of assets during boom periods when bubbles can form.

Taking into account the full range of public policies

In addition to monetary policy, the definition of macroprudential policy needs to take into account all public policies designed to influence the economic environment or particular sectors, and vice versa. One example of this is housing policy. If the government wants to facilitate access to the property market, it can use a range of public aid and tax incentives to do so; however, this objective should not be used to justify constraining macroprudential policy, in the event a housing bubble is detected.

The inclusion of the Minister of the Economy, Finance and Industry in the HCSF is intended to limit the potential for conflicts of interest: risks are analysed by a college, which compares different sets of risk diagnostics, and at the same time the independence of the supervisory authorities and the central bank is preserved.

3|3 Ensuring consistency with other public policies

A complement to monetary policy

Maintaining price stability is no longer considered a sufficient guarantee of financial stability. Over the past decade, the euro area has consistently met its objective of keeping inflation “close to but just below 2%”, but this has still failed to prevent the emergence of crises which have profoundly affected the region’s economies. The onset of the financial crisis and its spread to the real economy clearly demonstrate that price stability needs to be complemented with a financial stability objective. Nonetheless, a number of precautions must be taken to ensure the optimal use of these economic policy tools. While the objective of price stability is clearly established under monetary policy, the objective of financial stability is more complex to define. However, both policies appear to complement each other. For example, if an expansionary monetary policy creates the risk of a bubble in a particular asset market, macroprudential policy tools can be used to limit excessive credit expansion. This complementarity is crucial in an integrated zone such as the euro area, where the central bank manages nominal interest rates for the entire region, but, in the absence of nominal convergence, cannot control real interest rates in each member country. Nonetheless, the interactions between and complementarity of monetary and macroprudential policies should not come at the expense of central bank independence or interfere with the normal conduct of monetary policy. In this context, the exchange of information between authorities is essential.
4| Conclusion

Due to the central role played by the financial system, both in France and in developed economies in general, financial regulation constitutes a major policy challenge. Coordination between the various institutions involved is absolutely vital to ensure the proper functioning of the system and to safeguard its stability.

Maintaining financial stability and controlling systemic risk call for the implementation of an effective macroprudential policy. This in turn requires a dedicated operational framework which brings together cross-sector skills and ensures interaction between authorities at both a European and global level.

In France, this objective has been met with the creation of the HCSF, which groups together all bodies involved in the supervision of the French financial system. Its members also participate in the various European and international authorities (ECB, SSM, BIS, FSB, etc.), ensuring the level of cooperation required to meet the challenges of a globalised financial system.
Implementing macroprudential policies: the Swiss approach

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The global financial crisis has highlighted the need for a regulatory framework that directly addresses systemic risk. Such a macroprudential approach to financial regulation focuses on enhancing the resilience of the financial system to adverse shocks and on preventing the build-up of systemic risk in the course of a credit cycle.

Taking the viewpoint of a central bank, this article discusses how a macroprudential framework can be built. It points to the key challenges the implementation of such policies presents. In doing so, it draws on the recent experience of Switzerland.

First, the key objectives of the macroprudential approach are explained, highlighting that macroprudential policies should be seen as complementary to monetary policy and microprudential regulation in the pursuit of the twin goals of price and financial stability.

Second, it is argued that macroprudential policy is a shared responsibility among all authorities involved in fostering financial stability. Different institutional settings are conceivable. In any setting, however, central banks should play a key role in defining and implementing macroprudential policies.

Third, the article hints at the significant uncertainties linked to the use of macroprudential instruments, and describes the Swiss approach in dealing with these challenges, with a particular focus on the countercyclical capital buffer.

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1) **TWO KEY LESSONS FROM THE SYSTEMIC FINANCIAL CRISIS 2007-2009**

The recent financial crisis has highlighted the vulnerability of today’s globally integrated financial system and the dismal consequences of financial instability for the broader economy. From a regulatory perspective, two lessons stand out.

First, systemic financial risk was clearly underestimated. In general terms, systemic risk arises because an optimising financial institution does not fully account for the cost that its behaviour imposes on other financial institutions. Thus, in essence, the origin of systemic risk is a negative externality imposed by individual financial institutions or agents on the system. The second fundamental lesson from the crisis is that the pre-crisis policy consensus on the way to deal most effectively with systemic risk has been deficient. In short, the consensus view was dominated by a reluctance to address systemic risk directly. This was based on two key arguments.

On the one hand, it was largely assumed that securing the solidity of individual financial institutions would also grant system-wide stability and thus that regulation at the level of individual firms – microregulation – would suffice. The crisis clearly proved this view to be untenable. Risk in a financial system can arise quasi endogenously, even if all or most individual financial institutions appear to be robust, as the run on liquidity and the imminent risk of a cascade of bank failures in the aftermath of the collapse of Lehman Brothers plainly showed.

On the other hand, the predominant view was that monetary policy should not interfere with financial booms, as pricking an asset price bubble was thought to be generally more costly than cleaning-up after the bubble had burst. In this view – referred to as the “Greenspan Doctrine” – monetary policy was supposed to remain firmly focused on consumer price inflation, using the short-term interest rate as its main tool. As a corollary, asset price developments were thought to be of significance only to the extent of their effect on inflation. The foundation of this doctrine resided in the difficulty of identifying ex ante when a bubble is forming. While this fundamental difficulty remains, the crisis clearly highlighted the fact that monetary policy, which focuses on consumer price stability, is no guarantee for financial stability. Indeed, while monetary policy had been successful in containing inflation and reducing macroeconomic volatility during the “Great Moderation”, it was not able to prevent the large-scale build-up of financial imbalances.

The conclusion from these two lessons is clear. There is a strong case to improve crisis prevention measures in order to strengthen system-wide resilience and to contain the built-up of systemic risk ex ante. This is exactly the thrust of the macroprudential approach to financial supervision and regulation.

Switzerland is well advanced in the process of adopting such a macroprudential approach. Drawing on the experience gained so far, the article discusses the key challenges the implementation of such policies entails. Section 2 discusses the main objectives of the macroprudential approach, and the measures taken in Switzerland so far. Importantly, it leads to the conclusion that macroprudential policies should be implemented as complements to monetary policy and microprudential regulation in the pursuit of the twin goals of price and financial stability.

What may seem straightforward in theory is not necessarily easy to implement in practice. Two challenges stand out in particular. First, implementing macroprudential policies raises significant governance issues, given the tight and complex interaction of macroprudential policies with monetary and microprudential policies. Section 3 argues that implementing macroprudential policy is a shared responsibility of all authorities involved in financial stability, with central banks playing an essential role. The specific institutional setting chosen in Switzerland to deal with the ensuing coordination issues is explained. Second, the use of macroprudential instruments is subject to significant uncertainties. The specific challenges that arise when using the countercyclical capital buffer (CCB) and the way Switzerland deals with them are discussed in Section 4. Section 5 concludes.

2) **A MACROPRUDENTIAL APPROACH TO FINANCIAL STABILITY**

Macroprudential policy is generally aimed at two distinct but not mutually exclusive goals. First, macroprudential policy should strengthen
the resilience of the financial system as a whole. Second, it should limit system-wide excesses on asset and credit markets. Put differently, macroprudential supervision and regulation is concerned with the stability of the entire financial system, rather than that of individual institutions, the latter being the domain of microprudential supervision and regulation.

2|1 Structural macroprudential instruments

More specifically, a macroprudential approach involves, first, monitoring structural systemic risk. This is the risk that the default of a single bank – because of its size, market share or interconnectedness – could jeopardise certain functions that are vital for the economy, such as payment transactions or lending to the real economy. This is the problem arising from institutions that are “too big (or interconnected) to fail” (TBTF). The key objective of policies addressing this risk is to reduce both the likelihood of crisis at such institutions and the costs to the economy in the event of such a crisis.

One way to address these risks is to impose progressive capital adequacy requirements. The greater a bank’s systemic importance, the more equity capital it is required to hold. If capital adequacy requirements increase in step with systemic importance, banks have an incentive to stay smaller and less systemically important. If they do not, the extra capital at least makes them more resilient. In addition, given that it is impossible to rule out a future crisis, measures that improve the resolvability of a distressed systemically important financial institution (SIFI) are important. One can think of a broad variety of measures, from a mandatory separation of financial institutions, e.g. along the lines of the Glass-Steagall Act, to less intrusive rules such as requiring banks to ex ante demonstrate that their systemically important functions can be maintained in the event of a severe crisis.

The TBTF issue is particularly relevant in Switzerland. This explains that Switzerland adopted, in 2011 already, a package of measures designed in this spirit of complementarity. It prescribes a capital surcharge for SIFIs allowing banks to partially fulfil capital requirements by means of issuing contingent convertible capital (cocos). The cocos are converted exactly at the time when financial means are needed for restructuring a bank, thus acting as an internal crisis fund. Simultaneously the package requires banks to show convincingly – on the basis of “emergency plans” – that they are organised in such a way as to be able to maintain systemically important functions in the event of a crisis, thus reducing the need for a public bail-out. If they are not able to do so, the regulator, the Swiss Financial Market Supervisory Authority – FINMA, may impose specific organisational measures.

2|2 Cyclical macroprudential instruments

The second key element of a macroprudential approach is to directly address the root causes of cyclical systemic risk. This dimension of systemic risk captures the procyclicality of financial agents’ behaviour which, if left unchecked, can amplify the financial cycle and increase its instability – a classical collective action problem. Procyclicality can arise, for instance, from the tendency to underprice risk during booms and to overprice it in downswings. The key objective here is to limit excessively risky behaviour on the part of financial intermediaries, thus avoiding excessive credit growth, an overvaluation of assets and preventing bubbles from emerging, or at least constraining their size.

The interest rate, that is, the standard monetary policy tool, comes to mind as a potential instrument. Indeed, raising interest rates seems like a natural response to a credit boom, as the higher market borrowing rates exert a dampening effect on credit demand and – eventually – on asset prices. When this calls for deviations from otherwise (that is, from a price stability point of view) optimal policy, one talks of “leaning against the wind”. In economic upturns, this would involve central banks setting higher interest rates than would be necessary to achieve price stability alone. Using the interest rate to contain asset price growth would thus regularly lead to deviations from the interest rate path that would be optimally justified by the pursuit of the price stability mandate. At times, price and financial stability assessments may even require very different interest rate moves, possibly moves in opposite directions. These tensions are illustrations of the well-known Tinbergen principle according to which the number of policy tools should equal the number of policy goals.

The partial solution to these tensions is to resort to additional instruments to counter the emergence of cyclical systemic risk. Instruments directly targeting
the source of financial exuberance seem to be most appropriate. Regulatory action can be taken to cushion against or hinder the growth of such risks over time – for instance, by imposing a temporary obligation to build-up additional capital, a CCB, as proposed in the Basel III framework. This instrument allows for a temporary increase in capital requirements when imbalances appear to be building-up in the credit markets with the aim of increasing the capital buffer to absorb potential losses and, at the same time, lean against excessive credit growth. Another way of achieving the required countercyclical effect would take the form of tightening restrictions on loan-to-value ratios when signs emerge that a bubble could be forming in certain credit markets, such as the mortgage market.

The situation prevailing in Switzerland since 2011 provides a good illustration of the potential tensions between price and financial stability faced by a central bank described above. Confronted with extreme safe haven pressures resulting in a massive overvaluation of the Swiss franc, the Swiss National Bank (SNB) has been enforcing an exchange rate floor of CHF 1.20 per euro since September 2011. This policy move, aimed at fighting strong deflationary developments, has invalidated the interest rate as an instrument for dampening the sustained momentum observable in the domestic credit and real estate markets over the last several years. Against the background of the ensuing imbalances and risk to financial stability, the Swiss authorities introduced the CCB in June 2012 and activated it for the first time in February 2013. Since end of September 2013, banks are required to hold additional capital for mortgage loans financing residential property located in Switzerland.

In short, macroprudential instruments enhance the toolkit available so that it is possible to tackle system-wide risks to financial stability more directly and in a preventive manner. Clearly, microprudential and monetary policy instruments can also contribute to stabilising and to increasing the resilience of the financial system. But they have other main goals, namely the stability of single institutions and price stability, respectively. A macroprudential policy framework should thus be seen as complementary to a well-designed microprudential regulation targeted at assuring the resilience of individual financial institutions and it should be conducted alongside a monetary policy that remains firmly focused on price stability.

What is appealing in theory is not, however, always easy to implement in practice. The use of macroprudential instruments poses various challenges. Two stand out in particular. First, the use of macroprudential instruments raises significant governance issues, originating in the tight and complex interaction of macroprudential policies with monetary and microprudential policies. Second, the use of macroprudential instruments is subject to significant uncertainties, given the elusiveness of “systemic risk”. The following two sections elaborate on these issues and outline potential ways to deal with them, once again using the Swiss case as an example.

### 3. POLICY INTERACTIONS AND MACROPRUDENTIAL GOVERNANCE

In defining and implementing macroprudential policies and a suitable institutional set-up, it is important to be aware of their potential interactions with monetary policy, on the one hand, and with microprudential policy, on the other.

Through its impact on the credit cycle and on asset prices, monetary policy exerts an influence on the need for activating cyclical macroprudential instruments. Conversely, macroprudential policies aimed at credit markets influences the context of monetary policy decisions. This is because macroprudential policies, at least in part, work through the same transmission channels as monetary policy – namely the bank lending and balance sheet channels. For instance, a targeted increase in capital requirements applying to mortgage credits may increase the cost of borrowing in this specific segment of the credit market. Any kind of credit tightening triggered by such a change in macroprudential policy could also affect real activity and inflation, thus interfering with the action of monetary policy.

In general, these policy interactions are complex and, as a result, the optimal mix and stance of each policy may vary, depending on circumstances and on the type of shock hitting the economy. For instance, a positive shock to aggregate demand (inducing an increase in both credit and inflation) requires a tightening of both monetary and macroprudential policies. But a positive supply shock can give rise to policy conflicts since it may lead to rising asset prices and higher credit demand but dampened
consumer price inflation. The ensuing tightening of macroprudential policy may require an easing of the monetary policy stance to achieve price stability.

Clearly, macroprudential policies interact not only with monetary policy, but also with microprudential policies. This follows not only because macroprudential and microprudential policies share a common fundamental goal – preserving financial stability – but also from the fact that, to a certain extent, they make use of the same instruments such as capital and liquidity requirements. Here again, both complementary and counteracting effects are conceivable. On the one hand, if macroprudential policy successfully contains systemic risk, the environment in which financial institutions operate will be less risky. This may facilitate the task of microprudential policy in promoting the safety and soundness of individual financial institutions. On the other hand, microprudential regulation, such as risk-weighted capital requirements may generate those very procyclical effects that macroprudential policies aim to counter.

The institutional set-up of the macroprudential framework must take account of such policy interactions. Broadly speaking, there are three distinct institutional settings conceivable.

3|1 A key role for central banks

Before going into details, one preliminary remark is warranted. Whatever the selected setting, the central bank must play a central role as the traditional tasks of central banking are closely interlinked with various aspects of financial stability.

First and obviously, in their historical role as lender of last resort (LOLR), central banks bear a major responsibility in crisis management. During the recent crisis, central banks clearly demonstrated that they can fulfil this function to a previously unforeseen extent. Such crisis measures do not come for free, however. They should be seen solely as a last resort. In the longer term, they create distortions and can be the source of new instabilities in financial markets.

Second, as we have seen, monetary policy affects financial stability through various channels. Importantly, changes in the policy rate alter the tightness of borrowing constraints and the likelihood of borrowers’ default. The policy rate also influences the risk perception and risk tolerance of intermediaries. Moreover, interest rate changes may impose a negative externality on financial stability through their impact on asset prices and exchange rates. For instance, lowering interest rates can increase asset prices, which may trigger further increases in leverage and asset price booms, thus exacerbating the financial cycle.

Third and conversely, a stable, efficient financial system is an important prerequisite for the effective transmission of monetary policy signals to the broader economy. Developments observed during the recent financial crisis provide impressive evidence in this regard. As a recent example, balance-sheet strains led banks in the euro-area periphery to grant credit to the private sector only very parsimoniously and at high rates, despite record-low policy rates and unrestricted access to central bank liquidity.

There is thus no question that central banks must play an essential role in defining and implementing preventive policies aimed at contributing to the overall stability of the financial system. The crucial question is, what institutional set-up is best suited to foster this role while taking account of the policy interactions highlighted above?

3|2 Three basic institutional settings

There are three distinct approaches to handle the coordination issues that arise as a consequence of the interactions between monetary and macroprudential policies, on the one hand, and micro- and macroprudential policies, on the other.

The first is to place the entire responsibility of these three policies in the hands of a single institution. This is the approach chosen in the United Kingdom where the Bank of England, naturally in charge of monetary policy, has also been entrusted with full responsibility for both micro- and macroprudential regulation. Clearly all coordination issues are a priori resolved in this institutional set-up, at the cost of building a very powerful and complex institution which may prove politically vulnerable, given the scope of its action and the potential for policy mistakes.
The second possibility consists in creating a new specific institution, say a financial stability board, and entrust it with macroprudential authority. Such a board would include representatives of all bodies that have a say in financial stability matters, such as the microregulator, the ministry of finance and the central bank. By nature this set-up directly tackles the coordination issues arising in the macroprudential domain between the various authorities. A significant downside is the unclear attribution of responsibilities among the institutions involved, making this set-up more vulnerable to unwarranted policy interference and increasing the risk of inefficient policy decisions.

A third and more traditional possibility is to leave microprudential and monetary policies in the hands of distinct institutions (the microregulator and the central bank, respectively), with macroprudential policy being a shared responsibility. Clearly, such a “shared-responsibilities” approach must be supplemented by sound coordination mechanisms. A clear allocation of macroprudential duties, rights and instruments among the authorities involved in fostering financial stability is of utmost importance. The same holds for mechanisms and rules for information sharing between these authorities.

### 3|3 Switzerland: a lean framework with clearly assigned responsibilities

Switzerland has opted for the third institutional setting described, with the microregulator being fully responsible for the regulation and oversight of individual banks and the central bank mandated to conduct monetary policy, while macroprudential policy is implemented collaboratively, but with a clear division of primary responsibilities for the various dimensions of macroprudential policy.

Specifically, the instruments of macroprudential policy of the structural kind – policies addressing systemic risk arising from the systemic importance of individual financial institutions – are primarily in the hands of the microregulator, FINMA. Indeed, at the structural level, the interactions are particularly tight between microprudential and macroprudential policies since individual and system-wide stability risks overlap. Here macroprudential instruments such as the capital surcharge for SIFIs rely first and foremost on the monitoring of single institutions.

The authority in charge of individual institutions has all the related competences and is thus naturally best placed to take the lead. Being responsible for system-wide stability – and in its capacity as LOLR – the SNB must also be involved. It is mandated to identify the systemically important institutions and it helps define the regulatory requirements specific to these institutions.

It is in the case of macroprudential policies addressing the cyclical dimension of systemic risk that the interactions with monetary policy are the tightest and most delicate. It is also here that the specific analytical and forecasting skills of central banks can be most useful. It is precisely the expertise in analysing the overall economy and specific market segments, such as the real estate and credit markets, as well as the interlinkages between the financial system and the broader economy – a pre-requisite for the conduct of monetary policy – that is relevant for devising cyclical macroprudential policies. It is thus natural that the SNB holds a primary responsibility regarding cyclical macroprudential instruments. A different configuration would impose unwarranted constraints on the central bank and affect its ability to fulfil its core mandate, that is, securing price stability. This is reflected in the CCB decision-making framework installed in Switzerland, with the Swiss Federal Council making the ultimate decision on the basis of a proposal of the SNB in a process where FINMA is also consulted.

Despite this natural attribution of tasks, the interactions between different kinds of policies require a high degree of coordination and extensive exchange of information. A Memorandum of Understanding between the SNB and the FINMA define the terms of this collaboration and completes the institutional set-up.

To sum-up, the close interactions of macroprudential policy with microprudential and monetary policies must be taken into account in defining the institutional set-up of macroprudential policy. Given the absence of a dominant model, the preferred choice naturally depends on country specific elements. The chosen institutional set-up may evolve over time and the question of optimal macroprudential governance may be revisited in light of experiences. The primary role played by central banks, in particular, in assuming responsibility for cyclical macroprudential instruments will, however, remain as a constant.
4| Key Challenges in Implementing a Countercyclical Buffer

With respect to implementing the cyclical macroprudential instrument advocated on the global level, the CCB, Switzerland is well in advance of the baseline Basel III timetable. While the Swiss experience in this regard may thus be of general interest, it is premature to draw conclusive lessons at this point. The CCB was activated while further regulatory measures targeted at dampening the built-up of risk in the Swiss mortgage and real estate market were already in place. Disentangling the effect of any single measure is thus very difficult. What we have learned so far, however, is that using the CCB as an instrument is far from trivial. More generally, using cyclical macroprudential instruments implies taking decisions against the background of substantial uncertainty on various levels.

First, as mentioned earlier, identifying unsustainable developments in asset and credit markets is inherently difficult. Thus, the aim cannot, and should not, be to surgically prick bubbles or to fine tune asset price or credit market developments. It is easier, although not trivial, to identify situations of intensified financial stability risk. In such cases, taking precautionary action is fully justified. The key question to focus on therefore is, how can we assess whether the build-up of risk is approaching a critical stage? International evidence suggests a palette of quantitative early warning indicators that are reliable predictors of banking crises and financial instability. In line with this evidence, we concluded at the SNB that this identification issue is best dealt with by using a small set of indicators rather than a single metric of imbalances.

Second, practical experience with macroprudential instruments is limited. Significant open questions remain in particular regarding the effectiveness and optimal calibration of these instruments in the face of continuously changing economic conditions and given the aforementioned complex interactions between macroprudential, microprudential and monetary policies. The resulting scientific uncertainty increases the risk of policy errors. To take account of this limited knowledge, decision-making on the activation, change or deactivation of the CCB in Switzerland encompasses both a rule dimension and a discretionary dimension. Both dimensions are important. A rule is important to ensure that decisions and communications are consistent across time. Discretion is important because of the need for flexibility in CCB decision-making that arises because of the uncertainty and complexity surrounding the assessment of imbalances in the credit market.

Third, as for any regulatory intrusion, increasing capital requirements do not come without costs. However, these collateral costs to the economy are plausibly lower than the stability benefits generated. In this regard, estimates from the Bank for the International Settlements suggest that, by reducing the probability of a crisis, the benefit of higher capital buffers is, on average, significantly higher than their costs in terms of foregone real output. Expectations must remain realistic, however. While the CCB contributes to enhancing the resilience of the financial system and aims at dampening risk-taking incentives, there is no guarantee that its activation will counter a build-up of imbalances in credit markets under any circumstances.

5| Conclusion

The global crisis has clearly stressed the need for a more comprehensive approach to financial stability. The way forward is to insist on addressing systemic risk issues head-on. This is the intent of the macroprudential approach to financial stability. This approach is to be viewed as a complement to a well-designed microprudential regulation targeted at assuring the resilience of individual financial institutions and it should be conducted alongside a monetary policy that remains firmly focused on price stability.

Tight interactions of macroprudential policies with microprudential and monetary policies imply that implementing a macroprudential approach is a shared responsibility among all authorities involved in fostering financial stability. Interactions are particularly strong and the required analytical competences particularly close in the case of monetary and cyclical macroprudential policies. Central banks thus have an essential role in the design and implementation of these policies.

Switzerland has taken significant steps towards building and making use of a macroprudential framework. Implementation is not trivial. Significant uncertainties prevail in particular in the case of instruments addressing the cyclical dimension of systemic risk.
These uncertainties should not be cause for inaction. On the contrary, the huge cost of a systemic crisis induced by imbalances in the asset and credit markets makes it imperative that policy makers be endowed with additional macroprudential instruments. The first steps when engaging in the new demanding macroprudential territory should be taken in a spirit of modesty as well as flexibility and with the readiness to learn from experience.
The effects of macroprudential policies on housing market risks: evidence from Hong Kong

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Executive Director (Research)
Hong Kong Monetary Authority

This paper describes the framework and conduct of macroprudential policies regarding housing market risks in Hong Kong, and attempts to shed light on the question whether policy instruments such as caps on loan-to-value (LTV) ratios should be aimed at targeting household leverage, credit growth or property prices. The results of empirical work suggest that caps on LTV ratios have been effective in constraining household leverage, but do not appear to have sustained effects on housing prices. The effect on loan growth is likely to be state-dependent, being more effective when there is excess credit demand but less so when there is excess credit supply. In comparison, higher transaction taxes in the form of additional stamp duties levied by the Government appear to be effective in constraining housing demand and restraining housing price growth.
Housing market risks have been a central focus in the financial stability work of the Hong Kong Monetary Authority (HKMA), the central banking institution of Hong Kong. The HKMA has been using macroprudential policies to ensure that banks and their customers have sufficient cushions on their balance sheets to survive volatilities in property prices (He, 2013). These policies do not aim at targeting property prices but may help to dampen the amplitude of property-price cycles and to prevent the collateral damage that other more blunt policies might cause.

In terms of both output and inflation, the Hong Kong property market is an important driver of macroeconomic outcomes. In 2012, real-estate services accounted for 6 percent of gross domestic product (GDP), while the ownership of premises amounted to 10 percent of GDP. Housing costs also comprised almost 32 percent of the Hong Kong consumer price index basket. At the same time, residential mortgage lending (RML) has always been one of banks’ largest areas of risk exposure. Since 1991, the banking sector’s RML has never been lower than 20% of its lending for use in Hong Kong, with a maximum of 35% registered in September 2002.

Hong Kong’s approach to housing market risks has to a significant extent been shaped by its own history, particularly lessons from the Asian financial crisis that engulfed the region during 1997-1998. On the eve of the Asian financial crisis, housing prices in Hong Kong had shown signs of large misalignment with economic fundamentals, and the Hong Kong dollar had also become overvalued. The external shock of the Asian financial crisis prompted a collapse of the property market with housing prices dropping by 66 percent.

What is more interesting was the very low mortgage delinquency ratio that peaked at 1.4 percent despite the 66 percent correction in property prices. There was no banking crisis and there was no need to bail out banks. This is in sharp contrast to the banking and financial crisis in the United States and Europe after Lehman’s collapse, where housing prices dropped less significantly but the delinquency ratios increased more sharply. In the United States, home price dropped by about one-third between 2006 and 2011, while the mortgage delinquency ratio increased to over 10 percent; in Ireland, home price has fallen by 50 percent, while the ninety-day overdue mortgage arrears ratio rose to nearly 13 percent.

A range of factors had contributed to the relatively low mortgage delinquency ratio in Hong Kong after the bubble burst, including the declining mortgage rate and high savings rate of households. But an important factor was the macroprudential measure that capped the loan-to-value (LTV) ratio of mortgages at 70 percent. This provided banks with a significant cushion to absorb property-price corrections, and a substantial equity stake that maintained incentives for borrowers to service loans as long as they were able to do so.

After a few years of adjustment and steady recovery, housing prices in Hong Kong grew strongly since early 2009, with the level in Q4 2013 more than doubling that in Q2 2009. This rapid rise in residential prices reflected both low interest rates and very tight housing supply conditions. Mortgage interest rates went as low as 1 percent in the second half of 2009 and have stayed below 2.5 percent. Housing supply has fallen below the estimated demand since mid-2006 and, as a result, a large demand-supply imbalance has persisted. These developments, along with the forward guidance by the Federal Reserve that its policy interest rate will remain low for a rather long period, have led to strong expectations that property prices will keep rising. The possibility of a housing market bubble in the making has been the most important financial stability concern for the HKMA in the past several years.

Indeed, over the past two decades, the HKMA has used limits on the LTV ratio as one type of targeted policy tool to manage banks’ credit exposures to the property market and lean against the amplitude of property-price cycles. Hong Kong started off in the early 1990s with a maximum LTV ratio of 70 percent for all property types, introducing more differentiated ratios over time, depending on the property type and its value. Thus, the policy has expanded both in terms of its scale and scope. In recent years, the use of LTV limits by the HKMA has become more intensive as a mean to address the strong upward pressure on the housing market.

An important lesson from the Asian financial crisis is that policymakers should act early in the cycle, as expectation of a price increase is difficult to reverse once it becomes entrenched. It is also important to adopt scalable measures. Behavioural patterns suggest that property prices and market activities may pick up again after the market has digested the initial measures. The incremental approach allows policymakers to carefully assess the market impact of the introduced measures and, in light of the assessment, to calibrate the scope and
The effects of macroprudential policies on housing market risks: evidence from Hong Kong

Dong He

magnitude of further measures if considered necessary. The HKMA has introduced six rounds of macroprudential measures since October 2009 by lowering the caps on LTV and debt service ratio (DSR) gradually and extending the prudential target from luxury homes to investment properties, and later to those where borrowers repay their debt with foreign income or have multiple mortgages.

The HKMA has also coordinated with the fiscal and land authorities. As a long-term solution, the land authorities have introduced land- and housing-supply measures in order to redress property market imbalances. The fiscal authority has introduced demand-management measures to dampen speculative activities in order to buy time for supply-side measures to take effect. For example, in November 2010, the Hong Kong Government introduced a special stamp duty (SSD) of as much as 15 percent for properties resold within two years. In October 2012, it raised the SSD rate to as much as 20 percent and covered properties resold within three years. It also introduced a 15 percent buyer's stamp duty (BSD) on residential properties acquired by companies and non-locals, which had accounted for about 20 percent of total transactions. In February 2013, the Government doubled the rates of existing ad valorem stamp duty (also known as DSD) for transactions of all types of properties, except waiving local individuals who do not own any other residential property in Hong Kong at the time of acquisition. The Annex provides a detailed summary of the evolution of macroprudential measures and stamp-duty measures in Hong Kong since early 1990s.

Although available empirical evidence point to an important role of LTV policy in safeguarding banking stability, there remain debates about the design of the operational framework. In particular, would LTV policy be optimal to target household leverage, credit growth or property prices in pursuit of financial stability? Theoretically, the answer crucially depends on the transmission mechanism of LTV policy, particularly (i) the extent of the policy pass-through on these three variables, and (ii) their respective contributions to financial stability.

The rest of this paper is organised as follows. Section 1 of this article reviews the history of LTV policies of the HKMA in the past twenty years. Section 2 summarises recent work by HKMA research staff on the pass-through of LTV policy to borrowers' leverage and credit growth, and their respective contributions to financial stability. Section 3 describes the staff's findings of short-term policy impact on housing market activities. Overall, the empirical findings summarised in this paper support the view that the dampening effect of LTV policy on household leverage is more apparent than its effect on property prices. In comparison, higher transaction taxes in the form of additional stamp duties levied by the Government appear to be effective in constraining housing demand and restraining housing price growth. Nevertheless, further evidence needs to be accumulated to understand better whether the effects of tax policies on housing prices and transaction volumes are short-lived or long-lasting.

| A BRIEF HISTORY OF LTV POLICY IN HONG KONG |

Charts 1 provide a succinct visual summary of the developments in Hong Kong's LTV policy, together with changes in property prices and mortgage delinquency ratios. The development of LTV policy in Hong Kong can be broadly divided into four phases, as summarised below.

1| Phase 1: before 1997

Prior to the adoption of the LTV policy in 1991, “authorized institutions” (AIs) in Hong Kong were allowed to grant mortgage loans covering up to a LTV ratio of 90% under the Third Schedule of the Banking Ordinance, the legal framework for banking supervision in Hong Kong. In view of the systemic risk that could arise from RML, the Commissioner of Banking had intended to amend the Third Schedule to lower the 90% LTV threshold to 70%. The Commissioner of Banking consulted the banks during 1991 on these intentions. Banks were cooperative, offering to adopt the 70% LTV policy voluntarily, removing the need to amend the Third Schedule. The 70% maximum LTV ratio has since been fully endorsed by the Hong Kong Government as a prudential measure and has evolved into a banking industry standard intended to guard against overexposure to the property market.

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1. AIs are “institutions authorized” under the Banking Ordinance to carry on the business of taking deposits. All AIs in Hong Kong are supervised by the HKMA.
2. The HKMA was established on April 1, 1993, by merging the Office of the Exchange Fund and the Office of the Commissioner of Banking. Its main functions and responsibilities are governed by the Exchange Fund Ordinance and the Banking Ordinance. Banking supervision is one of its functions.
3. On 2 November 1995, the Hong Kong Government confirmed at a Legislative Council meeting that the 70% LTV ratio should be adopted as a long-term regulatory policy.
4. For details, see HKMA (2009).
The effects of macroprudential policies on housing market risks: evidence from Hong Kong

Dong He

Charts 1
LTV policy, real property prices and mortgage delinquency ratio in Hong Kong

Maximum LTV ratio

\begin{figure}
\centering
\includegraphics[width=\textwidth]{chart1.png}
\caption{LTV policy, real property prices and mortgage delinquency ratio in Hong Kong}
\end{figure}

<table>
<thead>
<tr>
<th>Year</th>
<th>LTV Ratio</th>
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<tbody>
<tr>
<td>1991</td>
<td>70%</td>
</tr>
<tr>
<td>1992</td>
<td>70%</td>
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<tr>
<td>1993</td>
<td>70%</td>
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<td>2004</td>
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<td>2005</td>
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<td>2006</td>
<td>70%</td>
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<tr>
<td>2007</td>
<td>70%</td>
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<tr>
<td>2008</td>
<td>70%</td>
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<tr>
<td>2009</td>
<td>70%</td>
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<tr>
<td>2010</td>
<td>70%</td>
</tr>
<tr>
<td>2011</td>
<td>70%</td>
</tr>
<tr>
<td>2012</td>
<td>70%</td>
</tr>
<tr>
<td>2013</td>
<td>70%</td>
</tr>
</tbody>
</table>

Source: HKMA.

Note: LTV cap tightening for mortgage applicants whose principal income is not derived from Hong Kong and for applicants with multiple mortgages is not shown in the chart. For details, see Annex.

Real property prices and mortgage delinquency ratio

\begin{figure}
\centering
\includegraphics[width=\textwidth]{chart2.png}
\caption{Real property prices and mortgage delinquency ratio}
\end{figure}

Source: HKMA.

Note: LTV cap tightening for mortgage applicants whose principal income is not derived from Hong Kong and for applicants with multiple mortgages is not shown in the chart. For details, see Annex.
Phase 2: from 1997 to 1999

Against the backdrop of a sharp rise in residential property prices in 1996, signs of speculative activities and the rapid increase in RML, the HKMA issued guidelines to all AIs on 28 January 1997 recommending the adoption of a maximum LTV ratio of 60% for properties with a value of more than HKD 12 million – the so-called luxury properties. In the wake of the Asian financial crisis, Hong Kong's property prices fell significantly – by more than 40% from September 1997 to September 1998 – yet the mortgage delinquency ratio remained at 1.43%, which is low by international standards. This fact alone suggests that LTV policy reduces the credit risk faced by banks and assures the quality of banks' mortgage loan portfolios.

Phase 3: from 1999 to 2008

In line with measures intended to stabilise the property market implemented by the Government, the HKMA restored the maximum LTV ratio of 70% in October 2001. Meanwhile, the HKMA allowed AIs to refinance the mortgage loans of homeowners with negative equity for up to 100% of the current market value of the mortgaged property. Notwithstanding this relaxation, the HKMA emphasised that the 70% LTV policy remained as a long-term prudential measure. Because of a significant drop in household income after the Asian financial crisis, prospective homebuyers faced significant obstacles in the housing market, which led to calls for the relaxation of the 70% LTV policy. In 1999, the Hong Kong Mortgage Corporation (HKMC)5 launched a Mortgage Insurance Programme (MIP), under which mortgage loans of up to an LTV ratio of 90% were made available to homebuyers meeting certain eligibility criteria.6 The MIP is designed to protect participating banks against credit losses on the portion of loans that exceeds the 70% threshold in the event of defaults. It also avoids the potential drawback of LTV policy because some homebuyers may not qualify for a mortgage because of substantial down payment requirements even if they have sound financial conditions. The increase in the number of homebuyers participating in the MIP during this period demonstrates that the MIP has helped a significant number of households overcome liquidity constraints (Chart 2) and that concerns about liquidity constraints should not be lightly dismissed.

One concern is that the MIP may reduce the effectiveness of LTV policy because it enables households to increase their leverage ratios, thereby boosting the risk of mortgage defaults and hence of bank credit losses. In reality, however, the HKMC’s MIP portfolio registers a lower delinquency ratio than Hong Kong's banking sector,7 indicating that, thanks to prudent underwriting criteria, the MIP has not undermined the LTV policy but has actually improved the stability of Hong Kong’s banking system.

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5 The HKMC, which is owned by the Hong Kong Government, was established in 1997. Its primary missions are: (i) enhancing the stability of the banking sector by serving as a reliable source of liquidity, thereby reducing the concentration and liquidity risk of mortgage lending by banks; (ii) promoting under home ownership; and (iii) facilitating the growth and development of the debt securities and mortgage-backed securities markets in Hong Kong.

6 The criteria include maximum levels for the debt-to-income ratio, loan amounts and maturities.

7 The delinquency ratio of the HKMC’s MIP portfolio reached a historical high of 0.39% at the end of September 2003, whereas the ratio for the Hong Kong banking sector was 1.65%.

---

Chart 2
Annual drawn down loan amount and usage rate of the MIP in Hong Kong

<table>
<thead>
<tr>
<th>Year</th>
<th>Drawn down loan amount (HKD millions)</th>
<th>MIP usage rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>2,000</td>
<td>6</td>
</tr>
<tr>
<td>2000</td>
<td>4,000</td>
<td>12</td>
</tr>
<tr>
<td>2001</td>
<td>8,000</td>
<td>24</td>
</tr>
<tr>
<td>2002</td>
<td>12,000</td>
<td>36</td>
</tr>
<tr>
<td>2003</td>
<td>16,000</td>
<td>48</td>
</tr>
<tr>
<td>2004</td>
<td>20,000</td>
<td>60</td>
</tr>
<tr>
<td>2005</td>
<td>24,000</td>
<td>72</td>
</tr>
</tbody>
</table>

Source: HKMA.

Note: The MIP usage rate is defined as the ratio of the mortgage loan amount drawn down under the MIP to the total mortgage loan amount drawn down in the Hong Kong banking sector.
14 Phase 4: 2009 to the present

Strong capital inflows and unusually low interest rates since early 2009 have fuelled property prices in Hong Kong sharply. As a prudential measure, the HKMA issued guidelines in October 2009 requiring all AIs to reduce the maximum LTV ratio for properties with a value of HKD 20 million or more from 70% to 60%.

To further safeguard banking stability and help banks manage credit risk more prudentially, the HKMA tightened LTV limits with subsequent five rounds of prudential measures between August 2010 and February 2013. As a result, the current maximum LTV ratio is set to be 50% for residential properties with a value of HKD 10 million or more, 60% for those with a value between HKD 7 and 10 million, and 70% for those with a value below HKD 7 million. The maximum LTV ratio for non-owner-occupied residential properties and properties held by a company is 50% regardless of property values. For commercial and industrial properties,8 the maximum LTV ratio is 40%. For net-worth-based mortgages, the maximum LTV ratio is 40% for residential properties and 30% for commercial and industrial properties. Regardless of property types or values, the maximum LTV ratio is lowered by 10% points for mortgage applicants whose income is mainly derived from outside Hong Kong. If the mortgage loan applicants already have outstanding mortgages, a further 10-percentage-point deduction in maximum LTV ratio is applied to applicants whose income is mainly derived from outside Hong Kong and to net-worth-based mortgages.

2 Empirical evidence on the policy pass-through to leverage and credit growth

This section summarises recent empirical work by HKMA research staff attempting to advance our understanding of the transmission mechanism of LTV policy. Wong et al. (2013) quantify the policy impact on borrowers' leverage and credit growth (i.e. henceforth referred to as the direct and indirect effects respectively) and their respective contributions to financial stability, using data from Hong Kong from Q2 1999 to Q4 2012. The empirical analysis helps assess whether household leverage or credit growth would be the optimal target of LTV policy.

21 Significance of the direct effect

One salient feature of LTV policy is that authorities operate the tool by adjusting the maximum LTV ratio instead of the actual LTV ratio in the market (LTVM). Theoretically, however, LTVM is determined together with other mortgage terms both by banks and homebuyers (Kent, 1980; Zumpano et al., 1986). An important question, therefore, is to what extent the LTV cap, serving as a macroprudential instrument, would be factored in when banks and homebuyers determine LTVM.

To answer this question, a regression model of the determinants of LTVM is estimated. The model postulates that a higher LTV cap, a higher property price return (relative to its volatility) and rental yield, and a lower debt-service ratio tend to be associated with a higher LTVM, as banks and mortgagors tend to accept a higher LTV ratio when the property market is buoyant, debt servicing burden is low, and the LTV cap is less stringent.

The empirical result is broadly in line with the hypothesis. In particular, the LTV cap is found to be one binding factor affecting LTVM, with the long-run elasticity being estimated to be 0.33. To gauge the responsiveness of LTVM to the LTV cap, Chart 3 shows the cumulative contributions of the determinants to the change of LTVM since September 2007. The five rounds of LTV cap tightening from 2009 to 2012 are estimated to have reduced LTVM significantly. Chart 4 plots the actual LTVM against a hypothetical series of LTVM under a counterfactual “no policy” scenario,9 suggesting that had the HKMA not tightened LTV caps, LTVM may hover above 60% instead of 52% at the end of 2012, indicating a significant direct effect.

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8 Including standalone car park space.
9 Theoretically, the direct effect improves the resilience because mortgagors would hold a larger equity buffer at origination, contributing to a lower likelihood of negative equity and thus lower default risk. The indirect effect primarily avoids banks underwriting excessively fresh mortgage loans, which are generally subject to higher default risks due to a relative low portion of equity.
10 The LTVM under the counterfactual “no policy” scenario is estimated by removing all the policy impact of LTV cap tightening (i.e. the dark red area in Chart 3).

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Macroprudential policies: implementation and interactions
Banque de France • Financial Stability Review • No. 18 • April 2014
The effects of macroprudential policies on housing market risks: evidence from Hong Kong

Dong He

Chart 3
Contributions of main factors to change in the market LTV ratio

<table>
<thead>
<tr>
<th>(% points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt-service ratio (right-hand scale)</td>
</tr>
<tr>
<td>Property price return (right-hand scale)</td>
</tr>
<tr>
<td>Property yield (right-hand scale)</td>
</tr>
<tr>
<td>LTV cap (right-hand scale)</td>
</tr>
<tr>
<td>The market LTV ratio (left-hand scale)</td>
</tr>
</tbody>
</table>

Source: Wong et al. (2013)

Chart 4
The market LTV ratio under the actual and counterfactual “no policy” scenarios

Source: Wong et al. (2013)

2|2 Significance of the indirect effect

The significance of the indirect effect is studied by estimating the demand and supply equations for mortgage loans in Hong Kong with a framework that allows for, but does not impose, disequilibrium. This empirical specification reflects two considerations. First, theoretically LTV policy is likely to affect both demand for and supply of mortgage loans. Estimating a demand-supply system would therefore facilitate a clearer identification of the policy impact. Second, loan market disequilibrium could contribute to a state-dependent effect of LTV policy on credit growth (see Chart 5 for illustration).

Table 1 presents the specification of the demand and supply equations for mortgage loans. The estimation result reveals that disequilibrium could occur in the Hong Kong mortgage market, suggesting that the demand or supply can be the sole binding factor in determining the credit volume.

---

11 LTV cap tightening may reduce demand for mortgages, as homeowners may be forced out of the property market because of higher liquidity hurdles or lower returns on equity for property investment. LTV cap tightening may also reduce credit supply because it may lead banks to lend less than they otherwise would.
Table 1
The specification of the demand and supply regression equations for mortgage loans in Hong Kong

<table>
<thead>
<tr>
<th>Variable</th>
<th>Remark</th>
<th>Expected impact</th>
<th>Estimation result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demand equation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual change in the market LTV ratio (LTVM)</td>
<td>A lower LTVM implies a higher down payment requirement, which could force some marginal homebuyers out of the property market (Zumpano et al., 1986), implying a positive relationship between LTVM and the demand for mortgages.</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Returns on equity (ROE) for property investment: (1/(1\text{–}LTVM)\times \text{net property return}^3)</td>
<td>From a property investor’s perspective, a lower LTVM constrains investors’ ability to take higher leverage to enhance their ROE, contributing to lower demand for properties. So, ROE would have a positive impact on the demand for mortgages.</td>
<td>+ ***</td>
<td></td>
</tr>
<tr>
<td>An interactive term of a dummy variable for capturing the effect of the SSD and ROE</td>
<td>– **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A dummy variable for stricter DSR requirements in 2010</td>
<td>–</td>
<td></td>
<td></td>
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<tr>
<td>A dummy variable for DSR tightening in 2012</td>
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<td></td>
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<tr>
<td>Unemployment rate</td>
<td>– ***</td>
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<tr>
<td>A dummy variable for Chinese New Year</td>
<td>– ***</td>
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<tr>
<td><strong>Supply equation</strong></td>
<td></td>
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<tr>
<td>Annual change in LTVM</td>
<td>An increase in LTVM has a positive impact on loan supply. This specification asserts that the actual price of a mortgage loan is determined not only by the mortgage rate, but also by other contractual terms, such as LTVM ratio and maturity (Kent, 1980; Stiglitz and Weiss, 1981). So, banks can shift their supply of mortgage loans by adjusting these non-price mortgage terms.</td>
<td>+ ***</td>
<td></td>
</tr>
<tr>
<td>Risk-adjusted return of mortgage loans on capital</td>
<td>+ ***</td>
<td></td>
<td></td>
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<tr>
<td>Annual growth rate of residential property prices</td>
<td>+ ***</td>
<td></td>
<td></td>
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<tr>
<td>Available funds: Annual growth rate of Hong Kong dollar deposits</td>
<td>+ ***</td>
<td></td>
<td></td>
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<tr>
<td>A dummy variable for stricter DSR requirements in 2010</td>
<td>–</td>
<td></td>
<td></td>
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<tr>
<td>A dummy variable for DSR tightening in 2012</td>
<td>– **</td>
<td></td>
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</tr>
</tbody>
</table>


a) **, *** indicate statistically significant at the 1% and 5% levels respectively.
b) It can be shown that \(1/(1\text{–}LTVM)\) equals the ratio of the property value to equity (i.e. the amount of down payments) for property investment.
c) Defined as the ratio of annual property price growth plus property rental yield minus effective borrowing rate for best lending rate-based mortgages times LTVM.
d) Defined as the sum of profit tax rate times net mortgage return divided by an estimated amount of regulatory capital required per HKD, where net mortgage return is effective mortgage rate minus total cost of mortgages (i.e. the sum of funding cost, administrative cost and expected credit loss).

Chart 6
Estimated supply for mortgage loans under the actual and counterfactual “no policy” scenarios (% of outstanding loans)

Chart 7
Estimated demand for mortgage loans under the actual and counterfactual “no policy” scenarios (% of outstanding loans)
LTVM is found to be a significant determinant of both the demand for and supply of mortgage loans, with the policy impact on loan supply being estimated to be significantly larger than that on loan demand. Charts 6 and 7, which show the supply and demand estimates respectively under the actual and counterfactual “no policy” scenarios, find that the dampening effect of the five rounds of LTV cap tightening from 2009 to 2012 is much larger on the loan supply than on demand.

These estimation results together suggest that the effect of LTV policy on loan growth in Hong Kong is likely to be state-dependent such that LTV policy is more effective in limiting credit growth when there is excess credit demand but less so when excess credit supply occurs. Chart 8, which presents the estimated mortgage demand and supply, reveals that since the beginning of the tightening of macroprudential policy in October 2009, the number of months with estimated excess demand is more than that with estimated excess supply, suggesting that credit supply is a major factor in determining the volume of new mortgage loans. In other words, LTV policy was effectively transmitted to the market through its dampening impact on the supply of mortgage loan.

2|3 Contribution of the direct and indirect effects to financial stability

To quantify the contribution of the direct and indirect effects to strengthening the banking sector resilience to property price shocks, it is hypothesised that the average non-performing loan ratio of mortgage loans in Hong Kong is positively correlated with the proportion of mortgage loans in negative equity in banks’ mortgage portfolios. Other things being equal, a mortgage loan portfolio with a higher average LTV ratio at origination and a higher share of new loans to total loans tend to have a higher proportion of mortgage loans in negative equity and thus a higher default rate, should negative property price shocks occur. LTV policy could therefore reduce the mortgage default risk by dampening the average LTV ratio at origination (by the direct effect) and the share of new loans to total loans (by the indirect effect).

Based on the estimated empirical model, a hypothetical property price shock (assuming a 60% drop in property prices) is imposed and the shock’s impact on the non-performing loan ratio in the eight quarters starting from Q1 2013 under the actual and “no policy” scenarios is calculated. Chart 9 shows

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12 The model also includes the unemployment rate and the proportion of mortgage loans with a distressed level of DSR as explanatory variables. Similar empirical models, which hypothesise that negative equity and a high level of debt-servicing burden are two triggers for mortgage defaults, have been developed by Froot et al. (2000) and Elul et al. (2010).

13 Assuming the property price shock is associated with a 300-basis-point increase in the reference interest rate, a 20% decline in household income and the unemployment rate increasing to 5%.
that the non-performing loan ratio would increase from 0.03% in Q4 2012 to around 0.95% in Q4 2014 in the actual scenario compared to a much higher ratio of 2.32% under the counterfactual “no policy” scenario. These results suggest that the five rounds of the LTV cap tightening from 2009 to 2012 should have improved the banking sector resilience to property price shocks.

Our core interest, however, is the relative contributions of the direct and indirect effects to the 1.37 percentage point reduction in the non-performing loan ratio from the counterfactual “no policy” scenario to the actual scenario. A decomposition analysis using the Shapley approach\(^1^4\) shows that, of the estimated 1.37 percentage point reduction in the non-performing loan ratio, the direct and indirect effects account for 1.21 and 0.16 percentage points respectively. In other words, the effect of LTV policy on reducing the sensitivity of mortgage default risk to property price shocks is mainly through its impact on leverage.

### Empirical Evidence on the Policy Pass-Through to Housing Market Activities

This section summarises assessment by HKMA research on whether LTV policy is an appropriate tool for stabilising property market activities. Theoretically, the policy impact on housing market activities can be revealed indirectly from the estimated impact of LTV ratios on credit demand so long as the demand for mortgage loans is derived from the demand for properties. If so, the low estimated sensitivity of credit demand to LTV ratios as presented in the previous section may be taken as suggestive evidence of weak direct policy pass-through to housing market activities. The following exercise provides additional evidence that points to a similar conclusion.

Chan and Yuen (2014) construct a vector auto-regression (VAR) model to evaluate the short-run impact of macroprudential measures and the Government’s tax measures on housing prices, transaction volume and outstanding mortgage loans in Hong Kong, after controlling for the impact of other economic and financial factors. The specification of the VAR is as follows:

\[
X_t = A_0 + A_1 X_{t-1} + BP_{t-1} + CZ_{t-1} + \epsilon_t
\]

where \(X\) is a vector of endogenous variables (housing prices, transaction volume and outstanding residential mortgage loans), \(P\) is a vector of policy variables, and \(Z\) represents other controlling economic and financial factors, which include the Hang Seng Index (HSI), the HSI Volatility Index, the unemployment rate and the average mortgage interest rate.\(^1^5\) The sample used for the analysis covers the period between January 2009 and November 2013.

There are two policy variables in the model, representing the prudential measures and stamp-duty measures (i.e. SSD, BSD and DSD) respectively. They are constructed as step-function variables, equal to 0 when no measures are in place and increasing by 1 for each new count of tightening and staying there until the policy is changed. Since prudential measures and stamp-duty measures may encompass more than one set of policy instruments, there can be several counts in each round of tightening.\(^1^6\) This setup helps deal with the problem of over-fitting and multicollinearity if all disaggregate policy measures and each round of tightening are put in a model as separate dummy variables. Following this setup, the coefficient for each policy variable provides the marginal effect of each count of tightening. The total impact of each round of prudential measures can then be derived following the feed-through between housing prices, transaction volume and residential mortgage loans in the model.

The estimated results show that, after controlling for the impact of other economic and financial factors, macroprudential measures helped dampen mortgage loan growth and transaction volume but do not appear to have had a direct impact on housing prices as the estimated coefficient is not statistically

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\(^1^4\) For details of the Shapley approach, see Israeli (2007).

\(^1^5\) Similar studies include the International Monetary Fund (2013), which regresses property prices and mortgage loans in two single equations.

\(^1^6\) The step-function approach is adopted in the International Monetary Fund (2013) and Kuttner and Shim (2013) in modeling the intensity of prudential measures.
The effects of macroprudential policies on housing market risks: evidence from Hong Kong

Dong He

Charts 10
Impact of macroprudential measures and stamp duties

On monthly change in housing prices

\( \% \) points

\begin{table}
\begin{tabular}{ccccccc}
\hline
Round & 1st & 2nd & 3rd & 4th & 5th & 6th & 1st & 2nd & 3rd \\
\hline
Prudential measures & -0.4 & -0.2 & -0.3 & -0.1 & 0.0 & 0.2 & -1.0 & -0.8 & -0.6 \\
Stamp duties & -1.0 & -0.8 & -0.6 & -0.4 & -0.2 & 0.0 & 0.2 & 0.4 & 0.6 \\
\hline
\end{tabular}
\end{table}

On transaction volume

\( \% \) change

\begin{table}
\begin{tabular}{ccccccccccc}
\hline
Round & 1st & 2nd & 3rd & 4th & 5th & 6th & 1st & 2nd & 3rd \\
\hline
Prudential measures & -3 & -17 & -17 & -7 & -7 & -18 & -18 & -35 & -18 \\
Stamp duties & -40 & -20 & -20 & -10 & 0 & -7 & -7 & -17 & -17 \\
\hline
\end{tabular}
\end{table}

On monthly change in mortgage loans

\( \% \) points

\begin{table}
\begin{tabular}{ccccccccccc}
\hline
Round & 1st & 2nd & 3rd & 4th & 5th & 6th & 1st & 2nd & 3rd \\
\hline
Prudential measures & -0.4 & -0.2 & -0.3 & -0.1 & 0.0 & 0.2 & -1.0 & -0.8 & -0.6 \\
Stamp duties & -1.0 & -0.8 & -0.6 & -0.4 & -0.2 & 0.0 & 0.2 & 0.4 & 0.6 \\
\hline
\end{tabular}
\end{table}

Source: Chan and Yuen (2014).

Note: Statistical insignificant if the bars are in broken-line borders.

significant. The findings also show that stamp-duty measures have dampened transaction volume and growth in housing prices, but their direct impact on mortgage loan growth was not statistically significant. The latter result may be partly attributable to the fact that those buyers who are subject to stamp-duty measures (particularly BSD and DSD) may be less reliant on credit from Hong Kong to finance their home purchases. Nevertheless, there is a significant indirect effect of stamp-duty measures on loan growth through its dampening impact on housing prices because housing prices are estimated to have a significant positive impact on loan growth. The significant indirect effect on loan growth is consistent with the notable contraction in property transactions, after the introduction of SSD in October 2010, BSD in October 2012 and DSD in February 2013, from 135,800 units in 2010 down to 81,300 units in 2012 and 50,700 units in 2013.

Based on the estimated coefficients of the policy variables, the total impact of each round of prudential measures and stamp-duty measures can also be calculated. In Charts 10, the vertical bars show the total impact on the monthly change in housing prices and outstanding mortgage loans as well as the level of transaction volume. The second, the third and the fourth rounds of macroprudential measures, which impose stringent LTV requirements, and DSR caps and stress tests, are found to be relatively more effective in limiting mortgage loan growth than other prudential rounds. They are found to have reduced mortgage loan growth by a monthly pace of 0.2 percent on average, compared with that of 0.1 percent for other rounds. These three rounds of prudential measures are also found to have a larger dampening effect on transaction volume (by an average 16 percent) than other rounds (by 6 percent). In contrast, the Government's stamp-duty measures are found to be more powerful in reining in housing price increase and reducing transactions. In particular, the latest two rounds of stamp-duty measures (mainly BSD and DSD) were found to have dampened housing price increase by a monthly pace of 0.9 percent and 0.5 percent respectively. They were found to have lowered transaction volume by 35 percent and 18 percent respectively.
\section*{Conclusion}

This paper has reviewed available evidence regarding the effectiveness of LTV policy as a macroprudential tool in Hong Kong. The empirical findings regarding the transmission mechanism of LTV policy shed light on one important policy question: should LTV policy be assigned to target household leverage, credit growth or housing market activities? There is strong evidence that tightening LTV caps would reduce household leverage, and that the effect on leverage plays the major role in reducing mortgage default risk. By contrast, there is no clear evidence that tightening LTV caps dampens property market prices. The effect on loan growth is likely to be state-dependent, being more effective when there is excess credit demand but less so when there is excess credit supply.

In comparison, higher transaction taxes in the form of additional stamp duties levied by the Government appear to be effective in constraining housing demand and restraining housing price growth. Nevertheless, further research is required to have a better grasp of the welfare costs as a result of the distortions caused by extraordinary macroprudential and tax policy measures. Of course, such costs need to be weighed against benefits of greater financial stability achieved through these extraordinary measures.
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ANNEX

Evolution of macroprudential measures and stamp duty measures in Hong Kong since early 1990s

<table>
<thead>
<tr>
<th>Year</th>
<th>Major Developments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1991</td>
<td>“Residential mortgage” is defined in the Third Schedule of the Banking Ordinance as a mortgage where, among other things, “the principal sum does not exceed 90% of the purchase price or the market value of the property, whichever amount is the lower”.</td>
</tr>
<tr>
<td>1991</td>
<td>The banking industry adopted the maximum loan-to-value (LTV) ratio of 70% in November 1991 and the Commissioner of Banking fully endorsed this practice as a prudent measure for banks against over-exposure to the property market.</td>
</tr>
<tr>
<td>1994</td>
<td>The HKMA introduced a 40% guideline for bank exposure to property lending at the beginning of 1994 when property lending was rising rapidly. It advised that authorised institutions (AIs) whose property exposure as a percentage of loans for use in Hong Kong was above the average for the industry as a whole (about 40%) should seek to stabilise or reduce that percentage.</td>
</tr>
<tr>
<td>1995</td>
<td>The Government confirmed at a Legislative Council meeting that a maximum LTV ratio of 70% should be adopted as a long term regulatory policy.</td>
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<tr>
<td>January 1997</td>
<td>The HKMA recommended that a maximum LTV of 60% should be adopted for “luxury” property with a value of more than HKD 12 million. All AIs are required to have a clearly defined and documented policy to assess the repayment capability of residential mortgage borrowers. This should include the use of a debt servicing ratio (DSR) test. The DSR is defined as the monthly repayment obligations of the borrower as a percentage of monthly income. The ratio should be no higher than 50 − 60% of income, though the upper end of this range should be confined to higher income earners.</td>
</tr>
<tr>
<td>1998</td>
<td>The “40% guideline” on property exposure of authorised institutions has been withdrawn.</td>
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<tr>
<td>October 2001</td>
<td>While the 70% LTV guideline remains generally appropriate as a long term prudential measure, and continues to apply to new RMLs, the HKMA does not object if AIs judge it commercially desirable to depart from the 70% LTV guideline in case of refinancing RMLs in negative equity. However, such loans should not exceed 100% of the current market value of the mortgaged property. The 60% LTV guideline for the purchase of “luxury” property (with a value of more than HKD 12 million) has been withdrawn. The maximum LTV ratio for such loans is restored to 70%.</td>
</tr>
<tr>
<td>October 2009</td>
<td>The LTV ratio is capped at 60% for residential properties valued at HKD 20 million or more. For residential properties valued below HKD 20 million, the 70% LTV cap continues to apply, but the maximum loan amount is capped at HKD 12 million.</td>
</tr>
<tr>
<td>August 2010</td>
<td>The LTV ratio is capped at 60% for residential properties with a value of HKD 12 million or more, and for non-owner occupied residential properties. For residential properties valued below HKD 12 million, the 70% LTV ratio continues to apply, but the maximum loan amount is capped at HKD 7.2 million. Banks are required to stress-test mortgage applicants’ repayment ability with an increase in mortgage rates of at least two percentage points, and limit the stressed DSR to 60%.</td>
</tr>
<tr>
<td>November 2010</td>
<td>The LTV cap is lowered: – to 50% from 60% for residential properties with a value of HKD 12 million or more; and – to 60% from 70% for residential properties with a value between HKD 8 and 12 million, and the maximum loan amount is capped at HKD 6 million. The LTV cap of 70% continues to apply to residential properties with a value below HKD 8 million, but the maximum loan amount is capped at HKD 4.8 million. The LTV cap is lowered to 50% for all non-owner-occupied residential properties, properties held by a company and industrial and commercial properties regardless of property values. A special stamp duty of 15% is imposed on residential properties resold within 6 months of purchase, 10% on residential properties resold between 6 months and 12 months, and 5% on residential properties resold between 12 months and 24 months.</td>
</tr>
<tr>
<td>June 2011</td>
<td>The LTV cap of 50% is applied to all residential properties with a value of HKD 10 million or more. The LTV cap is lowered: – to 60% for residential properties with a value between HKD 7 and 10 million, with the maximum loan amount capped at HKD 5 million; and – to 40% from 50% for properties under the net worth-based mortgage. The LTV cap of 70% continues to apply to residential properties with a value below HKD 7 million, but the maximum loan amount is capped at HKD 4.2 million. The applicable LTV cap is lowered by at least 10 percentage points regardless of property types or values if the principal income of the mortgage loan applicant is not derived from Hong Kong.</td>
</tr>
</tbody>
</table>
Evolution of macroprudential measures and stamp duty measures in Hong Kong since early 1990s (cont’d)

<table>
<thead>
<tr>
<th>Year</th>
<th>Major Developments</th>
</tr>
</thead>
</table>
| September 2012 | • For those mortgage applicants who have already borrowed or guaranteed outstanding property mortgage loans for one or more properties at the time of loan application,  
|            | - the maximum LTV ratio is lowered to 30% from 40% for mortgage loans assessed based on the net worth of a mortgage applicant;  
|            | - the applicable cap on the LTV ratio is lowered by 20 percentage points regardless of property types or values for mortgage applicants whose principal income is from outside Hong Kong;  
|            | - the DSR cap is lowered to 40% from 50% for applicants who already have an outstanding mortgage on residential, industrial or commercial properties; and  
|            | - accordingly, the maximum stressed DSR is lowered to 50% from 60%;  
|            | • The maximum loan tenor of all new property mortgage loans is limited to 30 years. |
| October 2012 | • The special stamp duty is raised to 20% for residential properties resold within 6 months of purchase, 15% for residential properties resold between 6 months and 12 months and 10% for residential properties resold between 12 months and 36 months,  
|            | • A buyer’s stamp duty of 15% is introduced for buyers of residential properties (except waiving Hong Kong SAR permanent residents). |
| February 2013 | • The LTV ratio is lowered by 10 percentage points for all commercial and industrial properties from the existing applicable levels.  
|            | • The LTV ratio of mortgage loans for standalone car park spaces is set at 40% and the maximum loan tenor at 15 years.  
|            | • The LTV applicable to commercial and industrial property mortgage loans is also applied to standalone car park space mortgage loans.  
|            | • In calculating the stressed DSR, banks are required to assume a mortgage rate increase of 300 basis points for all types of properties, including residential, commercial and industrial properties.  
|            | • The DSR and stressed DSR applicable to commercial and industrial property mortgage loans is also applied to standalone car park space mortgage loans.  
|            | • A risk weight floor of 15% is introduced on all new residential mortgages secured on Hong Kong properties, granted by banks using the internal ratings-based approach.  
|            | • The existing ad valorem stamp duty rates on both residential and non-residential properties are doubled across the board to a maximum of 8.5% (except waiving Hong Kong SAR permanent residents who do not own any other residential property in Hong Kong at the time of acquisition). |

Source: HKMA
The Bank of Korea is strengthening its ability to identify risk factors at an early stage by monitoring the basis of macroprudential conditions. Through its Financial Stability Report, a semi-annual statutory report, the Bank assesses macroprudential conditions, delivers early warnings, and presents policy alternatives. In addition, the Bank identifies the impacts of various types of macroeconomic shocks on the financial system through its recently-developed Systemic risk assessment model for macroprudential policy (SAMP). SAMP is utilised not only for systemic risk monitoring, but also for macro stress tests and the assessment of macroprudential policy effectiveness.

The macroprudential policy instruments used in Korea are loan-to-value (LTV) and debt-to-income (DTI) regulations, foreign exchange (FX)-related measures, and regulation of the loan-to-deposit ratio. So far these instruments are assessed as having effectively mitigated the build-up of systemic risk. First, the LTV-DTI regulations have contributed to curbing the high procyclicality of mortgage lending. Second, the FX-related measures have helped to reduce the volatility of capital in- and outflows in Korea, whose level of capital liberalisation is high. Third, the loan-to-deposit ratio regulation has eased the procyclicality of lending and the interconnectedness among financial institutions created through their expansions of credit supply via wholesale funding. At the same time, of course, these tools have also given rise to some unintended consequences.

Strengthening of the framework for monitoring macroprudential conditions, and the development of policy instruments, are areas where continuous policy efforts will be needed in the future as well. In particular, Korea plans a discussion of institutional arrangements for cooperation among the authorities responsible for financial stability.

NB: Dr. Jeong Eui Suh, Dr. Hoon Kim, Dr. Seung Hwan Lee and Mr. Ho Soon Shin, Heads of the Macroprudential Analysis Department, the Bank of Korea, co-authored this paper, a revised and updated version of Kim (2013), with Governor Kim.
1 | THE BANK OF KOREA’S VIEW ON THE MACROPRUDENTIAL POLICY FRAMEWORK

Since the global financial crisis, financial stability has become one of the major issues in the area of macroeconomic policy, along with price stability. The recent financial crisis has taught the valuable lesson that microprudential supervision alone cannot ensure the stability of the entire financial system. Based on this understanding, macroprudential policy has emerged as a new policy pillar for maintaining financial stability. Substantial theoretical achievements have been made in this area so far, led by the efforts of academia, international organisations, and central banks. In addition, macroprudential policy frameworks of individual countries have been gradually appearing.

Given all of the contributions to this area made so far, in order for macroprudential policy to be established as a core pillar in macroeconomic policy, like the traditional monetary and fiscal policies, I believe that the policy framework needs to be structured in consideration of three aspects.

First, a governance structure including the policy determining body and the implementing agencies should be clearly established. Second, a system for the monitoring of macroprudential conditions in a comprehensive manner should be developed, in order for policy authorities to judge the policy direction accurately and apply the policy tools efficiently. Third, policy tools necessary to control the build-up of systemic risks preemptively should be properly designed and put into use. This paper introduces various cases related to macroprudential policy in Korea, and their implications in terms of the oversight of macroprudential conditions and the development and application of policy tools. With regard to macroprudential policy tools in particular, unintended side effects occurring in the courses of their application are also taken into consideration.

The Bank of Korea (BOK) views the macroprudential policy framework as illustrated in Chart 1. First of all, to carry out macroprudential policy properly an accurate understanding of macroprudential conditions is pre-requisite. The macroprudential conditions can be measured by examining vulnerabilities, reflecting the extent of risks built up in the financial system, as well as resilience, representing the capacity to absorb shocks when they occur.1 Vulnerabilities

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1 Discussing the causes of the recent financial crisis, Bernanke (2010) distinguishes between triggers, which touch off crises, and vulnerabilities, which propagate and amplify the initial shocks. Bernanke (2013) also mentions that, although the monitoring of the financial system should attempt to identify potential triggers such as asset bubbles, given that the occurrence of shocks is inevitable it is necessary to concentrate our monitoring efforts on identifying and addressing vulnerabilities.
of the financial system in Korea can be assessed mainly in the areas of the credit and asset markets, banks, shadow banking, and capital in- and outflows. Resilience of the financial system, in a broader sense, can be understood not only as the capacity of financial institutions for enduring shocks, but also as the nation's fiscal soundness and the level of its foreign exchange reserves. Based on the assessment of macroprudential conditions, macroprudential policy tools are introduced and applied to control risks in the financial system. In addition, policy actions aimed at strengthening the resilience of the financial system also reinforce the macroprudential conditions and contribute to achieving financial stability.

2| Korea’s experiences

2|1 Monitoring macroprudential conditions

Under the revised Bank of Korea Act of December 2011, financial stability was newly added to the mandates of the Bank of Korea. This change seems to have a significant meaning in that it has confirmed macroprudential policy as a new policy area in addition to the BOK’s traditional monetary policy, through legislation of the National Assembly. Since the revision of the Act, the Bank has established the Macroprudential Analysis Department and concentrated efforts on devising a framework for the monitoring of macroprudential conditions, which will serve as a basis for policy implementation. For example, through the Financial Stability Report (FSR), which is to be submitted to the National Assembly under the revised Act, the Bank has endeavored to monitor macroprudential conditions in a comprehensive and systematic manner. In particular, it has worked to strengthen the FSR’s functions of providing early warning and suggesting policy alternatives. Moreover, the Bank has also newly developed and used Systemic risk assessment model for macroprudential policy (SAMP), a standardised quantitative analysis model that can monitor and evaluate the resilience of the financial system in cases of external shocks.

Financial Stability Report

Since 2003 the BOK has published the FSR twice a year. Bolstered by its elevation to a statutory report from 2012 and its submission to the National Assembly, the FSR has now become a strong and effective communication tool for organisations related to financial stability including the government and the supervisory bodies, as well as other financial market participants. There are three things that the Bank seeks to achieve through the FSR. First, it analyses and evaluates the potential risk factors in the financial system. Second, it provides early warnings of risk to the policy authorities and market participants. Third, through it the Bank endeavors to curb the accumulation of systemic risk in advance by suggesting policy alternatives as necessary. In this respect, the FSR also serves as an important macroprudential policy tool that the Bank can use.

The BOK has made continuing efforts to enhance the quality of the FSR. First, in reflection of the heavy dependence of the Korean economy on the overseas sector and its high degree of capital market openness, the Bank has heightened the analysis of global financial and economic conditions that have great impacts on the domestic financial system. Second, as Korean households and small- and medium-sized enterprises (SMEs) have become vulnerable since the financial crisis, the Bank has also endeavored to identify those related risks in a forward-looking way and to suggest policy alternatives. From 2013, in particular, a “Financial Stability Issue Analysis” section was created to analyse in depth various structural problems and potential risks that could undermine financial stability over a medium- to longer-term horizon. The Bank also regularly surveys expert groups from the financial and the real sectors, to enhance the identification of systemic risk factors prior to writing the report.

The BOK in addition arranges a feedback process, through which the FSR is evaluated by domestic and overseas experts and policy authorities, and their comments contribute to the future development of the report.

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2 There are only a few countries, including Korea, the Czech Republic and New Zealand, whose central banks are required to submit financial stability reports to their national assemblies.
Systemic risk assessment model for macroprudential policy – SAMP

Assessing the resilience of the financial system is a key element of monitoring macroprudential conditions. In this regard, the BOK has developed and used SAMP as a tool for the continuous monitoring of financial system resilience against external shocks.3

SAMP is an integrated systemic risk model with a framework comprising six modules. These modules estimate macro-risk factors, banks’ profits and losses, and default and liquidity contagion losses arising from banks’ interconnectedness over multiple periods. These results of SAMP estimation are employed to derive systemic risk indicators (Chart 2). SAMP measures not only the first round effects of macroeconomic shocks on the financial system, but also the second round effects amplified and propagated by interbank contagion, fire sales, credit crunches, and deleveraging.

Risk assessments were in the past limited to individual financial institutions. As SAMP has been developed, however, the BOK can now comprehensively assess the risks to the financial system as a whole. In this respect, SAMP has enabled macroprudential policy to operate at an upgraded level. First, the Bank uses SAMP to monitor the risk factors threatening financial system stability. Second, it examines the resilience of the financial system by conducting macro stress tests applying the model.4 Third, through policy simulations using SAMP, the Bank analyses the effects of policies such as the Basel III regulations, liquidity provision, and recapitalisation. Fourth, it also evaluates domestic systemically important banks (D-SIBs) by measuring the individual banks’ contributions to systemic risk. Furthermore, SAMP is

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3 Since SAMP’s initial development, it has been improved by reflecting comments from seminars at the Bank of England (December 2012), the Federal Reserve Bank of New York (January 2013), the International Monetary Fund (February 2013), the Bank for International Settlements (March 2013) and the European Systemic Risk Board (November 2013).

4 During the 2013 Financial Sector Assessment Program for Korea, the IMF and the World Bank conducted a macro stress test, a core tool for quantitative assessment, by using SAMP.
widely used in various other analyses, such as of bank performance and of financial interconnectedness.

Recently, to improve the accuracy and usage of SAMP, the BOK has added another assessment module related to foreign currency liquidity risk to the model. The Bank will continuously work to improve SAMP, including through the development of a macrofinancial linkage module. The scope of financial institutions subject to SAMP analysis will also be expanded to the non-bank sector.

2|2 Macroprudential policy measures

Macroprudential policy tools should be designed and applied in a flexible and timely manner, in line with the circumstances of individual countries, the types of systemic risk, and the extents of its accumulation. The sources of risk in the Korean economy can be viewed and examined as those before and those since the global financial crisis. Before the crisis the procyclicality of household and corporate lending predominated and drew big attention. Since the crisis the volatility of capital in- and outflows has increased greatly due to the implementations of zero interest rate and quantitative easing (QE) policies by central banks in advanced economies. To cope with these conditions, Korea has developed and applied macroprudential policy tools such as the loan-to-value (LTV) and debt-to-income (DTI) regulations, the loan-to-deposit ratio regulation, and the foreign exchange (FX)-related measures.

Macroprudential policy tools can be classified into two types: quantity- and price-based tools. The LTV-DTI and the loan-to-deposit ratio regulation, for example, are quantity-based policy tools, which directly regulate the amount of credit supply or banks’ individual balance sheet items. The macroprudential stability levy (MSL) on the other hand is a price-based tool, which affects the operating margins and funding costs of financial institutions. Policy tools based on quantity are known to be highly effective, while those based on price are deemed to have advantages in respecting the market function to a considerable extent. However, they both sometimes decrease economic efficiency by constraining the behaviours of economic agents, while these tools are good for securing financial stability. It should be noted that unintended consequences could occur in the process of their implementation.

Here I would like to discuss the background of the macroprudential policy tools introduced in Korea, their details, their mechanisms for controlling systemic risk, and their usefulness.

LTV and DTI regulations

The asset portfolios of Korean households have traditionally centered around real estate.\(^5\) Entering the 2000s, mortgage loans increased sharply as house prices skyrocketed in line with abundant market liquidity and increased demand for housing. The growth in mortgage loans also seems to have been considerably attributable to the changing direction of banks’ lending to focus more on households than companies, as loans for corporations were impaired after the 1997 foreign currency crisis. The supervisory authorities introduced the LTV regulation in September 2002, placing limits on the ratio of mortgage loans to the related housing value as collateral. The LTV ratio caps were differentiated depending upon the loan maturity, the housing price, and the location. Generally, the longer the maturity, the higher the housing price, and the more speculative the location, the lower the LTV ratio cap applied.

The LTV regulation has limitations in curbing procyclical behaviour, however, as increases in housing prices could raise loan amounts by pushing up the values of mortgage collateral. Accordingly, the DTI regulation was also introduced in August 2005, as a complement to the LTV regulation. The DTI regulation puts a limit on the ratio of the amount of annual debt payment to the debtor's annual income. The DTI ratio caps have also been differentiated, in accordance with borrower characteristics such as marital status, housing price, and the location of the property. The methods of differentiation based on the housing price and location are the same as those of the LTV ratio caps, while lower ratios have been applied to unmarried borrowers.

The LTV and DTI regulations have been managed in a flexible manner, tightened or relaxed depending

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5 The proportion of real estate in Korean households’ asset portfolio was 67.8% in March 2013 (Statistics Korea). If we compare the proportions of non-financial assets including real estate in total assets by country, they turn out to be 72.3% in Korea, 31.5% in the United States (September 2013), 50.1% in the United Kingdom (December 2011) and 53.3% in the euro zone (September 2012).
upon developments in terms of housing prices or mortgage lending. The LTV ratio has been adjusted a total of nine times, within the 40% to 70% range, while the DTI ratio has been similarly adjusted a total of eight times between 40% and 75% (Charts 3).

A counterfactual analysis of the effectiveness of the LTV and DTI regulations shows that they have contributed considerably to curbing the increases in mortgage loans and housing prices during expansionary phases. Simulation based on panel data from the first quarter of 2003 to the second quarter of 2012 shows that, if there had been no regulations in place throughout the sample period, housing prices and the outstanding amount of mortgage loans would have been 75% and 137% higher respectively than their actual levels at the end of the second quarter of 2012.6

Despite these positive contributions of the LTV and DTI regulations, however, there have also emerged some unintended side effects. First, as these regulations were applied only to the banking sector in their initial stages, balloon effects were incurred, leading to increases in mortgage lending through non-bank financial institutions. There were also some attempts by banks to circumvent the regulations through increasing their commercial mortgage or other household loans,7 which were not subject to the LTV and DTI regulations. Although the DTI regulation has an advantage in extending mortgage loan maturities,8 maturity mismatches between banks’ funding and lending have grown, causing liquidity risk to increase. For example, while the maturity of banks’ funding has not changed greatly, the average maturity of mortgage loans has risen from 6.5 years9 at the end of 2005, right after introduction of the DTI regulation, to 11.2 years as of end-September 2013. The policy authorities should also bear in mind that procyclical behaviour of economic agents could be reinforced without flexible operation of the LTV and DTI regulations during the transitional period of the business cycle.

Foreign exchange-related measures
Korea has high degrees of overseas dependency and capital market openness, while its won is a less internationalised non-reserve currency. Under these circumstances, excessive capital in- and outflows amplified the effects of the 1997 foreign

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6 See Kim (2013).
7 The gap between the rates of increase in commercial mortgage and in home mortgage loans widened from 1.3pp in 2010 to 4.0pp in the January to May 2012 period due to the tightening of regulations on home mortgage loans in 2011 (Byun and Shin 2012). Moreover, empirical finding shows that tightening of the LTV regulations boosts the rate of increase in non-mortgage household loans, although it decreases that in home mortgage loans (Jung, Kim, and Park 2014).
8 DTI = (mortgage loan principal/maturity + interest)/debtor’s annual income; the DTI ratio measures the debtor’s ability to repay his/her debt, and is calculated as the ratio of the amount of annual debt payment to his/her annual income.
9 The average mortgage maturity is estimated by the staff members of the Bank of Korea based upon domestic banks’ business reports.
currency crisis and the 2008 global financial crisis. Given the ample global liquidity resulting from the unconventional monetary policies implemented by advanced economy central banks in the wake of the global financial crisis, the pressure for capital inflows to emerging economies including Korea has risen. In this situation, greater vigilance has been required to cope with the possible spread of systemic risk caused by subsequent dramatic capital outflows.

Korea’s FX-related measures are designed to address risk factors that can be generated on both the demand and supply sides (Chart 4). Leverage caps on banks’ FX derivatives positions were first introduced in October 2010, aimed at curbing increases in banks’ short-term external debt and the resulting currency and maturity mismatches occurring in the process of excessive FX forward sales by companies. The leverage caps were initially set at 250% of capital for foreign bank branches and 50% for domestic banks, and were tightened later to 200% and 40% respectively in July 2011, and further to 150% and 30% in January 2013.

In August 2011 the MSL was introduced, to curb the excessive increase in banks’ non-core liabilities that can cause systemic risk in terms of procyclicality and financial institutions’ interconnectedness. The levy has been imposed on the outstanding amounts of non-deposit foreign currency liabilities, with the levy rates varying from 2 to 20 basis points depending upon the maturity of the liabilities.10 Lower levies are applied to liabilities of longer maturity, in order to improve the maturity structure of banks’ foreign currency liabilities.

Turning to the policy effects of these FX-related measures, we can see that they have contributed to alleviating FX market vulnerability by reducing banks’ foreign borrowings and improving their maturity structures.11 Counterfactual analysis estimates that, during the first years of their implementations, the leverage caps and the MSL reduced banks’ short-term foreign borrowings by about 0.5%-0.6% and 0.2%-0.3% of annual GDP, respectively.12 The leverage caps have contributed to reductions in currency and maturity mismatches by curbing FX derivatives-related leverage, while the MSL has done so by reducing the arbitrage margin and pushing up FX funding costs.

**Loan-to-deposit ratio regulation**

The loan-to-deposit ratio scheme was introduced in December 2009,13 to improve domestic banks’ liquidity conditions and suppress their competition to expand their asset sizes through reliance on wholesale funding. This regulation can also be regarded to have had the effects of reducing the procyclicality of bank lending behavior and the interconnectedness among financial institutions.14

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10 The levy rates are 20 basis points for maturities of less than one year, 10 basis points for maturities between 1 and 3 years, 5 basis points for maturities between 3 and 5 years, and 2 basis points for maturities of over five years.
11 After the implementation of the FX-related measures, the average FX forward position of foreign bank branches declined from 262% of equity capital in May 2010 to 87% in January 2013, while the share of short-term in total foreign borrowings by banks (including foreign bank branches) dropped from 64% as of end-June 2010 to 47% at end-December 2012.
12 See Kim (2013).
13 The supervisory authorities initially guided banks to comply with the loan-to-deposit ratio requirement by 2013, but on June 2011 they moved the date for compliance up to end-June 2012.
14 The Committee on the Global Financial System – CGFS (2012) assessed that the loan-to-deposit ratio is basically a measure for managing banks’ liquidity conditions but it is also used as a measure for controlling the increases in loans during periods of economic expansion.
The loan-to-deposit regulation limits the rates of banks’ won-denominated loans to won-denominated deposits (excluding certificate of deposits – CDs) to within 100%. Since the announcement of this regulation domestic banks’ average loan-to-deposit ratio has fallen continuously, starting to hover below 100% from October 2011 and recording 96.9% as of end-June 2013 (Chart 5).

Since the introduction of the loan-to-deposit regulation banks’ wholesale funding (CDs + repurchase agreements (RPs) + bank debentures, etc.) has declined dramatically,\textsuperscript{15} while their deposits have increased. This means that the regulation has reduced the interconnectedness among financial institutions,\textsuperscript{16} given that banks’ wholesale funding comprises liabilities mainly from other financial institutions.\textsuperscript{17} A reduction in the share of wholesale funding, whose run-off rate is higher than those rates of deposits, can be expected to slow the spread of crisis during times of financial instability.

Next, bank lending is a typical area where procyclical activities occur. During an economic boom, in particular, when loan demand is high, banks’ capacities for raising funds to meet this demand are a key factor determining the procyclicality of their lending. In fact, for several years prior to the financial crisis domestic banks in Korea were able to meet the soaring demand for loans through wholesale funding. In this regard, the loan-to-deposit regulation is assessed as effective in restraining the procyclicality of bank lending by reducing banks’ reliance on wholesale funding.\textsuperscript{18}

The loan-to-deposit regulation has, as we have seen, contributed to addressing the build-up of systemic risk, but unintended consequences can also be created in the process. Among other things, the loan-to-deposit regulation could weaken banks’ functions of financial intermediation, since it directly constrains the amounts of loans and deposits. Further consideration will be needed in regard to the issue of overlap with the liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) regulations, which also limit loans and deposits on banks’ balance sheets.

3) Ways forward

The Bank of Korea will make every effort going forward to develop its macroprudential policies into sophisticated macroeconomic policies comparable to monetary and fiscal policies.

First of all, the analysis of systemic risk accumulation due to macrofinancial linkages will be strengthened. There have been many discussions in this area so far, but additional research and analysis are required. Research needs to be intensified regarding macro stress test models when the impacts of macrofinancial feedback effects and the factors of capital in- and outflows, especially in Korea, are added to the models. So far, discussions about the effects of the real economy on the financial sector have concentrated only on borrower default and delinquency. In the future, there must be sufficient studies undertaken of how changes in borrower balance sheet positions can affect lending conditions, credit access, and the real

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{chart5.png}
\caption{Loan-to-deposit ratio (\%)}
\end{figure}

Source: Bank of Korea.

\textsuperscript{15} The share of wholesale funding of domestic banks declined from 21.0% at end-November 2009 to 8.5% at end-June 2013, while the share of deposits in the liabilities of domestic banks surged from 55.9% to 70.6% during the same period.

\textsuperscript{16} Analysis using the CoVaR method developed by Adrian and Brunnermeier (2009) has also found that a bank with a higher share of wholesale funding contributes more to the risks of financial institutions as a whole, which implies that the loan-to-deposit ratio has lowered the interconnectedness among financial institutions through a reduction in wholesale funding (Jun, Lee, and Park 2012).

\textsuperscript{17} As of September 2008, when the amount of wholesale funding peaked, financial institutions accounted for 72.0% of the total amount of bank debentures issued (31.3% for banks, 20.2% for securities companies, 10.9% for insurance companies, and 9.6% for asset management companies).

\textsuperscript{18} In an analysis using the “Bank lending decision model” employed by Kashyap and Stein (2006), banks with larger shares of wholesale funding were found to be more procyclical in their lending (Jun, Lee, and Park 2012).
Macroprudential policies in Korea – Key measures and experiences

Choongsoo Kim

There are two types of financial stability policy framework: (i) a council (United States and Germany) that recognises individual institutions’ own authorities and guarantees policy coordination among them, and (ii) a framework where the functions of establishing and executing the micro- and macroprudential policies are assigned to the central bank (England and Malaysia).

For the successful implementation of macroprudential policies, a systematic and reasonable assignment of roles and cooperation among the agencies related to financial stability, including the government, the central bank and the supervisory authorities, are critical. The frameworks of policy structures for financial stability could differ across countries, depending upon individual nations’ institutional and historical environments, but each authority’s power should be commensurate with its inherent functions and responsibilities. In these respects the establishment of a financial stability committee is necessary and that the central bank should play a key role on it. The strengthening of cooperation with the IMF, the FSB, the BIS, and other international organisations, not to mention other central banks, is also imperative.

Finally, as there are various factors affecting financial stability, we also need to keep in mind that one measure does not fit all cases in controlling systemic risk. Efforts must be enhanced to keep all sources of risk in check, through the development of policy tools in addition to the measures introduced so far. Meanwhile, the LTV-DTI regulations, FX-related measures, etc. must also be improved, in ways so as to maximise social welfare and reduce any unintended consequences.
REFERENCES


In India, we have a relatively long history of experience with conduct of macroprudential policy. The Reserve Bank has, over the years, attempted to address systemic risks in both its dimensions – the time dimension or procyclicality, and the cross sectional dimension – within a macroprudential framework.

The article will review India’s experiences/experiments with macroprudential policy prior to the crisis, during the crisis and more recently, the experience of using countercyclical policy to address the challenges posed by a sharp increase in volatility of exchange rates together with a heightened external deficit. The use of macroprudential policy in India has been extensive and multi-faceted – spanning the banking and non-banking financial sector; addressing asset price spirals and credit booms; encompassing capital flows and systemic liquidity management; dealing with large and complex financial institutions; calibrating the development of the OTC derivative markets; and tackling interconnectedness in the banking and financial sector and between the financial and the real sector.

The article will also touch upon the institutional arrangements for financial stability in India, pre and post the crisis. Prior to the crisis, no agency was explicitly granted a mandate for financial stability though the Reserve Bank acted as the implicit systemic regulator. Post crisis, institutional arrangements have been strengthened with the setting up of an inter-agency Financial Stability and Development Council.

The article will finally attempt to present the lessons emanating from India’s experience with operationalising a macroprudential policy framework, especially with regard to some of the major emerging questions – signal extraction, use of rules versus discretion in policy making, coordination with other policy segments (primarily monetary policy), assessing the impact of the policy measures, etc. It will then touch upon some of the challenges, viz. developing a framework for systemic risk assessment, assessing and plugging data gaps, and also focus on the challenges for extending the scope of macroprudential policy beyond the financial sector to the corporate sector, specifically for managing risks arising out of corporate leverage and un-hedged foreign exchange exposures, and to the sovereigns.
Post crisis, the term “macroprudential” is increasingly being used in regulatory and supervisory parlance. Key amongst the post crisis lessons was that financial stability needs to be pursued as a separate policy objective and that microprudential regulation and supervision need to be supplemented by macroprudential oversight of the financial system. However, there is as yet no commonly accepted definition of the term. The Financial Stability Board (FSB), International Monetary Fund (IMF), Bank for International Settlements (BIS), in their February 2011 update to the G20 on “Macroprudential policy tools and framework”, define macroprudential policy as a policy that uses primarily prudential tools to limit systemic or system-wide financial risk, thereby limiting the incidence of disruptions in the provision of key financial services that can have serious consequences for the real economy, by:

• dampening the build-up of financial imbalances and building defenses that contain the speed and sharpness of subsequent downswings and their effects on the economy;

• identifying and addressing common exposures, risk concentrations, linkages; and interdependencies that are sources of contagion and spillover risks that may jeopardise the functioning of the system as a whole.

In 2009-2010, the Committee on the Global Financial System (CGFS) conducted a preliminary “stocktaking” of issues and experiences related to the design and implementation of macroprudential policy. The CGFS survey showed that macroprudential instruments or interventions had been widely applied, especially in emerging markets. The interventions had targeted a variety of problems arising from the financial system and financial behaviour, at both aggregated and highly sector-specific levels.

The Reserve Bank of India (RBI) has been using macroprudential polices to address systemic risks both in their time and structural dimensions, as part of its toolkit for the pursuit of financial stability. This article attempts to share some of the experiences of RBI with regard to the macroprudential measures implemented and their various dimensions including objectives, approach, methodology and effectiveness. The article first presents a brief outline of the structure of the Indian financial system, the extant regulatory framework and mechanism for inter-regulatory coordination.

1| THE INDIAN FINANCIAL SECTOR

1|1 Institutions

The financial landscape in India is diversified and interconnected. The sector has grown rapidly, especially over the last couple of decades with overall assets amounting to nearly 150% of the country's GDP.

The system is bank dominated with commercial banks constituting 61% of the financial system's total assets. Within the commercial banking sector, public sector banks comprise the largest segment, accounting for 72% of the commercial banking sector's total assets.

Other credit institutions in the country comprise regional rural banks, cooperative credit institutions and deposit taking non-banking financial companies (NBFCs), which account for 9% of total financial sector assets. Complementing the deposit taking institutions in the country are the NBFCs (non-deposit taking), insurance companies, mutual funds and pension funds.

1|2 Regulatory arrangements

The country has a well-defined regulatory architecture. RBI regulates the banks and the NBFCs. It also regulates the money, government securities and foreign exchange markets and the payment and settlement systems. There are other sector specific regulators in the country for the capital market, insurance sector and pension funds.

1|3 Pursuit of financial stability

In India, prior to the crisis, no agency was explicitly granted a mandate for financial stability though RBI acted as the implicit systemic regulator. The Reserve Bank of India Act (1934) provides a broad legal mandate to RBI to secure monetary stability and generally to operate the currency and credit system of the country to its advantage. In practice, this meant the dual objective of growth and price stability, the relative emphasis being dependent on the context. In 2004, RBI formally added financial stability as an additional policy objective in view of the growing size and importance of the financial sector.
Framework for the conduct of macroprudential policy in India: experiences and perspectives
Kamalesh C. Chakrabarty

In 2010, a Financial Stability and Development Council (FSDC) was set-up to strengthen the institutional mechanism for financial stability. Though not a statutory body, the Council is chaired by the Finance Minister and includes the Governor of RBI, heads of other sectoral regulators and Ministry of Finance officials as members. The FSDC is assisted by a subcommittee chaired by the Governor.

2| CONDUCT ON MACROPRUDENTIAL POLICY: INDIAN EXPERIENCE – MEASURES

India’s experience with the conduct of macroprudential policy has spanned initiatives to address both dimensions of systemic risks – procyclicality and cross-sectional risks. Policies to counter procyclical trends through pre-emptive countercyclical provisioning and differentiated risk weights for certain sensitive sectors were adopted in 2004, during the expansionary phase of the economy. The experience with the policies to address interconnectedness in the financial system is relatively longer. India has put in place a framework for closer monitoring and supervision of large and potentially systemically important financial institutions/groups – termed financial conglomerates – in 2004, well ahead of the post crisis global initiatives. Evidence of India’s experience with macroprudential measures also spans certain concerns specific to emerging markets, notably its approach to capital account management.

2|1 Countercyclical measures

Investment fluctuation reserve

One of India’s early experiments with macroprudential policy was aimed at countering the impact of fluctuations in interest rates on banks’ marked to market profits. In the early 2000s, banks were enjoying profits from falling interest rates. To prepare banks to counter the impact of rising interest rates on treasury profits when the monetary cycle reversed, RBI asked banks to build-up an investment
fluctuation reserve (IFR) up to at least 5\% of their investment portfolio by transferring the gains realised on sale of investments within a period of five years. The IFR was allowed to be drawn down when the interest rate cycle turned and treasury incomes started falling. The prescription was withdrawn once the capital charge for market risk was introduced. In the meanwhile, the IFR enabled banks to maintain stable capital adequacy and ensured that a cushion was built-up during "good times", which was then used to "buffer" the not-so-good times.

**Charts 1**

Impact of investment fluctuation reserve (IFR)

a) IFR and profits

![Graph showing impact of IFR on profits](image)

Note: IFR amounts for years 2003 and 2004 are approximate estimations.

b) IFR and capital adequacy

![Graph showing IFR and capital adequacy](image)

Source: RBI.

**Table 2**

<table>
<thead>
<tr>
<th>Date</th>
<th>Risk weight</th>
<th>Provisioning requirements for standard assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2004</td>
<td>100</td>
<td>0.25</td>
</tr>
<tr>
<td>July 2005</td>
<td>125</td>
<td>0.25</td>
</tr>
<tr>
<td>November 2005</td>
<td>125</td>
<td>0.40</td>
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<tr>
<td>May 2006</td>
<td>150</td>
<td>1.00</td>
</tr>
<tr>
<td>January 2007</td>
<td>150</td>
<td>2.00</td>
</tr>
<tr>
<td>November 2008</td>
<td>100</td>
<td>0.40</td>
</tr>
<tr>
<td>November 2009</td>
<td>100</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Source: RBI.

**Table 3**

<table>
<thead>
<tr>
<th>Date</th>
<th>Risk weight</th>
<th>Provisioning requirements for standard assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2004</td>
<td>75</td>
<td>0.25</td>
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<tr>
<td>November 2005</td>
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<td>0.40</td>
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<tr>
<td>May 2006</td>
<td>75</td>
<td>1.00</td>
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<tr>
<td>May 2007</td>
<td>50-75</td>
<td>1.00</td>
</tr>
<tr>
<td>May 2008</td>
<td>50-100</td>
<td>1.00</td>
</tr>
<tr>
<td>November 2008</td>
<td>50-100</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Source: RBI.

Note: a) Risk weights varied according to amount of loan and LTV ratio (Table 3).

**Table 4**

<table>
<thead>
<tr>
<th>Loan amount</th>
<th>LTV(^{a}) ratio (cap of 80% for loan above INR 2 million and 90% for loan up to INR 2 million)</th>
<th>Risk weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to INR 3 million</td>
<td>≤ 75</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>&gt; 75</td>
<td>100</td>
</tr>
<tr>
<td>INR 3 million to INR 7.5 million</td>
<td>≤ 75</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>&gt; 75</td>
<td>100</td>
</tr>
<tr>
<td>INR 7.5 million and above</td>
<td>–</td>
<td>125</td>
</tr>
</tbody>
</table>

Source: RBI.

Note: a) LTV: loan-to-value.

**Time-varying risk weights and provisioning norms**

The use of time-varying risk weights and provisioning norms in India were used against a macroeconomic backdrop which provided evidence of disproportionately higher growth to sectors such as housing, commercial real estate (CRE), retail and equity. When the correction set in, in the second half of 2008, some of these measures were relaxed, but tightening measures were re-introduced as growth began to recover.
Table 5
Banks’ exposure to other retail loans

<table>
<thead>
<tr>
<th>Date</th>
<th>Risk weight</th>
<th>Provisioning requirements for standard assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2004</td>
<td>125</td>
<td>0.25</td>
</tr>
<tr>
<td>November 2005</td>
<td>125</td>
<td>0.40</td>
</tr>
<tr>
<td>May 2006</td>
<td>125</td>
<td>1.00</td>
</tr>
<tr>
<td>January 2007</td>
<td>125</td>
<td>2.00</td>
</tr>
<tr>
<td>November 2008</td>
<td>125</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Source: RBI

Table 6
Banks’ exposure to the capital markets

<table>
<thead>
<tr>
<th>Date</th>
<th>Risk weight</th>
<th>Provisioning requirements for standard assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2004</td>
<td>100</td>
<td>0.25</td>
</tr>
<tr>
<td>July 2005</td>
<td>125</td>
<td>0.25</td>
</tr>
<tr>
<td>November 2005</td>
<td>125</td>
<td>0.40</td>
</tr>
<tr>
<td>May 2006</td>
<td>125</td>
<td>1.00</td>
</tr>
<tr>
<td>January 2007</td>
<td>125</td>
<td>2.00</td>
</tr>
<tr>
<td>November 2008</td>
<td>125</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Source: RBI

Table 7
Banks’ exposure to NBFCs

<table>
<thead>
<tr>
<th>Date</th>
<th>Risk weight</th>
<th>Provisioning requirements for standard assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2004</td>
<td>100</td>
<td>0.25</td>
</tr>
<tr>
<td>November 2005</td>
<td>100</td>
<td>0.40</td>
</tr>
<tr>
<td>January 2007</td>
<td>125</td>
<td>2.00</td>
</tr>
<tr>
<td>November 2008</td>
<td>100</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Source: RBI

The pre-crisis years of 2004-2008 were a period of high growth and robust capital inflows for the Indian economy, with overall bank credit growing at over 30% per annum. Disaggregated trends, however, revealed that credit growth to certain sectors such as CRE was much higher, exceeding 100% during 2005-2006. The accelerated credit offtake was concomitant with increasing real estate prices. In response, the risk weight for banks’ exposure to CRE was increased from 100% to 125% in July 2005, and further to 150% in May 2006. The risk weight on retail housing loans was also increased from 50 to 75% in December 2004. Subsequently, the risk weights on smaller size housing loans (considered as priority sector loans) were reduced from 75 to 50%, while the risk weights on larger loans and those with LTV ratio exceeding 75% were increased to 100%. Simultaneously, as equity prices started rising sharply and there was a boom in consumer credit, risk weights on consumer credit and capital market exposures were increased from 100% to 125%.

The provisions for standard assets were revised upwards in November 2005, May 2006 and January 2007 in certain specific segments as detailed in the tables 5, 6, and 7. The provisioning requirement for other standard advances were, however, kept unchanged, in order to avoid disruption to the flow of credit to the productive and priority sectors.

When the crisis started impacting the domestic financial system and the macroeconomy, RBI responded by relaxing some of the pre-crisis tightening measures in a countercyclical fashion – easing both risk weights and standard asset provisioning norm – again largely following a sectoral approach. The prudential framework for restructuring of advances was also temporarily modified to facilitate viable units facing temporary difficulties tide over the crisis.

By late 2009, credit growth began to recover especially in the CRE segment prompting RBI to once again increase the standard asset provisioning requirements for this sector. Also, a system wide provision coverage ratio of 70% of gross non-performing advances was prescribed with a view to building-up a buffer (surplus of provisions over specific provisions) so that the same could be used by banks for making specific provisions for non-performing assets during periods of downturns. Several other measures, viz. introduction of a cap on LTV ratios and higher risk weights for large housing loans and higher standard asset provisioning for “teaser” housing loans, were introduced in 2010, but the focus of these measures was largely microprudential.
Policies to address the cross-section dimensions of systemic risks

Dealing with interconnectedness and common exposures

Several measures were taken to address systemic risks arising out of interconnectedness amongst banks, between banks and non-banking financial entities and from common exposures. These measures which have, over time, been built into the prudential framework for the financial sector, *inter alia*, include:

- prudential limits on aggregate interbank liabilities as a proportion of net worth;
- restriction of access to the un-collateralised funding market to banks and primary dealers with prudential caps on lending and borrowing;
- limiting a bank’s investment in the capital instruments of another bank/financial institution to 10% of its capital funds and 5% of the investee bank’s equity;
- limits on banks’ exposure to NBFCs;
- stringent prudential regulations for NBFCs;
- capping banks’ investments in liquid schemes of debt-oriented mutual funds as a proportion of net worth;
- restriction on banks’ exposure to capital markets to 40% of net worth, on solo and group basis;
- close monitoring of banks’ exposures to sensitive sectors;
- limits on overseas borrowings by banks, other than for lending for exports (banks’ open foreign exchange position are also subject to prudential caps in relation to capital funds);
- requirements for banks to hold a minimum of 23% of their net demand and time liabilities in the form of liquid domestic sovereign securities (this stipulation has worked both as a solvency as well as a liquidity buffer); and
- not allowing profits on sale of assets under securitisation to be recognised immediately but over the life of the pass through certificates, thereby curtailing the “originate and distribute” model.

Monitoring financial conglomerates

Since 2004, financial conglomerates (FCs) in India have been subject to more intensive supervisory oversight. FCs are entities with significant presence in more than one financial sector segment – banking, insurance, mutual fund, non-banking finance and pension. The supervisory process focusses on management of group-wide risks, intra-group transactions and corporate governance. It relies on offsite surveillance, regular interface with the management of the FC and periodic reviews by a college of supervisors. With the setting-up of the FSDC, an Inter-Regulatory Forum for Monitoring the FCs (IRF-FC) has been set-up. There are prudential regulations for group capital adequacy, exposure limits and intra-group transactions for the bank-led FCs. However, a differentiated prudential framework for FCs was not considered necessary as the financial system in India was (and continues to be) considerably less complex than in most developed markets and most complex, structured, products are either not allowed or are regulated. Recently, RBI has published a draft framework for dealing with domestic systemically important banks (D-SIBs) for comments.

Framework for the management of the capital account

Capital flow measures (CFM) are generally regarded as tools to regulate/limit capital flows. Post crisis, there is, however, an acknowledgement that such measures are an important part of the macroprudential toolkit especially for emerging markets where capital flows are large relative to their absorptive capacity. The IMF, in a 2012 paper,¹ for instance, says “to the extent that capital flows are the source of systemic

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financial sector risks, the tools used to address those risks can be seen as both CFM and macroprudential measures. In crisis-like situations, CFMs are often the first line of defence for a jurisdiction.

India’s approach to capital account management, both pre and post crisis, as also the measures taken more recently in the wake of exchange rate volatility, reflects the broad underpinnings of systemic risk management. The efforts are aimed at moving beyond addressing only the exchange rate and putting in place a framework which provides sufficient space and instruments for modulating policy to the different characteristics of capital flows, viz. procyclical and implications for banks, corporates and the sovereign. The salient elements of this framework include:

- an explicitly stated active capital account management framework, based on encouraging non-debt creating and long term capital inflows and discouraging debt flows;
- developing the policy space to use multiple instruments – quantitative limits, price-based and administrative measures, particularly for foreign currency borrowing by corporates;
- short-term debt permitted only for trade transactions;
- avoiding the “original sin” of excessive foreign currency borrowings by domestic entities, particularly the sovereign;
- prudential regulations to prevent excessive dollarisation of balance sheets of financial sector intermediaries, particularly banks;
- cautious approach to liability dollarisation by domestic entities; and
- significant liberalisation of permissible avenues for outward investments for domestic entities.

The approach has been, thus, “strategic” – there is an explicit preference for long-term over short-term flows and equity over debt flows, and both price-based and quantity-based controls have been used to operationalise this policy. Importantly, the key elements of the strategy have been periodically recalibrated to reflect the procyclical impact of lumpy and volatile flows as also in pursuit of greater capital account liberalisation.

Capital account measures taken by RBI in the wake of the announcement of an imminent start to tapering of asset purchase by the Federal Reserve were, however, largely a response to the exchange rate volatility from end May 2013 onwards. These included direct administrative measures aimed at reducing capital outflows and incentivising capital inflows as also measures for tightening liquidity in the domestic markets through the interest rate and the quantity channels. When the adverse spillover of these policies in the domestic markets, particularly debt market, became evident, RBI announced an array of regulatory dispensations to protect the banks’ bottom lines – measures which were largely macroprudential in their orientation.

### 3 | Conduct of macroprudential policy in India: some dimensions

#### 3.1 Objectives

The broad objectives of macroprudential policy, especially of the countercyclical policies in India, have been precautionary – to build the resilience of the banking system and to address risks from procyclicality. The objective was clearly spelt out in October 2005 in RBI’s policy statement:

“Traditionally, banks’ loans and advances portfolio is procyclical and tends to grow faster during an expansionary phase and grows slowly during a recessionary phase. During times of expansion and accelerated credit growth, there is a tendency to underestimate the level of inherent risk and the converse holds good during times of recession. This tendency is not effectively addressed by the prudential specific provisioning requirements for the impaired assets since they capture risk ex post but not ex ante.”

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3 See Dr. Subbarao (D.) (2011): “India and the global financial crisis what have we learnt?”, June.
4 See http://rbi.org.in/scripts/NotificationUser.aspx?Id=25386&Mode=0
The various options available for reducing the element of procyclicality including, among others, adoption of objective methodologies for dynamic provisioning requirements, as is being done by a few countries, by estimating the requirements over a business cycle rather than a year on the basis of the riskiness of the assets, establishment of a linkage between the prudential capital requirements and through-the-cycle ratings instead of point-in-time ratings and establishment of a flexible loan-to-value (LTV) ratio requirements where the LTV ratio would be directly related to the movement of asset values.*

As evidenced by this statement, the objective of the policy initiatives was not to address asset price bubbles. In fact, there was little concrete evidence of any such bubble given the context of the credit needs of an economy on a high growth path. The objective was also not to curtail overall credit off-take, again in the context of genuine credit needs of a developing economy.

The purpose was to prepare the banking sector to effectively manage any potential downside in select sectors. Also, various policy options – including dynamic provisioning, time-varying LTV ratios, capital requirements based on through the cycle ratings, etc. – were considered, with increased risk weights and provisions on standard assets emerging as the preferred policy option.

3|2 Coordination with other policies

There is now a widespread acknowledgement that financial stability is affected by a range of policies. To achieve its goals, therefore, macroprudential policy must be supported by effective microprudential policies and complemented by appropriate monetary, fiscal and other financial sector policies. In turn, macroprudential policy can help these other policies achieve their goals.

There are strong complementarities between macroprudential policy and monetary policy. Measures aimed at strengthening the resilience of the financial system buttress monetary policy by potentially preventing sharp financial disruptions. A stable financial system enhances the effectiveness of monetary policy by facilitating smoother transmission of monetary policy impulses. Conversely, macroeconomic stability could reduce the financial system's vulnerability to procyclical tendencies. Even during times of financial distress, monetary policy can play a crucial role in enhancing the effectiveness of macroprudential policy. This was amply demonstrated by the measures taken by central banks in the wake of the Lehman Brothers bankruptcy and during the sovereign debt crisis.

The Indian experience demonstrates these complementarities. It illustrates a coordinated approach to the conduct of monetary and macroprudential policy to simultaneously pursue price and financial stability. Interest rate measures targeted macroeconomic concerns including inflation and growth even as macroprudential measures aimed at "leaning against the wind" to address risks of procyclicality.

During the upswing of 2004-2008, countercyclical policies such as increasing risk weights and provisions were adopted. Simultaneously, monetary policy was also being tightened. During October 2008 to April 2009, when RBI relaxed its macroprudential measures, it was also aggressively easing its monetary policy. The stance reversed post October 2009, when inflationary pressures warranted monetary tightening while increased credit growth in some segments of the economy necessitated macroprudential tightening.

<table>
<thead>
<tr>
<th>Period</th>
<th>Monetary measures</th>
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<tr>
<td>Tightening</td>
<td>Repo rate</td>
</tr>
<tr>
<td>October 2008</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Reverse repo rate</td>
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<tr>
<td></td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>Cash reserve ratio</td>
</tr>
<tr>
<td></td>
<td>450</td>
</tr>
<tr>
<td>Easing</td>
<td>Repo rate</td>
</tr>
<tr>
<td>October 2008</td>
<td>-425</td>
</tr>
<tr>
<td></td>
<td>Reverse repo rate</td>
</tr>
<tr>
<td></td>
<td>-275</td>
</tr>
<tr>
<td></td>
<td>Cash reserve ratio</td>
</tr>
<tr>
<td></td>
<td>-400</td>
</tr>
<tr>
<td>Tightening</td>
<td>Repo rate</td>
</tr>
<tr>
<td>Post October</td>
<td>250</td>
</tr>
<tr>
<td>2009 – mid-</td>
<td>Reverse repo rate</td>
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<tr>
<td>2011</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Cash reserve ratio</td>
</tr>
<tr>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

Source: RBI
3|3 Approach and methodology

- **Focussed on banks.** Given the centrality of the banking system in the country, RBI's macroprudential policy has been focussed on banks. Some measures aimed at addressing the cross-sectional dimensions of systemic risks, however, also encompassed the non-banking financial sector, e.g. prudential limits on banks' exposures to NBFCs and to mutual funds. Also, in the recent past, measures taken in view of a sharp increase in gold prices and accelerated flow of credit against gold included NBFCs.

- **Sectoral approach.** The approach adopted for countercyclical policies was sector oriented. This approach could be attributed to two related constructs. One, while there was a degree of exuberance in the economy during the high growth phase of 2004-2008, credit growth was disproportionately higher in some specific sectors. Two, in a growing economy like India, use of a blunt instrument like interest rates could have resulted in affecting the flow of credit to productive sectors.

- **Metrics for the conduct of macroprudential policy.** The conduct of macroprudential policy was heavily reliant on policy judgement with empirical and anecdotal evidence being used to confirm judgement. RBI did not have any disaggregated statistical data or model to support its concerns on the risks of rising bank exposures to certain specific sectors. For instance, in the specific case of the CRE sector, policy judgement was based on trends in aggregate bank credit and credit to the sector; evidence from onsite inspections of banks about weaknesses in underwriting standards, emerging signs of under-pricing of risks; emerging trend of mortgages for second “homes”; anecdotal evidence about the inventory build-up; and a visibly steep increase in land prices.

- **Tools.** The tools used for countercyclical policy, viz. risk weights and provisioning, were largely tools of microprudential policy. Indeed, many of the policy measures initiated by RBI served a microprudential as well as a macroprudential purpose. RBI, in its conduct of macroprudential policy heavily drew upon its role as supervisor of banks for supervisory information, judgement and risk assessment. This approach reflects the post-crisis wisdom about the strong complementarities between microprudential supervision and macroprudential policy.

3|4 Effectiveness

An assessment of the impact of countercyclical policies is not straightforward as credit growth, including credit growth to specific sectors, is affected by a host of factors of which monetary policy and macroeconomic performance are predominant. Given that the stance of macroprudential policy in India complemented the stance of the monetary policy, a complete isolation of the impact of the respective policies may not be possible. However, some general observations in this regard could be made.

First, there is evidence that the policy tightening was able to dampen the exuberant credit growth in the targeted sectors. In particular, the flow of credit to CRE decelerated from over 150% (year-on-year) in 2005 to below 50% in 2008. During the same period, growth rate in total bank credit also decelerated (from about 30% to 23%) indicating, at least partially, the impact of monetary policy tightening.

Second, the effectiveness of countercyclical policies during downturns is less evident. In fact, credit growth slowed down considerably especially during late 2008 and early 2009 notwithstanding relaxations in monetary and macroprudential policy. The deceleration in credit growth was evidenced in total bank credit and also flow of credit to the specific sectors for which risk weights/provisioning norms were relaxed.

The asymmetric effectiveness of macroprudential policy measures during “good” and “bad” times could also partially be attributed to the effectiveness of the “signalling” effect of policy. During the tightening phase, a strong message was sent out about the central bank's concern with the pace of credit growth to certain specific sectors. This could arguably have made the banks more cautious in lending to these sectors. During the easing phase, however, the signalling effect became less effective due to subdued credit demand and risk aversion amongst banks.
Charts 2
Effectiveness of macroprudential measures

(%)  
a) Credit to CRE

b) Capital market exposures

c) Credit to NBFCs

Source: RBI.
Developing an analytical framework for systemic risk assessment

RBI’s experience with macroprudential oversight has been largely based on policy judgement. It is now clear that an effective and formal framework for macroprudential oversight requires both analytical sophistication and good judgement. Policy makers need to be able to assess the nature and extent of risk and be able to make informed judgement on when macroprudential polices should be activated and which tools should be used. RBI has been making efforts to develop an analytical framework for the assessment of systemic risks in recent years (see Box).

### Box

**Framework for systemic risk assessment**

A number of initiatives have been taken to improve the financial stability analytics in RBI. Some of these are outlined below.

**Stability indicators and maps**

Stability indicators and maps represent coincident indicators of systemic stress in the financial system. They are constructed by aggregating information from different segments of the overall financial system and encapsulating the information in a single statistic which measures the current state of instability in the financial system.

RBI has been using a variety of stability maps and indicators to assess trends in risk dimensions of various aspects of the macrofinancial system – the banking sector, the macroeconomy, financial markets, the corporate sector, etc. Each of these indicators is based on contemporaneous developments in different risk factors. A systemic liquidity indicator has also been developed to gauge the degree of stress in domestic liquidity conditions and to establish time frames for potential extreme events.

**Banking stability measures and expected shortfall**

Banking stability measures, a cross-sectional econometric framework, capture the distress dependencies among financial firms using stock price data and attempt to estimate the contribution of individual firms to systemic risk. A banking stability index is calculated, which captures the expected number of banks to become distressed given that at least one bank has become distressed. Separate toxicity and vulnerability indices capture distress between specific institutions while the cascade effect attempts to measure the distress in the system associated with the distress of a specific institutions. This method is also being used for estimation of expected shortfall of assets of banking system in response to a large negative shock.

.../...
Network analysis

The techniques of network modelling have been used to develop a bespoke financial network analysis and contagion stress testing platform for the Indian financial system. The analysis primarily looks into the interconnections that exist between different institutions in the financial system and tries to identify the build-up of systemic risks. Graphical network representations have been developed which are being used to assess the degree of system level interconnectedness and the stability of the system. A contagion simulator helps in assessing the possible loss of capital to the financial system due to a random failure of one or more financial institutions. Both the solvency and liquidity effects of failure of a financial entity are assessed.

Macrofinancial stress tests

RBI conducts a variety of macro stress testing exercises at regular periodicities. The first set of stress testing exercises uses multivariate regression tools to evaluate the impact of a particular macroeconomic variable on the asset quality of banks and their capital adequacy ratio at the system level. The second set is based on a vector autoregressive (VAR) model which assesses the impact of the overall economic stress situation on the asset quality and capital adequacy of the banking system taking into account the feedback effect of the macroeconomic performance of the economy on banks’ stability. The third set uses quantile regression techniques to model system level slippage ratio with macrovariables in the tails. Multivariate regressions and panel regressions are also used for projections/stress testing for various sector as well as at bank group level.

In order to improve the assessment of projected NPAs on the capital, a model based on time series econometric tool has been developed to project profit of banks under different macroeconomic scenarios. The projected values of the ratio of the non-performing advances are translated into capital ratios using the “balance sheet approach”, by which capital in the balance sheet is affected via the provisions and net profits.

There are, however, clear challenges in developing a robust analytical framework for conduct of macroprudential policy. Putting in place an assessment infrastructure which is capable of raising “red flags”, i.e. signalling trends that could make markets or countries vulnerable to unanticipated events is far from straightforward given that systemic risks per se are generally complex, very often opaque, and always multifaceted. In fact, there is no universally accepted definition of systemic risk, adding to which there are major gaps in the availability of data at both the national and international level to ensure that the build-up of risks is recognised and addressed in a timely manner. Regulatory judgements will thus continue to play a critical role in informing decisions about macroprudential policy with associated risks of both type I and type II errors – imposing buffers too early out of excessive caution or delaying imposition of buffers till it is too late to avert an implosion – which can be costly in macroeconomic terms.

Managing risks arising out of corporate leverage and un-hedged foreign exchange exposures of corporates

Post crisis, especially in an environment of low interest rates and abundant global liquidity, corporate leverage has gone-up substantially even while the banking system leverage has been curtailed due to the regulatory reforms. A study of ten large corporate groups in India by Credit Suisse has revealed that the share of these ten groups in total banking sector credit more than doubled between 2007 and 2013 even while the overall debt of these groups rose six times (from under INR one trillion to over INR six trillion). Similarly, the lure of cheap foreign funds also enticed several corporates to borrow large sums of monies abroad without adequately hedging their exposures. While the banks’ proprietary exposure to the forex market operations is capped by regulations, the same is not true for the corporates’ forex exposures.
In fact, the volatile capital flows in India and probably across the emerging markets have led to building-up of significant amount of stress on the corporates' balance sheet due to these un-hedged currency exposures. The burgeoning leverage and the un-hedged currency exposures of the corporates have created implications for the banking system in the form of increased credit risk. To some extent, this is already evident in India due to manifestation of these risks in few corporate entities and the consequential impact on the balance sheets of the banking sector. As systemic risk primarily emanates from increased credit risk in the banks' books, it is important for the regulators to find ways to limit the leverage and the extent of overseas borrowings. Going forward, macroprudential policy may need to explore the possibility of prescribing that greater weightage is given to the capital/leverage of corporates in the credit appraisal of banks. Alternately, differentiated risk weights/higher provisioning for such exposures as well. In any case, this is an area which warrants further work at the global policy making level.

4|3 Policy coordination

The importance of policy coordination is critical for the success of macroprudential policy. This article has earlier discussed that the coordinated monetary policy and countercyclical measures contributed to the effectiveness of both sets of policies in the pre-crisis exuberance phase in India. It is not difficult, however, to conceive of situations where the policy stance and objectives conflict. Indeed, the seeds of the financial crisis were sown in a period of monetary stability and low interest rates. There are clearly challenges associated with ensuring some degree of coordination between monetary and macroprudential policies, while ensuring the independence and credibility of monetary policy. These challenges could be further accentuated in emerging markets like India where monetary policy often needs to factor in considerations of growth and development.

Again, it is difficult to make a binary distinction between microprudential and macroprudential policies. Incorporating a systemic perspective in microprudential policies could, for example, be easier in boom times when buffers are required to be built-up. During “bad” times, there could be tensions as the macroperspective could call for relaxations in policy (e.g. release of buffers), while the microperspective may favour retaining the buffers.

In the Indian case, so far, these conflicts have been resolved as RBI is the monetary authority, regulator and supervisor of the banking system and also the implicit systemic regulator. Going forward, however, as the financial system becomes more complex and macroprudential considerations have to factor in various sectors of the economy, challenges may emerge and strong coordination between the regulators and with the government will be called for.

4|4 Macroprudential policies in “good” times and in “bad” times

One major challenge of macroprudential policy is the strong resistance to countercyclical policies during “good” times. The difficulties are compounded by the fact that it would be difficult to put in place a rule based approach to macroprudential policy. Systemic risk assessment remains an inexact science with considerable scope for missing signals and false alarms, which makes it difficult to spur concrete policy action especially as such actions often involve taking away the proverbial punch bowl just as the party is going strong.

In “bad” times, implementation of macroprudential policies may be relatively easier in the context of the political economy, but, as the Indian experience has shown, ensuring the effectiveness of policies during busts/slowdowns presents its own sets of difficulties. It is much easier for a regulator to stop a bank from lending than for it to induce the bank to lend! Similarly, it is arguably easier to control capital inflows during booms than to persuade international investors to bring in flows during busts.

5| Concluding remarks

The article has outlined the experiences and perspectives of RBI in implementing macroprudential policy in India. The experience so far has been enriching but the road ahead is very challenging. Macroprudential policy has its own limitations, especially in emerging markets. There are risks of macroprudential policy being over-applied – they are...
not a panacea for all evils nor a sure shot recipe for financial stability. There are also risks of making macroprudential policy too narrow in focus.

It would be important for policy makers to clearly understand what macroprudential policy can do and what it cannot do. For example, it would be unrealistic to expect macroprudential policy to successfully affect aggregate demand in the economy or influence economic cycles. Again, macroprudential policy cannot directly address asset price bubbles. It can, at most, enable the economy and the financial sector to weather the impact of a disorderly fall in asset prices. The experience in India so far suggests that macroprudential policy is best suited to improving the resilience of financial institutions to shocks.

In emerging markets, the implementation of macroprudential policy will need to additionally factor in the risk of stifling growth potential.

A general trend of high credit growth may not, by itself, be a matter of systemic concern in an emerging market. A case in point is the calibration of the countercyclical capital buffer (CCB). The BIS has suggested the use of credit-to-GDP as the primary metric. However, as enunciated in the draft framework for operationalising the buffer published by RBI, while the credit-to-GDP gap will be used for empirical analysis to facilitate CCB decision for banks in India, it may not be the only reference point and may be used in conjunction with other indicators.

As discussed earlier in the article, macroprudential regulation is essentially an inexact science. Development of the framework for implementation of macroprudential policy is still work in progress. Moreover, the policy has its own limitations and needs to be used in conjunction with other policies to be effective.
Learning from the history of American macroprudential policy

Douglas J. Elliott
Fellow in Economic Studies
The Brookings Institution

Contrary to impressions based on recent years, the United States of America has conducted an active policy of cyclical macroprudential intervention over most of the century since the Federal Reserve’s foundation in 1913. Douglas Elliott was the co-author of a comprehensive study of these interventions, including a preliminary statistical analysis of their effects. In this paper, he offers a number of lessons for future macroprudential policy, based on America’s history. In particular:

• macroprudential policies are feasible even in a generally non-interventionist context;
• political support can be obtained for macroprudential tightening;
• macroprudential and monetary policy blend together;
• cyclical macroprudential policy can affect credit supply as intended;
• different economic sectors can be targeted;
• macroprudential policy may be easiest when measures appear technical;
• a major mistake can make future macroprudential policy much harder;
• macroprudential policy may be most easily done through a single body.

NB: This paper draws heavily from the author’s previous paper for the Brookings Institution, “Lessons for macroprudential policy from America’s history” (September 2013), http://www.brookings.edu/research/papers/2013/09/13-macroprudential-policy-lessons-american-history-elliott
Over the last 100 years, the United States has made frequent use of financial regulatory policies designed to control credit cycles—what we now call cyclical “macroprudential” policies. This contradicts a common belief in policy circles, based on their lack of use in the last two decades, that these tools were never used in the United States. I recently co-authored a comprehensive paper on American macroprudential policy since 1913 (Elliott, Feldberg and Lehnert, or EFL for short, 2013). The paper provided a taxonomy and catalog of these historical actions, an explanation of the circumstances and politics affecting the significant actions, and some initial statistical analyses of the impacts of the policies. However, it did not suggest policy implications for the future, except indirectly.

This paper builds on EFL (2013) by drawing a number of lessons for macroprudential policy around the world going forward. These conclusions are mine alone and may or may not agree with the views of my co-authors of the earlier paper, although I am indebted to them for many insights and for their comments on a draft of this paper.

The key lessons that I draw are:

- Macroprudential policies are feasible even in a relatively unfavorable, US context;
- Political support can be obtained for macroprudential tightening;
- Macroprudential and monetary policy blend together;
- Cyclical macroprudential policy can affect credit supply as intended;
- Different economic sectors can be targeted;
- Macroprudential policy may be easiest when measures appear technical;
- A major mistake can make future macroprudential policy much harder;
- Macroprudential policy may be most easily done through a single body.

Overall, US history strongly suggests that it is feasible and desirable to utilise macroprudential policy more actively in the future in America and the rest of the world.

**Macroprudential Policies are Feasible Even in a Relatively Unfavorable, US Context**

Prevailing American political ideologies are considerably less favorable to direct government intervention in the economy than is true in many other nations. In consequence, some argue that macroprudential policies simply do not fit the American ethos and circumstances. This view clearly does not fit the historical facts.

The extensive catalog of historical actions in EFL (2013) demonstrates that it is possible in an American political and economic context to use macroprudential policies to try to reduce the damage from booms and busts in credit markets. Since 1913, we counted 245 instances of the use of tools that we considered to be of a macroprudential nature and intended to counter credit cycles. (Macroprudential policy can also be of a structural nature, intend to strengthen the system across time periods. We have not focused on these uses.)

This long time period encompassed a wide range of political and economic conditions, including control by each of the major political parties. Thus, it seems unlikely that there is some uniquely American feature that would prohibit the use of macroprudential policies in the future.

The compatibility of macroprudential policy with the US political environment strongly suggests that such policies would also work in the rest of the world, where there are generally fewer ideological barriers to economic intervention.

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2] **Political support can be obtained for macroprudential tightening**

A concern about cyclical macroprudential policy is that political constraints may render it impossible to tighten policy. (As with monetary policy, it is presumed to be easier to persuade people to accept looser credit conditions.) For example, many doubt that the authorities would have been allowed to implement a tightening in credit conditions during the boom leading to the recent financial crisis. This is a very reasonable concern, both in America and in other countries, and there will doubtless prove to be constraints of a political nature. Indeed, in designing the Basel III capital framework, global policymakers implicitly recognised this point when they favored a rule-based trigger for implementation of the countercyclical capital buffer. Under the framework, if national credit-to-GDP growth sufficiently exceeds its long-term trend, authorities must either turn on the countercyclical buffer or explain why doing so is inappropriate.

Nonetheless, the United States has implemented substantial tightening measures in response to some previous credit booms. There has always been political opposition, but there has often been sufficient political support to uphold the measures. The most striking instance was the use of powerful credit restraints in 1980 as part of a campaign against inflation, described below. Another important example took place in the early 1950’s, with a coordinated response by multiple regulators to counter a housing boom that appeared excessive. It is not that there was an absence of political pushback, but rather that the rationale for action appeared compelling enough to allow substantial actions to proceed.

It is worth noting that some of the most potentially effective tools, such as loan to value limits for mortgages, may be the hardest to push through because of political opposition. The chances of being able to do so are heightened if the tools can be readied in advance of when they are needed, so that the process can be quicker and there are fewer points at which politics can intervene. EFL (2013) shows that supervisors in the United States had great difficulty even putting out formal guidance that might have slowed down the excessive boom in commercial real estate. It would likely have been easier to act if better tools had already been created in anticipation of such a need.

3] **Macroprudential and monetary policy blend together**

We were faced with an interesting fundamental task in researching EFL (2013), which was to determine when a policy was of a cyclical macroprudential nature during the many decades prior to the invention of the term “macroprudential”. This required some judgment calls, but I believe that the choices we made are generally reasonable, consistent, and useful. However, it was striking how often the question arose as to whether an action was in the furtherance of monetary policy or was macroprudential in nature.

Monetary policy works very largely via interactions with and influences upon financial institutions and markets. So does macroprudential policy. Monetary policy attempts to affect credit conditions, as does macroprudential policy. The rationale and methods generally differ, but there is definitely overlap. The most difficult call was on the use of reserve requirements. For many decades the Federal Reserve (Fed) has required member banks to keep reserves as deposits at the Fed proportionate to the size of their total deposits and often that of other specific liability categories. The percentages that have needed to be held have been increased and decreased over time in order to tighten or loosen credit conditions.

As we indicate in EFL (2013):

*Most treatments of reserve requirements describe them as tools of monetary policy, along with open market operations and discount rates. Indeed, in the United States, by setting a floor on the volume of reserves banks have to hold, reserve requirements influence the demand for federal funds and thus the equilibrium federal funds rate. Nonetheless, we include them in our taxonomy of macroprudential tools because they can, in principle, exert a direct effect on the supply of loans, while a change in the target federal funds rate affects both the supply and demand for loans. In practice, policymakers, even in modern times, have described changes in reserve requirements as motivated by a desire to control credit supply independently from the setting...*
of monetary policy. For example, the 1992 decrease in reserve requirements was part of a coordinated program of government actions to ease what were perceived at the time to be excessively tight credit conditions.⁴

There are a number of instances described in EFL (2013) in which reserves requirements were used either for the purpose of altering overall credit conditions or, sometimes, to alter credit conditions more selectively.

Muddying the waters further, the Fed’s ability to determine interest rates was severely constrained during most of World War II and through 1951. Until the so-called Treasury Accord of that year, the Fed was obliged to ensure that Treasury securities could be sold at low interest rates, in order to assist the war effort and to help deal with the huge overhang of debt that existed for years after the war.

During this period, the Fed relied more heavily on the other tools available to it, including macroprudential instruments such as credit controls, but especially reserve requirements, which fall in the borderland between the two types of policies.

There are some analysts and policymakers who wish to use macroprudential policies to ensure financial stability and hope that monetary policy would not need to be set with financial stability in mind. The very muddy distinction historically between these types of policies suggests that life will not be quite this simple.

In framing the distinction between monetary and macroprudential policy, it is useful to consider the differing aims of the two. Monetary policy in the United States is required to meet the dual mandate of low inflation and full employment and therefore focuses on the classic business cycle. Macroprudential policy can be thought of as striving to maintain financial stability by moderating financial cycles. The official business cycle dating committee of the National Bureau of Economic Research counts 11 business cycle peaks from 1945 to the present. Although no similar authority exists to define financial crises, over the same period, by any definition; there have clearly been far fewer financial crises. Research at the Bank of England has reached the same conclusion that business cycles are substantially shorter on average than financial cycles.

4 | CYCLICAL MACROPRUDENTIAL POLICY CAN AFFECT CREDIT SUPPLY AS INTENDED

The statistical analysis presented in EFL (2013) shows that cyclical macroprudential policy actions did indeed affect credit supply in significant ways. Because the tools used and credit aggregates targeted changed over the years covered by our study, our statistical evidence is effectively a series of case studies. Indeed, by the nature of macroprudential policymaking, the fundamental structure of the financial system evolved in response to policymaker actions, suggesting caution in using the precise quantitative estimates from our study in forecasting the effect of similar policies today. Despite this caveat, some themes appear to be fairly convincing from the data.

**Macroprudential policies affected credit growth.** The statistical tests that used all macroprudential policies taken together did not reach statistical significance at a high level of significance, reflecting the shifting toolkit and targets mentioned above, as well as some measurement difficulties. However, tightening actions were associated with a decrease in credit and easings with an increase. The more precise tests that looked at changes in reserve requirements showed that a tightening generally led to a 1% decrease in bank credit.

**The policies were less clearly effective in “pushing on a string”**. As with monetary policy, it seems to be harder to spur increased lending in pessimistic times than it is to restrain lending in optimistic times. The statistical analysis of the effect of reserve requirements did not produce a clear relationship between easings and increases in bank credit, unlike the results for tightenings.

**Some lending moves away from banks or other restrained entities.** As stated in EFL (2013), the statistical analysis of the effects of reserve requirements shows that “[...] Total consumer credit, which includes loans made by non-banks, falls less. This suggests either that non-bank lenders stepped in to make loans to households following a tightening in reserve requirements, or business lending fell by more than consumer lending in response to a tightening. Because reserve requirements operate directly on banks, it is at least plausible that some lending leaked...”
outside the banking system in response to higher reserve requirements, although we cannot verify this directly.”

We did not measure the effect on systemic resilience, which could be more crucial. It is important to emphasise that EFL (2013) did not attempt to capture what could be the most critical advantage of cyclical macroprudential policy in the future. Whatever degree of benefit exists from restraining credit cycles by influencing the volume of lending, it may be more crucial to ensure that financial institutions are better prepared to deal with the consequences of a credit bust following a boom. If the quality of mortgages has been increased by tightening credit standards, or the ratio of bank capital to assets has been raised during the expansion, for example, then the harm done when a boom collapses may be considerably reduced.

5| DIFFERENT ECONOMIC SECTORS CAN BE TARGETED

The ability to execute macroprudential actions in the United States does not appear to be limited to a particular economic sector, nor to the economy as a whole. The authorities have acted in ways designed to affect borrowing across the economy as a whole, as well as sometimes targeting specific sectors. These sectors frequently included housing or other forms of consumer borrowing. Business borrowing was less frequently targeted, but such targeting did occur.

6| MACROPRUDENTIAL POLICY MAY BE EASIEST WHEN MEASURES APPEAR TECHNICAL

It is noteworthy that the great bulk of macroprudential actions were taken through measures such as the reserve ratio or margin requirements that the public does not focus on or particularly understand. The actions may be powerful, but they are indirect and appear to be of a technical nature. Both factors likely make it harder for political opposition to develop.

That said, there have been times when actions were taken that would receive more attention from the public. The most notable was the invocation of credit controls in 1980 which were launched in a major campaign and which affected a wide variety of activities. More frequently, down payment or other requirements on mortgage loans were altered. The public understands down payment requirements and much of the public cares about the topic.

The balance of historical activities suggests that some of the actions that may be easier to take in the future would include:

• countercyclical capital;
• countercyclical risk weightings;
• countercyclical loan loss provisioning;
• countercyclical liquidity buffers;
• countercyclical margin and collateral requirements.

7| A MAJOR MISTAKE CAN MAKE FUTURE MACROPRUDENTIAL POLICY MUCH HARDER

The ability of macroprudential authorities to act can be curtailed sharply and quickly in the event of a major mistake in this policy area. This is illustrated very clearly by the history of the Credit Control Act. Congress in 1969 gave the President the power to direct the Fed to implement credit controls in the US economy, with a very wide grant of authority. This was not used until 1980, when President Carter invoked these powers to induce the Fed to take strong actions to rein in credit growth, which was seen as contributing to the inflationary environment (see EFL, 2013 for a considerably more detailed explanation of the actions and the surrounding circumstances).

The economy quickly sank into recession and there appeared to be a very direct connection between the credit controls and this drop in activity. Once the controls were removed, which was quite quickly thereafter, economic growth resumed, with a considerable bounce-back. The disastrous use of such a strong set of macroprudential tools made it much harder to attempt future macroprudential actions, even of milder and more conventional form. It did not help that President Carter’s subsequent defeat in the 1980 elections may have resulted in substantial
part from these unfortunate economic conditions. Within two years, Congress repealed the authority to establish credit controls. In general, 1980 may be seen as the high point in the use of macroprudential policies in America, with a very substantial drop starting soon thereafter and a virtually total cessation over the next decade.

Clearly there were other changes in the political, economic, and social environment after 1980, particularly the tide of deregulation that began in the 1970s and continued with the “Reagan Revolution”, but it seems highly likely that the disaster of 1980 played an important role in the decline of macroprudential policy. Certainly opponents of such policies cited it frequently.

This lesson has particular relevance for policymakers in the United States today, because America is essentially making a fresh start on macroprudential policy after the recent financial crisis and the passage of the Dodd-Frank Act. Little was done in this area for decades, so those actions that are taken will receive particular scrutiny. Global views on how macroprudential policy fits into the larger scheme of things have also evolved very considerably, adding to the sense of a fresh start. Should the United States authorities make a large mistake in this area, or be perceived to have done so, it could halt significant macroprudential policy of a cyclical nature in the United States for many years. This may be counteracted over time by the successful use of such tools in other countries, but home grown lessons tend to have much greater force, especially political force, than lessons from abroad.

This point is especially important because macroprudential policy is not solidly based in political and public support at this point. There is a very strong consensus for monetary policy to be undertaken, although there does remain a core of support for a gold standard. Monetary policy mistakes are unlikely to lead to the abolition of the Fed. The equivalent cannot be said for macroprudential policy.

8| MACROPRUDENTIAL POLICY MAY BE MOST EASILY DONE THROUGH A SINGLE BODY

A large majority of the macroprudential actions were taken by a single entity, the Federal Reserve, although there are a number of instances in which other entities acted, often in combination with the Fed. For instance, fears of excessive growth in housing credit in the 1950’s led to aligned moves by the Fed, the Federal Home Loan Bank Board, and the Federal Housing Administration.

It is clearly easier for a unified body to take a step than it is to coordinate among a number of players. Largely for this reason, the International Monetary Fund has argued on the basis of a global analysis that “the central bank needs to play an important role” in macroprudential policy, and has found that policy responses that involve the central bank tend to be quicker. However, US history shows that it is not impossible to reach a consensus, even for tightening moves, which are inherently more difficult to sell to politicians and the public.

Nonetheless, I have serious concerns that America’s macroprudential coordinator, the Financial Stability Oversight Council, will find it quite difficult to act, because of its nature as a large committee representing many regulatory interests. US history does not present definitive evidence in this regard, but the Fed’s predominant role does suggest that a more unified entity might have better luck implementing macroprudential policy.

9| CONCLUSIONS

US history strongly suggests that we can and should use macroprudential policy more actively in the future, after America’s hiatus of several decades prior to the financial crisis. We may do so most effectively by heeding the lessons of the last century of experimentation in this country.

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Macroprudential policy and quantitative instruments: a European historical perspective

From 1945 to the 1970s, rather than steering interest rates, European central banks used a variety of quantitative instruments to attain their targets in terms of monetary aggregates and credit, and as part of selective credit policies. A number of the tools currently being referred to as macroprudential (loan-to-value ratio, reserve requirements, liquidity ratio, etc.) thus have historical precedents, which this article sets out to examine. The objectives pursued in the past were not always the same as those being used to justify the implementation of macroprudential policies today. However, the instruments were used in part to modulate the expansion of credit and direct it towards specific sectors, as well as to control bank liquidity levels in an effort to secure financial stability. A historical perspective can thus help to shed some light on how prudential instruments can complement or, on the contrary, conflict with monetary policy. But this article also argues that historical comparisons need to be regarded with caution, as the financial and economic sectors have undergone radical changes, as have the institutional framework and objectives of monetary policy.

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The recent financial crisis has prompted numerous calls for the implementation of a macroprudential policy, motivated by a desire to increase the stability of the financial system. Macroprudential policy relies largely on existing tools derived from the current regulatory frameworks and from microprudential supervision. However, the use of these instruments to limit systemic risk, that is the risk of disruption to the overall financial system, is generally regarded as an innovation.

Macroprudential policy is usually described as having two key dimensions. The structural dimension is concerned with limiting the risks to financial stability, for example those caused by the interlinkages between financial institutions (common exposures, borrower-lender relationships). The temporal or cyclical dimension, meanwhile, is concerned with reducing excessive procyclicality in the financial system, often by acting on credit growth, even though the regulation of the economic and financial cycles is not strictly a target of macroprudential policy.1

The countercyclical use of macroprudential instruments by central banks is nothing new. Microprudential tools are frequently used for macroprudential purposes, especially in emerging Asian economies where measures such as the tightening of lending criteria (e.g. lowering of caps on the loan-to-value – LTV ratio) appear to have reduced the vulnerability of the financial system (Committee on the Global Financial System, 2010; Lim et al., 2011). There are also numerous older examples of central banks intervening in the financial system as part of an approach that can be qualified as macroprudential (Goodhart, 2010; Capie and Wood, 2011; Monnet et al., 2013; Elliott et al., 2013). Recent studies (Elliott et al., 2013; Reinhart et al., 2013) have highlighted the frequent use of instruments that can be classified as “cyclical macroprudential” in the United States throughout the 20th century, notably in response to the stock market bubble in the 1920s, the housing bubble in the 1950s, the credit crunch in the 1960s and the banking crisis in the 1980s. These consist of tools designed to influence the demand for credit (caps on the LTV ratio or on the size of repayments) and credit supply (caps on interest rates, restrictions on bank loan portfolios, reserve requirements, capital ratios), and which were used to modulate credit growth both in the broader economy and in specific sectors. Similarly, from 1945 to the 1970s, the majority of European central banks relied primarily on quantitative control instruments rather than on interest rate mechanisms to steer credit growth or redirect it towards specific sectors, and to influence bank liquidity levels in order to maintain financial stability (Hodgman, 1974; Monnet, 2013, 2014).

Opinion is currently divided over whether a return to this kind of macroprudential policy would be useful. Advocates point to historical experience as justification for macroprudential frameworks (Borio, 2010; Goodhart, 2010) while others are deeply critical (Reinhart, 2012), maintaining that the “macroprudential” restrictions or regulatory measures adopted between the late 1940s and the 1970s in Bretton Woods countries were little more than a form of financial repression which encouraged the “liquidation” of public debt.

These historical examples thus provide a useful perspective for assessing whether or not macroprudential measures can be regarded as appropriate or efficient. Our aim in this article is twofold – first to present the quantitative and prudential instruments used by the main European central banks in the period 1945-1980, and second, to compare briefly the previous use of these instruments with the macroprudential policies currently being implemented.

1| DEFINITION AND FRAMEWORK OF MACROPRUDENTIAL POLICY

1|1 How do we define macroprudential policy?

It is not easy to find an exhaustive and universally accepted definition of macroprudential policy. The term itself is a relatively new invention. The first public references to the “macroprudential” supervision of the financial system surfaced in

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1 “Today, the most realistic objective of macroprudential policy is considered to be “to increase the resilience of the financial system to the emergence of financial strains”, through “the countercyclical building-up and releasing of capital and other buffers in the financial system” (Bank for International Settlements, 2010).
the 1980s – the Cross report (Bank for International Settlements, 1986) used it to refer to the vulnerabilities created by the financial innovations of the time – and it was only in the wake of the 2007 financial crisis that the term became more common. The Basel Committee’s recent reform of banking regulation, Basel III, which came into force in the European Union in January 2014, establishes specific macroprudential instruments. However, there is still ongoing debate over the precise definition, objectives and institutional framework of macroprudential policy, and the use of the term “macroprudential” remains ambiguous (Borio, 2009; Clement, 2010).

Macroprudential policy is designed to reduce systemic risk, defined as the risk of a disruption in the activities of the financial system that will have serious consequences for the real economy (Galati and Moessner, 2010). Macroprudential policy is therefore a useful complement to microprudential policy: the former focuses on the stability of the overall financial system, while the latter aims to ensure the solvency of individual financial institutions. Although macroprudential and monetary policy are closely linked, they do not always share the same goals: while some believe that monetary policy should also be concerned with preventing financial imbalances (Borio and Lowe, 2002), the conventional wisdom now is that its main goal is to ensure price stability by setting interest rates.

Macroprudential tools can be categorised in a number of ways. They can be divided into new instruments designed specifically for macroprudential policy, and those that were already part of the existing microprudential or monetary policy toolkits (capital ratios for the former and reserve requirements for the latter), and which can be redefined for financial stability purposes (Banque de France, 2013). Macroprudential tools can also be divided into price-based instruments (haircuts, capital ratios, liquidity ratios, financial transaction taxes, for example) and quantity-based instruments (constraints on the LTV ratio and debt-service-to-income – DSTI ratio for residential property loans, guarantee deposit requirements for secured financing transactions).

More subjectively, recommendations, guidelines or pressure can also be regarded as macroprudential if they seek to render the financial system more resilient: Draghi (2013) cites the recent recommendations from the Spanish and UK central banks that banks should maintain adequate capital levels as examples of macroprudential policy.

The historical analysis we propose in this article focuses on the temporal dimension of macroprudential policy, that is the use of instruments aimed at mitigating excessive procyclicality in the financial system. Following the example of Elliott et al. (2013), we define cyclical macroprudential measures broadly as those tools that are not part of a “traditional” fiscal or monetary policy (according to the current definition of these policies), and which are used more or less directly to steer credit growth throughout the economic and/or financial cycle (as opposed to structural changes in regulation). It is important to note that credit expansion has often been a root cause of financial imbalances (e.g. asset bubbles) and that instruments to adjust lending criteria play a vital role in macroprudential policy as they limit the procyclicality of the financial system. Thus measures to control credit growth form an important part of the countercyclical macroprudential tools introduced under Basel III, and there is a significant focus on the smoothing of credit cycles.

From a historical perspective, the instruments defined today in Basel III and in national legislation to modulate lending criteria (see Box below) can be seen as a reflection of past experiences. However, it is important that any comparison be viewed with caution.

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2 In addition, macroprudential policy considers the aggregate risk to be endogenous and dependent on the collective behaviour of institutions, whereas microprudential policy regards it as exogenous.
3 Both have macroeconomic stability as their ultimate objective and their channels of transmission, the credit channel and bank balance sheets, are similar.
4 Quantity-based instruments are often considered to be more vulnerable to distortions and regulatory arbitrage than price-based instruments (for example Lim et al., 2011; and Haldane, 2013). Moreover, the distinction between instruments based on prices and those based on quantities does not correspond to the historical definition of quantitative instruments (instruments used to directly control quantities as opposed to interest rate mechanisms, see section 2.1).
5 For example, the countercyclical capital buffer will be activated on the basis of the change in the ratio of credit to GDP in relation to its long-term trend (see Bank for International Settlements, 2010, and Article 136 of Capital Requirements Directive – CRD IV).
6 Although this is not in itself one of the primary objectives of the new countercyclical macroprudential instruments (which are designed primarily to increase the financial system’s ability to withstand systemic risks), the Basel Committee considers that a reduction in the procyclicality of the financial system (via a moderation of the expansionary phase in the credit cycle) would be a ‘positive side benefit’ of the countercyclical capital buffer (Basel Committee on Banking Supervision, 2010).
Box

Current implementation of macroprudential tools in the European Union

The instruments defined under Basel III are transposed into European Union legislation via a Capital Requirements Regulation (CRR) and a Capital Requirements Directive (CRD IV). The bulk of the rules contained in the legislative package apply since January 2014.

- These texts include provisions whereby the quality and quantity of “core” capital can be increased using different capital buffers, such as a countercyclical buffer, a specific buffer for systematically important financial institutions (SIFIs) and, at European level, a buffer for structural systemic risk. Regulators will also be able to use microprudential tools to promote financial stability (for example, adjusting the risk weighting of residential property loans).

- In the medium term, these instruments will be backed up with a liquidity coverage ratio (LCR) and a net stable funding ratio (NSFR). Although in principle, these liquidity requirements are microprudential measures, they also have a cyclical dimension and work is currently underway to determine how to use them for macroprudential purposes. There will also be a measure to limit bank leverage via a leverage ratio that is separate from risk exposure and takes into account off-balance sheet items. This too could potentially be used as a macroprudential tool to target systemic risk (ESRB, 2013).

- The main quantitative tools (constraints on loan-to-value and debt-to-income ratios, etc.) are not harmonised under the legislative package but European Union member states consider their use at national level.

- In France, the law of 26 July 2013 separating and regulating banking activities created a macroprudential authority, the Haut Conseil de stabilité financière (HCSF – High Council for Financial Stability), which will be responsible for all decisions relating to countercyclical and systemic capital buffers. The law also specifies that the HCSF can set lending criteria for banks in order to avoid excessive rises in asset prices or prevent economic agents from building up excessive levels of debt.

1|2 Relevance and limits of historical comparisons and specific features of credit policy

Although the instruments currently associated with macroprudential policy have been implemented in the past, they were often used to achieve completely different objectives to those currently being sought. For instance, quantitative tools to control credit, bank liquidity or credit standards were used for a combination of monetary policy (control of inflation), industrial policy or trade policy purposes, as well as for prudential control.

The main limits of any historical comparison relate to the interpretation of what constitutes macroprudential policy.7 In order to be able to make a useful comparison, it is therefore important to use the broadest possible definition.

In the past, public authorities used quantitative tools in a context when the boundaries between fiscal, monetary, industrial and prudential policies were deliberately blurred. Indeed, it is only in the past two decades that a clear distinction has been made between these policies, due in part to the increasing independence of central banks, which was one of the prerequisites for European Monetary Union in the 1990s. This independence, which was deemed a condition for both price and financial stability, was a key issue in the debate over whether to attribute central banks a prudential role.8 The distinction between policies also stems from financial market deregulation, beginning in the 1980s and culminating in the 1990s, which led to a redefinition of the role of central banks and to a restriction of their mandates in order to guarantee their credibility.

Although quantitative instruments were used massively from the 1930s to the 1970s as part of

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7 In their study of macroprudential policies in the United States, Elliott et al. (2013) recognise the limits of historical comparisons and decide to use a relatively broad definition, which distinguishes macroprudential policies from our current understanding of monetary and fiscal policies (see section 1.1.).

8 In his history of European Monetary Union, Harold James recounts how the debates that followed the 1989 Delors Commission frequently struggled with the question of how to grant regulatory powers to an institution that was independent of the government; see James (2012).
central banks’ strategy to control inflation, they were subsequently called into question amid concerns of a dangerous overlap between monetary and other policies.\(^9\) After Milton Friedman in the 1960s and Marvin Goodfriend and Robert King at the end of the 1980s, a whole strand of economic thought began to push for a clearer distinction between monetary policy – which is concerned essentially with controlling the money supply and inflation without affecting asset allocation – and banking or credit policy which influences the allocation of assets via bank supervision, direct control of credit and liquidity or the composition of central bank assets (Friedman, 1959; Goodfriend and King, 1988). Today, however, those who advocate macroprudential policies would like central banks to be given back policy levers to control asset allocation and quantities with the aim of reducing financial risks, while at the same time supporting the ideas of Friedman, Goodfriend and King who maintain that both in practice and in theory monetary policy and macroprudential policy should be kept completely separate.

2) Historical equivalents of macroprudential policy

The main quantitative instruments used by European central banks from 1945 to the 1970s which, in hindsight, can be equated to a macroprudential policy, fall into two main categories:\(^10\) those that directly influence bank credit and those that influence liquidity and the composition of bank assets.\(^11\) The expression “quantitative instruments” is here used in its historical sense to mean any tool used to directly control the quantity of credit rather than to steer interest rates. In the period under review, central banks also issued a number of individual or general recommendations to the banking sector which can be regarded as part of macroprudential policy, in that they were designed to increase the resilience of the financial system (see section 1[1]).

Although there are examples of countries implementing these tools in the 1930s and especially during World War II, their use became more widespread after 1945. This was due to the introduction of new banking regulations and the key role attributed to central banks under these regulations. Prior to the 1930s, with the exception of Sweden and the United Kingdom, there was no banking supervision or regulation in Europe, and in France, for example, the first banking law was introduced in June 1941. The institutions responsible for implementing these policies and regulations varied across countries, but in most cases the role fell to the central bank, in close cooperation with the ministry of finance (Holbik, 1973; Singleton, 2010; Monnet, 2014). In all countries, the underlying principle of the new policies was to use banking regulation for macroeconomic purposes, in order to avoid modifying the law and going through parliament.

2|1 Credit control instruments: rediscunt ceilings and constraints on credit expansion

The “rediscunt ceiling” was a cap on the total value of loans that the central bank would discount for each bank or credit institution. The ceiling was generally a percentage of the bank’s deposits and was entirely discretionary, varying from one institution to another according to the quality of their assets and their individual risk exposure. As such, it was primarily a microprudential tool. However, it could also be used for macroeconomic purposes, in a similar way to an industrial, agricultural or trade policy, as certain institutions, sectors or types of loan could be given priority access to central bank funding. The Banque de France used the ceilings for all these purposes until the practice was abolished in 1972 (Monnet, 2012).

In addition to the official ceilings applied to each institution, the central bank could impose temporary ceilings on loans used to finance specific products, in order to avoid the risk of a bubble caused by excess credit growth. In the 1950s and 1960s, for example, the Banque de France frequently set rediscouting
quotas for agricultural products (cereals and poultry) whenever the Ministry of Agriculture and the Banque's own departments identified an "overproduction crisis" (Monnet, 2013).

As well as being used for microprudential purposes or to target specific sectors, these ceilings also had a macroeconomic and cyclical function. By simultaneously lowering or raising all ceilings by a fixed percentage, the central bank could adjust credit growth, money supply and prices to combat inflation or, conversely, stimulate the economy. Up until the end of the 1960s, the majority of Western European and US central banks believed that inflation was primarily linked to an excess of credit growth in relation to output. In economies where financial markets played a limited role and the banking sector was highly regulated, this excess credit supply translated directly into higher consumer and output prices rather than into higher asset prices and financial risks. Thus, the quantitative and countercyclical limitation of credit growth via a reduction in rediscount ceilings (credit rationing) was primarily used as a monetary policy tool in that it was intended to limit inflation.

It should be noted that rediscount ceilings were a highly efficient way of controlling money creation if banks carried substantial levels of central bank debt (Monnet, 2012). They were much less effective, however, if banks' central bank debt was low. Thus, from the 1950s onwards, many central banks chose to impose direct limits on credit expansion, a practice which in France was known as a "credit ceiling" (encadrement du crédit). This involved imposing a cap on the actual amount banks could lend to households and corporations rather than on their central bank refinancing. The definition of this tool and its scope of application varied widely from one European country to another, depending on the choice of policy and the structure of the banking system. The only country never to use it was the Federal Republic of Germany.

The countercyclical nature of direct credit controls extends beyond the realms of monetary policy. First, they could be used for preventing any financial bubbles which might have appeared in the form of an overall rise in prices. Second, they were an effective tool for influencing the allocation of credit, as certain types of loan could be exempted (export credit, housing loans, occasionally medium-term loans). Moreover, as interest rates did not rise during periods of credit control, the state treasury could issue bills at attractive rates and thus raise financing more easily. In France, throughout the 1950s and 1960s, special regimes or exemptions were applied first to housing loans and then to consumer credit either to boost lending or prevent bubbles without affecting the rest of the economy (Efrosse, 2003; 2013).

It is difficult to estimate the effects of these quantitative controls. In the case of France, Monnet (2012) demonstrates that the use of credit controls for monetary policy purposes between 1948 and 1973 enabled authorities to lower inflation rapidly and dramatically, without raising interest rates. But this is only one dimension of a credit rationing policy. With regard to the objective of financial stability, we need only point to the lack of a crisis over the period (except in 1974 in the United Kingdom and in Germany). However, this stability can be attributed to a number of other factors, notably the fact that financial markets were not very open at the time. In the case of the United States, Elliott et al. (2013) postulate that these instruments had a positive impact over the short term but that over the long term they generated distortionary effects that became apparent in the 1970s when credit controls were no longer sufficient to contain inflation (ineffective or misused) and serious questions were raised over their ability to influence the allocation of credit.12

2|2 Liquidity and reserve requirements

After World War II, banks in Western Europe were subject to liquidity and reserve requirements, designed to channel resources towards specific sectors of the economy (and especially the public sector) and encourage the issuance of medium and long-term loans. Over time, these requirements have been varyingly called "liquidity ratios" or "liquid asset ratios", depending on the country (BIS, 1963; Holbik, 1973; Monnet, 2014). For example, obliging banks to increase the volume of long-term treasury bonds in their portfolios helped to channel investment...
towards the public sector and – in the short term – reduced the amount of liquidity in the economy. This way, liquidity and reserve requirements were effective tools for influencing credit distribution and levels of bank liquidity (by placing constraints on banks’ use of liquidity or obliging them to hold specific securities). They can thus be regarded as prudential policy tools, to the extent that they helped to regulate risk.

Liquidity ratios were used countercyclically, in a similar way to the credit controls described previously. If the central bank wanted to lower inflation and considered that there was an excess supply of credit to the economy, it could raise liquidity ratios to force banks to keep a higher proportion of liquid assets on their balance sheets, thus reducing the supply of liquidity to the economy.

Finding the optimal balance between liquidity ratios and credit controls was one of the key concerns of central bank discussions (Monnet, 2012). Liquidity ratios were considered a crucial complement to credit controls: if a bank’s credit was rationed at the central bank discount window through a reduction in its discount ceiling, then it also had to be prevented from converting its long-term securities into liquid assets in order to limit money creation and maintain a restrictive policy. In order to meet the desired policy objective, it was therefore essential for the central bank to use a combination of instruments to prevent banks from substituting their assets. This was facilitated to a large extent by the fact that the financial system was primarily dependent on banks, so asset substitution was limited to bank assets, as demonstrated by the difficulties encountered by the Bank of England in using instruments similar to those developed in continental Europe (Capie, 2010). In a financial system that is more dependent on capital markets than on banks and where asset substitution is no longer restricted solely to the banking sector, these instruments are harder to use and their effect on money creation is thus reduced.

Throughout the 1960s, the use of liquidity ratios declined in the European Community. France, Italy and Belgium moved increasingly towards a German model, which focused more on reserve requirements, although none of the central banks in the region relied exclusively on this one instrument. The reserve requirement or reserve ratio is the minimum portion of customer deposits and/or loans that banks have to hold in reserve at the central bank, in interest-earning or non-interest earning accounts. The central bank could change the reserve ratio in order to control money supply. If the deposits held do not earn interest, this instrument constitutes a form of tax on the banking system, as opposed to a market-based system of liquidity management (Brock, 1989). It is also a selective system in that not all credit institutions are subject to the same requirements. In France and Italy, for example, public institutions had no reserve requirements, while in the majority of European countries different requirements were set for non-residents. If the reserve requirement was set as a percentage of loans instead of deposits, long-term loans and export loans could also be excluded from the calculation (for example in Belgium and France).

Like the other instruments described in this paper, reserve requirements were ambiguous and could be used for a variety of different purposes. They enabled the regulation of money supply, and could also be used to favour specific sectors or for the prudential regulation of liquidity. The BIS today recognises reserve requirements as a macroprudential policy tool to the extent that they limit liquidity risk (BIS, 2010).

2|3 Informal powers and recommendations

In addition to these official quantitative instruments, central banks have also used their role as bank supervisors or as providers of bank finance to influence behaviour at an individual, sector or macroeconomic level. It is difficult to find a trace of these policies as they tended to be based on more or less formal exchanges of information which are thus hard to observe or to quantify. However, a few recent studies have shown that these practices were common and exerted an influence on the banking system.

One example was the Bank of England’s habit of discussing liquidity and solvency ratios with banks, before it was officially assigned the role of bank regulator in 1979 (Capie, 2010). France and Italy also had national credit councils which, particularly in the post-war reconstruction period, regularly singled out sectors, products or regions which they thought needed to be given priority in the distribution of credit or, on the contrary, had an abnormal level of debt and needed to be contained (Monnet, 2013).
The central bank’s power to discriminate against individual banks in the refinancing process via its discount window and to issue official directives or administrative circulars, makes it highly likely that these unofficial recommendations played a significant role.

3 | Conclusion

Some of the instruments used in the past by European central banks can be considered comparable to today’s macroprudential policy tools. However, the main difference is that in the past no distinction was made between macroprudential policy and fiscal, monetary or industrial policies. The instruments were often used in complex and varying combinations, which served to combat inflation, facilitate public sector financing, aid post-war recovery or channel credit to those sectors deemed in most need. The regulation of financial risk was also an objective, but was often relegated to a secondary role.

These policies were implemented against a backdrop of highly regulated and relatively closed national financial systems, where an excess supply of credit translated primarily into upwards inflationary pressure rather than into a banking or financial crisis. Quantitative control instruments proved particularly effective in this context, where financial markets were neither as developed nor as open as they are today. Credit controls were often backed up with capital controls and could thus be targeted specifically at the banking sector without leading to an exchange of assets with the rest of the financial sector. The degree of openness and the complexity of the financial system are thus key factors in determining the choice of macroprudential instruments, which in turn explains why emerging and developed economies prefer to use different tools ( Claessens et al., 2013 ).

The use of these instruments was largely driven by the belief that a central bank’s role was both to control inflation and to implement a selective credit allocation policy, thus pursuing a form of industrial policy. However, this has since been called into question, and it is difficult to draw lessons from history in a context where institutional objectives and central bank mandates in Europe and the United States have changed radically. That said, history still demonstrates that the implementation of a macroprudential policy can have a significant impact on monetary policy: the use of quantitative instruments to control credit and bank liquidity necessarily influenced money creation and inflation due to the low level of bank disintermediation, and often had an impact on credit allocation as banks substituted the assets on their balance sheets. Consequently, central banks have a key role to play in implementing macroprudential policy, as it is vital that this strategy be coordinated closely with monetary policy.

It should be noted however, that this belief is still common in certain countries such as China, where macroprudential and industrial policy instruments are closely linked.
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Macroprudential policy interactions and transmission channels
Macroprudential policy has largely been viewed and implemented as a form of banking regulation in recent practice. However, the externalities to be addressed by macroprudential policy stretch beyond the banking sector and also play a prominent role in the household and corporate sectors. Trying to address these externalities with banking regulation alone leads to various forms of leakage as they encourage lending to move to non-banking financial intermediaries and foreign banks – a problem that has affected the implementation of macroprudential policies. We discuss how a macroprudential policy framework could be extended beyond banking regulation in feasible and practical ways, for example by targeting policies on borrowers rather than lenders.
Following the global financial crisis of 2008-2009, macroprudential policy is often presented as a third pillar of the policy mix for macroeconomic stabilisation, together with monetary policy and fiscal policy. Frameworks for macroprudential policy are being established, but a number of questions about the appropriate instruments, the appropriate governance, and the relationship with monetary policy remain open. Meanwhile, a new theoretical literature has evolved to study the foundations of macroprudential policies and shed light on questions of their implementation. In this paper we would like to draw attention to a gap between theory and practice that has significant consequences for the effectiveness of macroprudential policies.

On the practical side, macroprudential policy is typically treated as a part of banking regulation. Macroprudential policy is a topic for central bankers and bank regulators. The instruments of macroprudential policy are the tools of banking regulation.

However, the frictions to be addressed by macroprudential policy stretch beyond the banking sector. They also play a prominent role in the household or nonfinancial corporate sectors. Trying to address these frictions with banking regulation leads to various forms of leakage – a problem that has affected the implementation of macroprudential policies.

This is especially problematic in Europe because having a common currency implies that monetary policy cannot play its role of macroeconomic stabilisation in response to asymmetric shocks. Therefore macroprudential policy must take on a greater role in macroeconomic stabilisation.

This note is structured as follows. We briefly review the framework for macroprudential policies as it is being put in place (section 1) and compare it to the main lessons from the recent theoretical literature (section 2). We show how the existence of a gap between the objectives and the instruments of macroprudential policies leads to several sources of leakage that reduce the effectiveness of these policies (section 3). We then offer some thoughts on measures to make macroprudential policy more effective (section 4).

1 THE MACROPRUDENTIAL REGULATION OF BANKS

Recent policy reforms take macroprudential regulation to be a form of banking regulation. Most reforms so far have focused on extending the traditional framework of banking regulation to include macroprudential objectives.

The starting point of the macroprudential regulation of banks is a contrast with microprudential regulation. Microprudential regulation aims to guarantee the stability of individual banks and is therefore by definition a form of banking regulation. Microprudential regulation curtails risk-taking by banks with the goal of protecting unsophisticated depositors and limiting moral hazard generated by financial safety nets.

An area that illustrates this difference very starkly is the use of value-at-risk (VaR) models by banks. The microprudential approach would hold that risk is appropriately contained if all banks limit their exposure to market risk using VaR models. By contrast, the macroprudential approach recognises that collectively, VaR models may generate systemic risk if they compel all banks to sell the same assets in a crisis, leading to an asset-price crash (Shin, 2010). Similarly, constant capital adequacy ratios could be procyclical and exaggerate systemic risk even though they may seem appropriate from a microprudential perspective. A macroprudential approach, thus, would gear these instruments (VaR or capital adequacy ratios) to the stability of the system as a whole rather than to individual institutions.

To a large extent the macroprudential approach to banking regulation represents a gradual evolution in traditional policies rather than a radical change. The notion that banking regulation had to mitigate systemic externalities was understood and accepted before the crisis, although it was overlooked by some regulators, as was the extent of the systemic vulnerabilities that had developed in the global banking system.1

Most of the policy instruments that are used for macroprudential regulation are the traditional instruments of microprudential banking regulation.2

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1 See Borno (2003) for an early discussion of the distinction between the micro- and macroprudential approaches to banking regulation.

2 The ten instruments reviewed in Lim et al. (2011) are: caps on the loan-to-value (LTV) ratio, limits on maturity mismatch, caps on the debt-to-income (DTI) ratio, reserve requirements, caps on foreign currency lending, countercyclical capital requirements, ceilings on credit or credit growth, time-varying/dynamic provisioning, limits on net open currency positions/ currency mismatch, and restrictions on profit distribution.
Some of these instruments target certain characteristics of bank loans, such as restrictions on debt-to-income (DTI) or loan-to-value (LTV) ratios. Other instruments, still aimed at banks’ assets, attempt to limit the growth in banks’ total loans, the loans to particular sectors, or the loans denominated in foreign currency. On the bank liability side, capital adequacy regulation is also used for macroprudential purposes. These tools are not new but they are used with an eye to limiting the contribution of banks to systemic risk rather than simply limiting the risk of individual banks. For example, time-varying capital requirements, in the form of a capital surcharge linked to aggregate credit growth, are part of the new Basel III accord. In the future, these regulatory developments could rely more on new measures of systemic risk contributions, such as CoVaR (Adrian and Brunnermeier, 2011) and systemic measures of equity shortfall (Acharya et al., 2010).

Existing empirical research finds that the macroprudential regulation of banks has been effective in some ways. Based on aggregate data, Lim et al. (2011) and Dell’Ariccia et al. (2012) find evidence of some macroprudential policies being effective in reducing the procyclicality of credit and leverage. Claessens et al. (2013) look at the experience of 48 emerging market and advanced economies, of which 35 used macroprudential measures over the period 2000-2010 based on disaggregated data on more than 2,000 banks. They look at the impact of nine different macroprudential instruments and find that they generally reduce the growth in leverage, total assets and non-core liabilities of banks. There is evidence that measures contingent on the characteristics of the borrowers, such as caps on the LTV ratios or the DTI ratios, are more effective than capital adequacy ratios or rules about provision. As we will discuss in more detail below, it turns out that such measures that target borrowers are also better aligned with the goals of macroprudential policy proposed by the theoretical literature.

One strand of this literature focuses on the externalities generated by asset price swings and fire-sale externalities (see e.g. Jeanne and Korinek, 2010; Benigno et al., 2013; Bianchi and Mendoza, 2010). According to this view, collateralised borrowing leads to externalities because individual borrowers do not internalise that increasing leverage during good times will force them into greater deleveraging during bad times when they fire-sell assets, thereby exacerbating downturns.

Another externality is related to the network of cross-bank claims and liabilities. The interconnectedness externality comes from the fact that the distress or failure of a bank can directly affect other institutions through exposures in the interbank market or the derivative markets because of a “domino effect”. The literature on financial networks suggests that high interconnectedness mitigates the impact of small shocks but amplifies large shocks (Acemoglu et al., 2013). Individual institutions do not internalise their contribution to the propagation of the systemic risk when they contract with other banks, leading to a network that is excessively fragile.

A third strand of literature on macroprudential regulation focuses on collective moral hazard (see e.g. Farhi and Tirole, 2012) and observes that the collective risk-taking behaviour of economic agents induces policymakers to engage in costly macroeconomic policy measures that bail them out, e.g. protracted expansive monetary policy, countercyclical fiscal policy or direct financial sector support.

Yet another strand of literature proposes macroprudential regulation to address aggregate demand externalities that arise in the presence of nominal rigidities when there are limits to the use of monetary policy (Farhi and Werning, 2013). An important example is policies that reduce leverage in good times to prevent an economy from entering a deleveraging-induced liquidity trap in bad times (Korinek and Simsek, 2013). Schmitt-Grohé and Uribe (2012) consider an economy with downward nominal rigidity that pegs its nominal exchange rate (they have euro area members in mind). The nominal wage increases during a boom in capital inflows, but does not fall when there is a reversal, leading to unemployment. The externality, in this case, is that agents do not take into account the impact of increasing their nominal wages on future unemployment.

2| THEORY

The recent theoretical literature takes a much broader view of macroprudential policy. To put it in very general terms, it views macroprudential policies as policy measures that mitigate externalities generated by certain financing activities or financial instruments that lead to systemic risk.
Macroprudential policy beyond banking regulation
Olivier Jeanne and Anton Korinek

There is no doubt that the externalities that justify macroprudential policies are important in the banking sector. Fire sale and network externalities were certainly at play in the banking sector in the recent crisis (Brunnermeier, 2009). And some of the recent theoretical literature specifically looks at the effects of these externalities in the banking sector (see e.g. Stein, 2012).

However it is important to realise that many of the externalities that justify the use of macroprudential policies stretch beyond the banking sector.

The recent theoretical literature on Fisherian deflation, for example, has studied how the type of fire sale externalities that have been invoked to justify macroprudential regulation of banks also lead to excessive leverage in the real sector: in a residential real estate bust the fact that households are credit-constrained puts further pressure on house prices, amplifying the bust. This feedback loop imposes negative externalities on other households. This mechanism is analysed in the three-period model of Lorenzoni (2008), and more dynamic quantitative contributions can be found in Jeanne and Korinek (2010) and Bianchi and Mendoza (2010). These papers talk about macroprudential policy in the context of models that do not involve banks.

This is even truer of the mechanisms that involve aggregate demand rather than financial externalities. The models of Schmitt-Grohé and Uribe (2012), Farhi and Werning (2013) or Korinek and Simsek (2013) exhibit aggregate demand externalities during credit busts that call for macroprudential regulation but do not revolve around banks.

The externalities justifying macroprudential policy interventions may occur within the banking sector, but many of them are the result of borrowing and lending activities that occur outside of the traditional banking sector. Imposing regulations that affect solely the banking sector therefore lead to a gap between the objectives and the instruments of macroprudential regulation. It would be akin to a central bank that only has the power to set interest rates at which banks obtain credit but that has no effect on other segments of financial markets. Several challenges that policymakers currently face in the implementation of macroprudential policy are in fact the reflection of this gap.

The problem, essentially, is that the macroprudential regulation of banks attempts to influence the actions of the borrower in the real sector indirectly, by affecting the supply of loans by banks. The fact that policy attempts to achieve its goal indirectly leads to two main forms of leakage.

First, some of the borrowing and lending activities that generate negative externalities may occur outside of the banking sector and as such fall outside the scope of banking regulation. For example, a significant part of mortgage lending in the United States, in particular in the subprime sector from which the 2008-2009 crisis originated, had bypassed the traditional banking sector. Another example is the large buildup of corporate debt, in particular in the technology, media and telecommunications sector, in the United States in the late 1990s that contributed to the slow recovery from the 2001 recession. At present, China is struggling with a large amount of debt in its shadow financial sector that has been intermediated outside of the regulated banking system and makes up close to one third of all financing in the Chinese economy. Recent wobbles in this unregulated segment of the Chinese financial sector have raised significant concerns about financial stability.

3| GAPS AND LEAKAGES

The externalities justifying macroprudential policy interventions may occur within the banking sector, but many of them are the result of borrowing and lending activities that occur outside of the traditional banking sector. Imposing regulations that affect solely the banking sector therefore lead to a gap between the objectives and the instruments of macroprudential regulation. It would be akin to a central bank that only has the power to set interest rates at which banks obtain credit but that has no effect on other segments of financial markets. Several challenges that policymakers currently face in the implementation of macroprudential policy are in fact the reflection of this gap.

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It has been common in recent decades to observe lending activities move from the traditional regulated banking system into non-bank financial intermediaries that are subject to less regulation or no regulation. From a microprudential perspective, this may have been acceptable as it moved risk off the balance sheets of banks that are formally insured and thereby reduced the official contingent liabilities of the lender-of-last resort for banks. However, from a macroprudential perspective, leakage implies that lending activities in unregulated or under-regulated segments of the financial market impose enormous negative externalities on the rest of the economy and lead to excessive credit growth, as illustrated by the run-up to the global financial crisis of 2008-2009. Such leakage therefore constitutes a socially costly form of regulatory arbitrage.

The second channel of leakage has to do with limitations in the international reach of domestic macroprudential regulation. In an internationally integrated banking system, the borrowers of a given country can borrow from foreign banks, directly or through their domestic branches. National regulators have jurisdiction over domestic banks as well as the subsidiaries of foreign banks. But the branches of foreign banks (unlike their subsidiaries) are only to a very limited extent subject to domestic regulation.3

As a result, the borrowers of a given country can respond to a restriction in domestic macroprudential policy by transferring their business from domestically regulated institutions to banks whose activity is regulated abroad. Large corporate borrowers can borrow directly from foreign banks and smaller borrowers can obtain funds through domestic branches. For example in the United Kingdom, Aiyar et al. (2014) find that UK-owned banks and resident foreign subsidiaries reduce lending in response to tighter capital requirements but that this effect is partially offset by an increase in lending from resident foreign branches. This leakage is substantial, amounting to about one-third of the initial impulse from the regulatory change.

International leakage problems are especially significant in the euro area, where banking integration makes it difficult to address national booms and busts in credit and asset prices by using national macroprudential regulation. The rules of the single market allow foreign banks to engage in domestic lending but strongly curtail the ability of domestic regulators to impose macroprudential restrictions on such lending activities (Aiyar et al., 2014).

In fact, before the global financial crisis of 2008, there was a strong movement towards granting market access to foreign financial institutions without subjecting them to the financial regulations of each country in which they are active in, based on the notion that regulators in the country of origin could ensure the soundness of individual financial institutions. This is a clear example of where a microprudential mindset interfered with the capacity to impose effective macroprudential regulation and preserve systemic financial stability. Unfortunately, this mindset continues to be pushed in many of the investment treaties that open up market access for foreign financial institutions in emerging markets, hampering the ability of local policymakers to engage in effective macroeconomic stabilisation policies (see e.g. Gallagher, 2011).4

As these examples illustrate, implementing macroprudential regulation solely through the banking sector leaves important areas of the economy outside of the reach of regulators. They encourage lending activities to leak from the regulated banking sector to non-banking financial intermediaries or foreign banks. This continues to leave our economies vulnerable to excessive booms and busts and to the associated large externalities.

## 4 | Macroeconomic Policies beyond Banking Regulation

The main lesson that we draw from the gaps and leakages in the existing macroprudential policy regime is that it would be desirable for macroprudential regulation to move beyond banking regulation in order to be effective. Specifically, macroprudential regulation must be broadened and targeted as

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3 Basel III allows domestic regulators to require foreign regulators to impose higher capital standards on domestic lending by foreign banks. In the European Union, this was implemented through the Capital Requirements Directive. These cooperation agreements narrow the gap but they are still subject to considerable limitations.

4 If less regulated foreign banks compete with local banks, this may also induce a regulatory race to the bottom as domestic regulators are under pressure to ensure that domestic banks are not at a competitive disadvantage to foreign banks.
closely as possible at those activities that generate externalities.

As we discussed above, most of the externalities that underlie macroprudential concerns originate from leveraged borrowing in the real sector – no matter whether the source of funds was domestic banks, international banks, or alternative lenders outside of the regulated banking system.

If we were to design an optimal macroprudential policy framework from a clean slate, it would cover any type of financial intermediation rather than focusing on bank credit. Furthermore, it would specifically penalise credit to highly leveraged borrowers, which creates particularly large negative externalities on the macroeconomy.

One political difficulty of this approach is that it requires policy instruments that are considerably broader in scope than banking regulation, which therefore needs to rely on new powers granted by the political process. In short, the state needs to impose limits on the freedom of contract in order to regulate the massive externalities created by leveraged borrowing. In the context of banking regulation, this practice is commonly accepted: the state grants banks the license to operate and offers them the protection of the law under the restrictions that derive from banking regulation. In the context of broader macroprudential regulations, the state would have to condition the enforcement of lending contracts on lenders obeying the desired macroprudential restrictions.

In practice, policymakers already have a number of instruments in their toolkit that enable them to curtail a much wider set of externality-generating activities than what is covered by banking regulation.

One important avenue that is of particular relevance to curbing housing booms is consumer protection laws. In many countries, these laws enable regulators to protect consumers by imposing LTV or DTI ratios on mortgages and by curtailing usury interest rates or the use of short maturities. Sometimes consumer protection regulations are viewed as static policy instruments that are kept at a constant level at all times, similar to many microprudential banking regulations. However, just like microprudential banking regulations are insufficient to protect the banking sector from systemic risk, it is important that consumer protection have a systemic dimension that requires that regulations be tightened in periods of excessive booms. This gives consumer protection laws a macroprudential dimension that could mitigate real estate booms and busts and therefore curtail one of the greatest sources of macroeconomic instability in history.

Another avenue that is relevant for most advanced economies is to reform tax codes that favor interest payments over dividend payments. Such tax codes encourage leverage and have strongly adverse effects on macroeconomic stability. This practice should therefore be abolished by unifying the tax treatment of interest and dividend expenses for corporations. From a macroprudential perspective, it would even be desirable to move in the opposite direction, i.e. to provide a tax advantage to equity over debt by allowing for tax deductions of corporate dividends but not debt. This would mitigate the externalities associated with excessive leverage both in the corporate and financial sector. Ideally, the relative tax treatment of debt and equity should be adjusted to the economic cycle, but the political process behind fiscal policy may make this difficult in practice.

Certain tax-like instruments, however, can be sheltered from short-term political influences. This is especially the case with capital control measures. Several small open economies (mostly emerging economies), have employed capital controls to complement macroprudential regulations on banks so as to target credit flows that would otherwise have bypassed the regulatory framework. Several of these controls also showcase how macroprudential regulations can be effectively implemented outside of the banking sector. For example, Brazil’s central bank has the power to impose taxes on capital inflows which can be dynamically adjusted to account for the magnitude of externalities from foreign credit intermediation. Interestingly, the law that created this tax (passed in 1966) allows the Brazilian executive to change the tax rate without congressional approval or oversight (Chamon and Garcia, 2013). Similarly, Chile’s central bank can impose unremunerated reserve requirements (URR) that can be increased in response to a surge in capital inflows. The rate of the URR is left at the discretion of the central bank. Similar powers of taxation or regulation over domestic credit creation would be highly desirable around the world to implement a leak-proof framework of macroprudential regulation.
In the European Union, a robust and effective macroprudential framework is of particular importance since financial integration among euro-area countries is particularly advanced, making international leakage problems more severe. Furthermore, in the euro area, a common monetary policy cannot deal with country-specific booms and busts and requires additional instruments for macroeconomic stabilisation.

Laying out in detail the implications of our analysis for the European macroprudential framework goes beyond the scope of this note but we can offer a few general considerations. The main principle is that European macroprudential authorities should focus on correcting the externalities in borrowing and lending relationships by targeting borrowers in the real economy rather than focusing solely on banks and financial institutions.

Several European countries have already established independent macroprudential authorities. The coordination of national macroprudential policies at the European Union level is facilitated by the European Systemic Risk Board (ESRB), an agency set up in 2011 (Tressel and Zhou, 2014). The ESRB has limited powers but it can influence national policies by issuing warnings or recommendations, which can be kept confidential or made public.

Furthermore, Basel III and the European Capital Requirements Directive implementing it ensure that banks that operate in different countries are subject to the different capital requirements of each country. This limits the one channel of leakage that we have discussed above, namely the migration of lending from domestic banks to foreign banks. However, it is crucial that other macroprudential measures such as LTV ratios and DTI ratios also be applied to lending by foreign institutions. Under the current plans, the European regulatory and supervisory architecture does not yet seem to be able to deliver this.

Some might argue that the system that we propose, in addition to being complex, would run counter the objective of European banking integration. However, in contrast to the objective of most other European institutions, it is crucial to remember that effective macroprudential policy sometimes requires that financial integration be reduced in order to stem international leakage problems and target policies at the specific macroeconomic situation of each country.

These difficulties reflect the deeper problem that banking regulation is at best an indirect tool to contain excessive leverage in the real sector. The European macroprudential framework relies too much on imposing macroprudential restrictions via banks and other financial institutions rather than directly targeting borrowers. If domestic macroprudential policy targeted the borrowers (for example, in the area of consumer and mortgage finance, by relying on consumer financial protection policies), its effectiveness would not be reduced by international leakages.

5] Conclusions

This article makes the case for a new macroprudential policy framework that forms a third pillar of macroeconomic stabilisation policy and goes beyond traditional banking regulation. We emphasise that identifying macroprudential regulation with banking regulation leaves two important leakage problems: it does not cover financial intermediation from non-bank financial institutions and from international banks. An effective macroprudential policy framework requires that these two sources of leakage be closed.

We propose that such a new macroprudential policy framework directly targets credit creation and focuses in particular on reducing highly leveraged borrowing in the real sector. We identify a number of avenues to implement such a framework using existing regulatory structures, such as consumer protection laws, and changes in the tax code, such as abolishing the tax advantage of interest payments over dividend payments.
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Principles for macroprudential regulation

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The drafting of macroprudential regulation is largely being driven by the need by policy makers to meet timetables that have been agreed. The legislative drive is taking place without any clear theoretical framework to organise the objectives. In this article we propose two principles that any satisfactory framework ought to respect and then describe one specific model that embodies these principles. We explain the insights from this approach for regulatory design.

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Under our current system of safety-and-soundness regulation, supervisors often focus on the financial conditions of individual institutions in isolation. An alternative approach, which has been called systemwide or macroprudential oversight, would broaden the mandate of regulators and supervisors to encompass consideration of potential systemic risks and weaknesses as well." Ben Bernanke, August 22, 2008.

1) GUIDING PRINCIPLES FOR MACROPRUDENTIAL REGULATION

The quote above from Ben Bernanke, about three weeks before the failure of Lehman Brothers delivered at Jackson Hole in front of the top central bankers around world, shows regulators even before the intense phase of the global financial crisis (GFC) recognised that the existing regulatory architecture was deficient. In the subsequent five years, while many speeches, working groups and proposals have been made to remedy the problems, tangible progress has been relatively modest. Bank regulations involving capital requirements have been substantially refined. Other changes to rules regarding liquidity, or to give regulators other powers over, say dividends or loan-to-value (LTV) standards have been delayed. Indeed, it is fair to say that there is still no unified framework that organises thinking about how to proceed.

In this article we step back from the immediate policy debate to propose two principles about how to organise future discussions of macroprudential regulation. We derive these principles starting from a pair of definitions proposed by Eric Rosengren (2011) that we believe captures well the sense of many experts:

“Financial stability reflects the ability of the financial system to consistently supply the credit intermediation and payment services that are needed in the real economy if it is to continue on its growth path.”

“Financial instability occurs when problems (or concerns about potential problems) within institutions, markets, payments systems, or the financial system in general significantly impair the supply of credit intermediation services – so as to substantially impact the expected path of real economic activity.”

We like Rosengren’s definitions for three reasons. First, they rightly place the goal of delivering financial stability as supporting the real economy. This immediately implies that activities that are superfluous to supporting growth are rightly seen as non-essential ones that could be jettisoned. Second, he takes a broad view of what the financial system does to support the economy. As we explain below his focus on intermediation and payment services matches well with the academic literature on this issue. Third, he emphasises threats that come from not only problems that actually materialise, but also those that simply might arise and emphasises the need to guard against both. We will see that this prescription also fits well with an analytic approach to regulatory design.

To operationalise Rosengren’s definition, it is necessary to determine how offering intermediation and payment services supports economic activity. Unless we are precise about these channels then it is impossible to judge whether regulations which will restrict the system are on balance worthwhile. A corollary to this perspective is that being precise about the reasons why regulation is needed in the first place is also useful for guiding regulatory design.

There is a vast academic literature on the social purpose of the financial system which points to three contributions. The first is to expand the amount of credit that can be extended to a given borrower. The micro-founded explanations for this conclusion typically assume that borrowers can potentially default on loans and so any lender has to be diligent in monitoring borrowers (Diamond, 1984). By concentrating the lending with specialised agents these monitoring costs can be conserved and the amount of credit extended can be expanded.

A second widely posited role for the financial system is helping people and businesses share risks (Benston and Smith, 1976; and Allen and Gale, 1997). There are many ways to formalise how this takes place, but one simple one is to recognise that by having banks that not only offer deposits, but also allow savers to buy bank equity, the banks can create two different types of claims that would be backed by risky loans. These two choices allow savers to hedge some risks associated with lending and this hedging improves the consumption opportunities for savers.
A third role, which the literature recognises as complimenting the second, is having a financial system that creates liquid claims that facilitate transactions. There are various motivations for how this can be modeled. In Diamond and Dybvig (1983), a financial intermediary can cross-insure consumers’ needs for liquidity by exploiting the law of large numbers among customers. But doing so exposes banks to the possibility of a run which can be disastrous for the bank and its borrowers and depositors. Calomiris and Kahn (1991) and Diamond and Rajan (2001) explain that the very destructive nature of the run is perhaps helpful in disciplining the bank to work hard to honor its claims. So the fragility associated with the runs is potentially important in allowing both high amounts of lending and large amounts of liquidity creation.

These observations bring us to our first principle:

**Principle No. 1.** Any satisfactory framework for analysing financial stability and macroprudential regulation should be rich enough to account for all three of these contributions of the financial system.

It is perhaps easiest to appreciate the importance of this principle by looking at some examples which violate it. One prominent policy proposal that is often held up as an appealing alternative to current bank regulations is to insist that banks hold only liquid securities as assets (Kotlikoff, 2010). The creation of these narrow assets would eliminate the risk of a bank run and still allow banks to provide liquid assets to their customers. One might imagine that banks could even be profitable if they were buy large denomination securities and using the law of large numbers to manage the transactions costs of selling them when cash is needed for customers.

This kind of a proposal is superficially appealing but it excludes the credit creation function of the banking system. Hence, if implemented, it would force that activity away from the banks. The theoretical work (and associated empirical work such as Kashyap, Rajan and Stein, 2002) that shows there are synergies from combining liquidity provision and credit extension suggests that this solution would be inefficient. Employing a model that bakes in the assumption that there are no efficiency costs from decoupling lending and liquidity provision is misguided.

Likewise, in the aftermath of the GFC many economists have argued that bank capital requirements are far too low. An extreme example of this is Admati, DeMarzo, Hellwig and Pfleiderer (2010) who advocate creating a banking system that creates no liquid claims against its risky assets. Again this bank will be free from runs and able to absorb credit losses without needing any taxpayer support. But, the arrangement supposes that liquidity provision is not a core function of banks and that precluding them from providing liquidity is costless. So this type of analysis also strikes us as incomplete and ill-suited as a starting point for regulatory design.

In what follows we will sketch a model developed by Kashyap, Tsomocos and Vardoulakis (2014), henceforth KTV, that includes all these three roles mentioned above for the financial system. In the KTV model, there are three underlying frictions that influence that way transactions are structured and the social contribution of the financial system. One is the incompleteness of contracts, i.e. not all potential contingencies can be spelled out in advance. This means that are some circumstances where agents may default inadvertently (or perhaps strategically) and potentially these defaults spillover to affect others parties in the economy.

A second friction in the KTV model is the assumption that borrowers are subject to limited liability. A popular narrative about the GFC holds that some large institutions took reckless gambles knowing that they would not be held fully accountable for any associated losses. By building in limited liability for contracts directly into the model this incentive is present.

The third friction is borrowers do not fully appreciate the consequences of their actions on the interest rates that they face. This is a much more subtle factor than the other two and we explain it in detail below. But, it is important because it determines the equilibrium cost of credit in the economy. One of the strengths of the Rosengren approach is to recognise that potential threats to stability, not just realised ones can matter. To fully account for both types of risks, forward looking behaviour must be present and prices must reflect these future possibilities.

This brings us to our second principle:

**Principle No. 2.** Any satisfactory framework for analysing financial stability and macroprudential regulation should incorporate forward looking behaviour and have prices that adjust endogenously to reflect potential risks.
At a technical level, this principle implies that the analysis should be conducted in a general equilibrium environment so that the endogenous actions that agents take to counteract the various distortions are reflected in prices. There are several other reasons to favor a general equilibrium approach. By deriving behaviour from utility maximisation with rational expectations and market clearing, we ensure that the model will specify coherent behaviour, even if policy essentially changes the regime in which an agent operates. General equilibrium also makes welfare analysis, and especially distributional questions, amenable to a rigorous treatment. In general equilibrium one sees all the indirect effects and feedback mechanisms, so that one can judge whether, and under what conditions, they can be safely ignored. So although the effects we describe below depend on the exact parameterisation of the model, the ones we emphasise are relatively robust and their strength varies quantitatively, but not qualitatively.

At a practical level, this principle opens up a role for both ex ante regulation that operates on incentives to avoid problems and ex post policies that seek to mitigate the damage after bad realisations occur. Many policy discussions can be confusing because the environment is not rich enough to allow for both these types of policies. By respecting this principle we can be assured that the framework does not presuppose that either the ex ante or ex post approach is necessarily better.

We now turn to a description of the KTV model of financial intermediation that embodies these two principles. We view this model of more of an example of the benefits from adopting this particular approach to thinking about macroprudential regulation, rather a fully calibrated model that would be suitable for using in a quantitative analysis of competing regulations. Hence, in explaining the model we emphasise the intuition behind the way it operates and its qualitative predictions. That treatment is sufficient to allow for a high-level comparison of competing regulations even in the absence of a tightly parameterised, empirical mode.

2| A SPECIFIC MODEL OF FINANCIAL INTERMEDIATION

The framework proposed by KTV is an extension of the widely studied three-period model that was first developed by Diamond and Dybvig (1983) (and explained with a very accessible and intuitive example in Diamond, 2007). In Diamond and Dybvig (1983) savers have an uncertain demand for access to liquid assets and the economy naturally delivers opportunities to invest in a highly illiquid asset. The loan is not risky in that it has a guaranteed high rate of return if the project is allowed to continue to completion; so a loan initiated in period 1 can pay back with certainty in period 3. If the lender asks for early repayment of the loan in period 2, however, the amount that can be recovered is far below the promised level. The problem is that some depositors might have an urgent need for funds in period 2. Consequently, if any individual saver opts to make a direct loan to fund an illiquid project and then discovers that funds are needed in the interim period, the early repayment will be very low. So by assumption direct lending leaves savers with very little available resources in the event that liquidity is needed on short notice.

Banks in their model pool the risks regarding liquidity needs over many customers. So the bank has no advantage in forecasting liquidity needs, or even in the proceeds it gets from demanding early repayment on any particular loan. But, the bank can guess that in normal circumstances most savers will not need their money on short notice. So the bank can make the following offer to savers: compared to directly lending yourself, we offer a deposit contract that pays you more in the event that you want to get your deposit back in period 2 and less than if you can get if you wait until period 3 to be repaid.

The whole reason for impatience in normal circumstances is an urgent need for funds, so the marginal utility of having the money in the second period is high on occasion. Diamond and Dybvig assume every depositor has some chance of needing money in the interim period and no one knows as of period 1 whether they will need the money early or not. Accordingly, reducing the variance of the return on deposits by giving up some of the extra return from being patient in exchange for a higher return when a depositor is impatient is appealing to the depositor.

The bank can support this contract by calling in extra loans to pay off the impatient depositors, so for each depositor who asks for withdrawal in period 2, the bank recalls more than one loan to make that repayment. With fewer loans outstanding, the total amount available in period 3 will be less than the
number of depositors who turn out to be patient. Diamond and Dybvig suppose that the number of depositors (and borrowers) is large, so that the bank can make an informed guess about the aggregate number of impatient depositors and set the returns promised to the patient depositors low enough to credibly pay them and the impatient depositors. Hence, the bank is in the business of offering liquidity insurance.

The problem with this arrangement is that if an unexpectedly large number of depositors request an early withdrawal, then the arrangement can unravel. At a certain point every patient depositor can realise that too much has been paid out to people withdrawing early, so that by period 3 the full promised return will not be available. If all the patient deposits could coordinate, they would agree that waiting and taking whatever is available gives them more than running and seeking an early withdrawal. When they all line up to get their deposits back, some will wind up getting paid the lower promised return for an early withdrawal and others get nothing when the bank has called in all its loans. Unfortunately, being patient is not individually rational if a depositor conjectures that everyone else is going to run. So the Diamond-Dybvig bank is inherently fragile and vulnerable to a run that leads to some depositors not being paid and a collapse in credit extension where loans are called before projects come to fruition.

KTV modify the basic Diamond and Dybvig setup in five important ways so that the extended model satisfies the two principles proposed in section 1. First, they introduce three types of agents: savers, bankers, and entrepreneurs. Each of these agents is given an endowment in period 1 that can be consumed or invested. In addition, the banker begins with some equity that is trapped in the bank and can only be invested. This creates a natural reason for the banker to take funds from the saver and function as an intermediary.

A second change is that the entrepreneurs have unique access to a risky investment opportunity. The entrepreneurs have insufficient funds to operate at the efficient scale so they must borrow. The banks have a natural advantage at lending and can lend more than would be available if the entrepreneurs had to borrow directly from the savers. The projects that are financed have a stochastic payoff, so unlike in Diamond and Dybvig there is intrinsic investment risk in the economy.

Third, KTV posit that banks and entrepreneurs are subject to limited liability. This creates an incentive for both the banks and entrepreneurs to take excessive risk, which translates to undertaking more risky investment than otherwise. So it is possible that a bad outcome will arise because of this gambling to exploit the limited liability.

KTV’s fourth change is that savers face a portfolio decision in which they can directly invest in a safe asset or invest in the bank in the form of either deposits or equity. In Diamond and Dybvig the safe asset is dominated by making loans and if necessary liquidating them early. In KTV, the saver could choose to hold the safe asset to avoid the excessive gambling by the banks and entrepreneurs. The banks can also invest in the safe asset if the discount from calling in the loan early is sufficiently high.

Finally, KTV make an assumption about how depositors decide whether or not to run. In the Diamond and Dybvig model, a run can occur because of a pure failure to coordinate by the patient depositors; in the jargon that is now popular, a random event like a “sunspot” could lead to a panic where all the patient depositors decide to run (Cass and Shell, 1983). KTV instead make the probability of a run a random variable which is more likely to occur based on the fundamental condition of the bank.1 When the bank has more risk because of increased lending, the probability of a run increases. Likewise, when the bank is more levered, i.e. has higher deposits relative to equity, a run is also more likely.

Together these ingredients are enough to create a very rich environment that facilitates both a role for regulation and different outcomes depending on the form that regulation takes. One important consideration is that there are still not enough assets for savers to fully hedge the risks that they face.

1 Goldstein and Pauzner (2005) show that this kind of result can be derived formally in a model that is in the spirit of Diamond and Dybvig (1983). In the Goldstein and Pauzner setup the savers each receive noisy signals about the health of the bank and must form beliefs about whether the other depositors will run. They show that an equilibrium of the sort constructed by Morris and Shin (1990) exists, i.e. depositors will run only when their signal is below a threshold determined by fundamentals. Thus, the ex ante probability of a bank-run is computed uniquely as a function of other endogenous variables.
So they need to choose how much to save using deposits, bank equity and the safe asset to control the risk taking incentives created by limited liability.

The distorted incentives of the banks and entrepreneurs to gamble also affect outcomes in a second more subtle way. The limited liability puts a floor on private payoff to the bank and the entrepreneur from taking more risk. When the saver makes an investment in the bank, the saver understands the risk taking incentives of the bank and demands appropriate risk adjusted returns to compensate for the risk. Likewise, when the bank lends to the entrepreneur, the bank recognises the entrepreneur's temptation to adjust risk and appropriately prices its loan to account for this.

So although the interest rates (and required return on bank equity) reflect the risk in the economy, both the bank and the entrepreneur take the prices as given. Hence, neither the bank nor the entrepreneur fully internalises the effect that their own actions have on the prices they face. As is usually the case in these situations, this means that the privately optimal choices made by the bank and the entrepreneur will not match the socially optimal choices. For example, a social planner would recognise that if the bank is less aggressive about exploiting its option to default on deposits it could raise deposits at a lower interest rate. So the bank and the saver might both reach different decisions were the feedback from risk-taking to lower interest rates was taken into account. But, the bank left to its own does not perceive anyway to commit not to gamble, so the feedback effect is ignored in its decisions.

Given these KTV assumptions, and various parametric assumptions about risk aversions, endowments, and the risk of investment project, the model can be solved for a set of allocations. KTV calibrate their parameters so that the baseline equilibrium has the saver making both deposits and equity investments in the bank. The bank lends to the entrepreneur and invests in some safe assets to cover early expected withdrawals (so that early loan liquidations can be avoided.) In the equilibrium, there is a positive probability of a run, because the bank does not fully recognise that its lending and borrowing choices affect the prices it pays. So it uses more deposit funding to exploit the default option that would be optimal if it recognised the effects on interest rates from doing so.

3 | Regulation

Regulation in the KTV model serves two purposes. First, as just described the agents do not fully internalise the effects of a run. So the private optimum will have an inefficiently high probability of a run. A run is destructive and lowers the welfare of all the agents: depositors do not get fully paid, the bank and the saver have their equity wiped out, and loans are liquidated early which harms the entrepreneur. Regulation to reduce the probability of a run can potentially be Pareto improving.

Second, as also explained, the limited liability assumption means that the borrower and the bank have an incentive to take excessive risk. The saver recognises these incentives in deciding how much to invest in the bank and the bank accounts for this when pricing its loan. But these price effects are not sufficient to overcome the distortion. Despite the higher interest rates, the limited liability assumption, on the margin, always leads to overinvestment. Provided that a bank-run has been controlled by other regulations, stopping the excessive risk-taking cannot be Pareto improving: the agents that are engaging in the gambling, will not want to be prevented from doing so.

The model thus embodies the two narratives that dominate the discussions of the crisis: excessive risk-taking and funding runs. Models that fail to respect our two principles are much more likely to exclude one of these possibilities. The purpose and effect of regulation are also likely to differ in models where eliminating distortions makes all agents better off, compared to models where eliminating distortions help some agents at the expense of others.

There are many tools that can be used to fix these two distortions. We briefly review five alternatives. The first one is raising banks’ capital requirements. Higher capital requirements have multiple effects. The direct effect is to reduce the vulnerability of the bank to a run by reducing the reliance on deposit financing. Eliminating the run helps all three types of agents.

But, higher capital requirements indirectly exacerbate the limited liability problem. Higher capital requirements can only be achieved by when the bank induces the saver to buy more bank equity. When the saver buys more equity, the bank is offering
Macroprudential policies: implementation and interactions

Anil K Kashyap, Dimitrios P. Tsomocos and Alexandros Vardoulakis

less risk-sharing to saver. So this creates a powerful incentive for the banker to take more investment risk. Intuitively, substituting equity funding for deposit funding will reduce the required amount of liquid assets that the bank needs to hold, which frees up capacity to lend more. Quantitatively the direct effect of capital requirement tends to dominate the indirect effect so that the risk of a bank run still falls when capital requirements are increased.

A second tool is liquidity requirements. KTV model this regulation in the spirit of the liquidity coverage ratio which specifies the percentage of safe and risky assets. Left to themselves, banks only will hold safe assets to service their expected deposit outflows by the impatient savers whenever the cost of liquidating loans becomes very expensive. If the regulator forces banks to hold additional safe assets, the banks will endogenously respond by recognising that these assets allow them to raise more deposits. As the banks raise deposit funding and shrink equity financing, the benefits of the extra liquidity in preventing runs are reduced. The higher use of deposit finance also exacerbates the limited liability problems. Liquidity requirements of this type are less effective than capital regulation in overturning the distortions in the model.

A third possible regulation is deposit insurance. In the original Diamond and Dybvig model deposit insurance is a very attractive regulation because it wipes out the possibility of run without creating other problems. In the KTV model, deposit insurance does eliminate a run, but it severely encourages the banks to gamble. The banks load up on deposits at the expense of equity, and lend aggressively. Deposit insurance thus proves to be a two-edged tool.

A fourth potential regulation is the imposition of loan-to-value restrictions. This kind of regulation forces the entrepreneurs to consume less in period 1 and borrow less to finance their investment. This reduces the spillovers to the bank and the saver from a failed investment. The greater self-funding by the entrepreneur encourages the bank to fund its lending with deposits rather than equity. So there are competing effects for whether a LTV requirement will raise or lower the probability of a run: the reduced lending by the bank and higher LTV ratio makes a run less likely, but the desire by the bank to exploit the protection of limited liability leads it to use more deposit financing which makes a run more likely. The net effect on the probability of a run depends importantly on the parameter choices. Nonetheless, by crimping credit extension and having the banks offer less risk-sharing to the entrepreneurs, entrepreneurs are typically much worse off under this regulation in isolation.

Finally, it is possible to impose a tax on dividends paid by the bank on its profits. A dividend tax reduces the appeal of equity financing, so the bank and the saver want to shift towards funding loans with deposits. This leads to a reduction in interest rates on deposits which further helps the banks and hurts the savers. The increased use of deposit finance means the bank’s gambling is amplified, so that dividend taxes in isolation will not help reduce the risk of bank runs. This tool will benefit the bank at the expense of the savers.

From this brief tour of the various regulatory options we draw three important conclusions. First, accounting for the general equilibrium effects that arise from the endogenous choices of the agents in response to their incentives is important. The baseline equilibrium that obtains in the absence of any regulation has several subtle properties that emerge because of the forward looking behaviour of the agents. More importantly, only by recognising the countervailing choices that the agents will take once a regulation is imposed can we understand how they operate.

Second, once we have enough frictions in the model to allow the financial system to perform all three of its functions, no single regulation is enough to correct all the distortions. The problems associated with limited liability and runs are very different and we see that tools that fix one of them can often exacerbate the other.

Third, the ways that the different regulations operate, even to solve a similar distortion, can be very different, meaning that the consequences for different agents will vary. Generically, the bank’s gambling to exploit limited liability is usually bad for savers, so policies that reduce the bank’s use of deposit financing help the savers at the expense of the bank. Conversely, restrictions on the asset side of the bank’s balance sheet may not constrain the bank’s ability to gamble. So even though the risk of a run can be mitigated by working on either the asset or liability choices for a bank, the fallout from the policies will differ.
4 | **Conclusions**

The point of our brief tour of the KTV model is merely to show the rich and subtle ways that regulations can manifest themselves. The absence of any generally agreed upon principles, let alone the lack of a workhorse model, makes it easy to miss some of the interactions that we believe are important. We see the KTV model as a first step in a promising direction, rather than a complete framework that is ready to be used to quantitatively explore various regulatory options.

Nonetheless, the KTV model already leads us to three robust conclusions. First, in models that are rich enough to realistically capture the different roles of the financial system, the different roles are likely to be justified by a variety of frictions. Put differently, it is well understood that the form of financing for a firm only matters when the assumptions underlying the Modigliani and Miller capital structure irrelevance propositions fail. We think that to explain the various contributions of the financial system to supporting economic activity, several of these assumptions must fail. Our cursory exploration of the KTV model suggests that correcting all of the distortions caused by the frictions will require multiple regulatory tools.

Second, using the limited set of tools which we described to attack the various distortions have very different allocational effects. One of the assumptions in the KTV model is that markets are not “complete”, meaning that complete hedging is impossible and default is a possible outcome. In that case, there are not going to be market based schemes (and associated prices) to evaluate the full social costs of transfers of resources from one agent to another. A social planner in these circumstances will have to decide how much weight to place on various agents to evaluate policies. This makes it much harder to rank and compare alternative policies.²

Finally, the fact that competing policies have such potentially different allocational effects creates strong incentives for the disadvantaged parties to try to evade the regulations. One prominent feature of the last crisis was the role that regulatory arbitrage played in making the risks in the financial system more opaque and vulnerable. The KTV framework does not allow for regulatory arbitrage, nor do most other models that are used in discussions of macroprudential regulation. This is an important defect of these models and a critical area for future research.

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² This is a much more general issue. Welfare analysis in models with incomplete markets is not straightforward.
Principles for macroprudential regulation
Anil K Kashyap, Dimitrios P. Tsomocos and Alexandros Vardoulakis

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Macroprudential capital tools: assessing their rationale and effectiveness

In this paper, the authors analyse the rationale for and effectiveness of macroprudential capital tools. They first present the limits of the traditional approach to bank capital regulation and the reasons why developing a more holistic approach is deemed appropriate. They then assess the effectiveness of capital tools (namely capital requirements, countercyclical capital buffers and sectoral risk weights) from a macroprudential perspective in the context of a dynamic general equilibrium model that features the default of the various classes of borrowers (banks, households and firms). Three main results stand out from this exercise: (i) there is generally an optimal level of capital requirements; (ii) the lower the banks' capital ratio (or the higher their leverage), the greater the scope for amplification of real and financial shocks; (iii) a moderate degree of countercyclical adjustment of capital requirements may significantly improve the benefits of setting these requirements at a high level.
ne of the main policy responses to the recent financial crisis has been to refocus prudential regulation on the overarching objective of financial stability. As a result, expectations are currently high in policy circles surrounding the ability of newly introduced macroprudential policies to prevent systemic risk, limit procyclicality in the financial system and mitigate the negative impact of these factors on the real economy. So far, apart from a few exceptions such as aggregate loan-to-value ratios or dynamic provisioning, the macroprudential toolkit mostly consists of standard microprudential tools which, following the addition of a time varying component (or the possibility of modifying them over time), are expected to be used with a rather different, more macroeconomic, perspective. Within this set of instruments, capital tools play a key role. The new regulatory standards introduced by the Basel Committee (Basel III) and the proposals of the Financial Stability Board (FSB) are important illustrations of this new trend.

Little is known, however, about the effectiveness of these instruments from a macroprudential perspective, and policymakers still lack the necessary analytical frameworks to fully understand how they operate and affect the real economy. In addition, macroprudential tools are likely to affect agents’ incentives and can have different welfare implications for different classes of agents, which are all of policy relevance. In this contribution, we try to address these issues. First, we review the rationale for introducing macroprudential capital tools. We then present the main features of a macroeconomic model that we developed with the aim of assessing macroprudential policies: we focus on its key ingredients and core mechanisms. Finally, we analyse the responses of our model to a rich set of real and financial shocks. Using a tentative but nonetheless realistic parameterisation, three main results stand out from our analysis: (i) we find that there is generally an optimal level of capital requirements. While they reduce the distortions caused by limited liability and safety net guarantees, therefore resulting in lower bank defaults and better allocation of credit, they may also be excessively contractionary if set at too high a level; (ii) the lower the banks’ capital ratio (or the higher their leverage), the greater the scope for shock amplification; therefore, high capital requirements tend to insulate the economy from the additional amplification caused by bank fragility, which is only sizeable when the risk of bank failure is significant; (iii) a certain degree of countercyclical adjustment of the capital requirements may significantly increase the benefits of setting these requirements at a high level.

1) The rationale for macroprudential capital tools

There is a longstanding but rather inconclusive body of literature discussing the rationale for capital regulation. For some, like Admati et al. (2010), the benefits of high capital requirements are clear: having more capital increases banks’ loss absorption capacity and reduces their probability of default. High requirements also reduce banks’ incentives to take on risk, especially when deposit insurance exists, so in this context they serve as a means of controlling moral hazard problems. For others, like Allen and Gale (2002), in the absence of a welfare-relevant pecuniary externality, banks will choose the optimal capital structures themselves, without the need for capital regulation. At the same time, the banking industry itself complains that high capital requirements increase its cost of funding, and tends to emphasise the adverse effects of these requirements on credit supply and on the real economy.

It can be argued that empirical and policy developments have so far played a greater role than economic theory in designing and shaping capital regulations. Moreover, while previous papers have discussed the macroeconomic implications of capital regulation, very few address the analysis in a fully fledged dynamic macroeconomic setup. The market failures revealed by the recent financial crisis probably make a stronger case for analysing bank capital regulation from a macroeconomic or macroprudential perspective.

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1 All technical details and results can be found in Clerc et al. (2014).
2 See for instance the paper by Levy-Garboua and Maarek in this issue of the Financial Stability Review.
The standard rationales for capital regulation

According to Hellwig (2008), there are at least three rationales for imposing capital requirements: (i) Equity capital can act as a buffer against negative shocks, and hence against the risk of insolvency; (ii) Equity capital requirements can curb excessive risk-taking by bank managers; (iii) Capital regulation provides room for intervention by the supervisor at a time when the bank is not yet subject to insolvency proceedings.

However, as pointed out by Hellwig, these rationales have the following shortcomings. First, the objectives of capital regulation are unclear as standard capital regulation cannot be used for all three of the above-mentioned purposes at once. For example, if capital is designed to work as a buffer, it should be possible to consume it during periods of distress. However, this might conflict with the two other objectives. Moreover, strictly enforcing capital requirements in each period may even increase a bank's insolvency risk if it induces the fire-sale of some of its assets.3

Second, the dynamics of capital regulation are neglected.4

Third, the systemic dimension of capital regulation is ignored.

The rationales for macroprudential capital tools

These shortcomings have been partly addressed by the new set of regulations recently proposed by the Basel Committee and the FSB. In addition, the Capital Requirements Directive (CRD IV) and Capital Requirements Regulation (CRR), which have been in force in the European Union since 1 January 2014, have endowed national and European authorities, such as the European Central Bank, with clear macroprudential responsibilities.

First, capital requirements have been reinforced both quantitatively and qualitatively under Basel III. This still reflects the standard rationale which is to increase banks' loss absorption capacity by asking them to hold significantly more capital, but in the form of common equity Tier 1. A capital conservation buffer of 2.5% has been added to the minimum level of 4.5% common equity Tier 1 capital, in order to ensure that banks build up capital buffers outside periods of stress which can be drawn down as losses are incurred. These buffers can serve to trigger early supervisory monitoring in the event the capital base of a bank is eroded, or even some form of early supervisory intervention (constraints on dividend distribution, share repurchases and executive compensation). They may also trigger early conversion of bail-inable instruments (e.g. contingent convertibles when available). In this way, the dynamics of capital are partly accounted for.

By factoring in off-balance sheet exposures, the revised requirements also take into account banks' exposures to the shadow banking system (something which will be complemented with the large exposure regime which is currently under revision).

Basel III also introduces two macroprudential instruments in the form of a leverage ratio and a countercyclical capital buffer. The first instrument is supposed to act as a backstop to capital requirements in case risk-weighted assets fail to provide a proper measure of bank exposures. It explicitly aims to contain banks' leverage and limit the excessive distribution of credit. The motivation for adding countercyclical elements to capital requirements stems from the concern that risk-sensitive capital requirements may contribute to the cyclicality of credit supply, potentially making capital requirements too low in the expansionary phase of the business cycle and too high during downturns.5

The systemic dimension of capital requirements has been a key focus of the FSB, as part of its objective of reducing the distortions caused by the "too-big-to-fail" problem.6 This effort is taking the following form: (i) the identification of global systemic institutions, be they banks, insurers, infrastructures (like central

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3 See Gersbach (2009).
4 Hellwig refers here to the fact that traditional models sustaining capital regulation rely on two-period setup.
5 See Repullo and Suarez (2013).
counterparts) or unregulated institutions (shadow banks). The methodology for this is based on several indicators, such as size, global activity, complexity, substitutability and interconnectedness; (ii) the establishment of an additional loss absorption capacity: global systemic institutions are asked to increase their going-concern capital to reduce the need for public bail-outs to the maximum extent possible. This objective is consistent with efforts to identify the structure of existing financial networks and the goal of imposing higher capital requirements on the most interconnected institutions; (iii) the introduction of more effective resolution regimes, in order to resolve failing financial institutions in an orderly and expeditious manner without causing severe systemic disruptions or cost to the tax payers.

The systemic capital buffers, introduced in the European Union by CRD IV, are yet another layer of capital designed to tackle systemic risk. They provide the competent or designated macroprudential authorities with the power to increase capital requirements for all institutions or subsets of institutions in order to address the build-up of financial imbalances, either at a sectoral or regional level.

Most justifications for requiring banks to hold minimal amounts of capital are based on the premise that, without these requirements, banks would neglect a significant fraction of the social costs that their failure might cause to the financial system or to the economy at large. Our analytical framework captures this idea formally by combining three key sets of frictions.

The first consists of frictions connected to external financing which, in the model, is based on standard debt contracts. These frictions may be due to informational asymmetries which lead to adverse selection, and typically produce distortions and deadweight losses that are increasing in the probability of default of the borrower. We formally capture these frictions by assuming the existence of bankruptcy costs, which may restrict access to credit and, in the absence of other distortions, result in too little borrowing compared with a first best world (consider, for instance, the role of uncertainty regarding the financial soundness of banks in the dynamics of the recent financial crisis and the associated deleveraging process in the subsequent recession).

The second set of frictions stems from the existence of explicit or implicit government guarantees, which provide banks with the incentive to take on risk at the expense of the deposit insurance agency or the tax payer more generally. This may result in excessive lending and borrowing (or excessive gambling), especially when bank leverage is high. The growth and cheap cost of credit during the last part of the expansionary phase leading up to the recent crisis, and even the delays in the adjustment of bank balance sheets observed in some European countries during that crisis, are possible manifestations of agents’ expectations of public bailouts.

The third set of frictions is the presence of pecuniary externalities, which can produce the sort of feedback loops witnessed during the financial crisis between bank balance sheets and asset prices, resulting in excessive volatility of asset prices and of macroeconomic variables in general. The pecuniary externalities arise because agents generally do not internalise the effect of their actions (e.g. borrowing and lending decisions) on the prices of housing and physical capital, which in turn affect their collateral constraints and net worth.

2| A FRAMEWORK FOR ASSESSING MACROPRUDENTIAL POLICIES

In order to properly incorporate the financial frictions and distortions mentioned above and capture their implications for the broader economy, a meaningful model for analysing macroprudential policy should put financial intermediation at centre stage. In this section, we present the main features of our model.

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7 See for instance Clerc, Gabrieli, Kern and El Omari (2014) for an illustration of the CDS market.
8 See for instance Clerc (2008).
2|1  The key ingredients

Our model first incorporates non-trivial financial intermediation performed by banks. The banks are endowed with equity capital by their owners, obtain outside funding in the form of partly insured deposits and provide mortgage loans to households and corporate loans to firms. In contrast with many other models in the literature, our model explicitly allows for positive and time varying default rates among all borrowers, including banks.

We try to put the following ingredients together in a coherent manner in our model: (i) non-trivial lending and borrowing decisions in the household sector, with some households demanding bank loans for the purchase of housing, (ii) non-trivial borrowing decisions in the corporate sector, with firms demanding bank loans for the funding of their capital accumulation, (iii) non-trivial default risk for all classes of borrowers, including deposit-taking financial intermediaries, (iv) a net worth channel operating at the level of each leveraged sector, i.e. indebted households, indebted entrepreneurs and leveraged banks, and (v) a bank funding fragility channel, which operates through a premium requested by risk-averse depositors who suffer some deadweight losses (transaction costs) when banks default.

In contrast with other models, ours relies on heterogeneity to accommodate the coexistence of borrowing and lending among households and the existence of some interior failure rates for each class of borrowers. There are patient households, who are the savers in the economy, provide deposits to banks and own the firms, and impatient households, who borrow from banks to buy their houses. There are also entrepreneurs, who are specialised in maintaining the productive capital of the economy, which they buy with bank loans and with their own net worth, and bankers who are the exclusive providers of equity funding to the banks. Banks are modelled as one-period perfectly competitive financial intermediaries, owned by the bankers and specialised either in mortgage or in corporate lending. These banks enjoy and try to fully exploit the benefits provided by limited liability and deposit insurance. In this set-up, capital requirements play a key role in limiting excessive leverage and risk-taking by banks.

Agents from each of the three classes of borrowers (i.e. households, firms and banks) default when the aggregate or idiosyncratic shocks that affect their repayment capacity (or the assets posted as guarantees) make them unable or unwilling to pay back their debt. Individual households default when their house is worth less than the (non-contingent) promised debt repayment. Entrepreneurs default when the gross returns of their activity make them unable to pay the fixed repayment associated with their loans. Lastly, banks default when the returns on their assets (i.e. the corresponding portfolio of mortgage or entrepreneurial loans) are insufficient to pay the depositors in full. As in the costly state verification literature, all of these forms of default produce deadweight losses for the corresponding lenders (banks, depositors) or guarantors (the deposit insurance agency).9

The rigorous micro-foundations of our model allow for an explicit welfare analysis of capital regulations (and potentially broader classes of macroprudential regulations). This welfare analysis is conducted in the same spirit as the Bank for International Settlements (2010) and Miles et al. (2013) but, arguably, in a more compactly integrated model that could be expanded to fit both numerous macroprudential extensions and some core-macroeconomic extensions (such as, for example, nominal rigidities and the interaction of macroprudential with monetary policy).

2|2  Implicit subsidies, risk-taking and capital requirements

The model emphasises the distortions due to the presence of limited liability and deposit insurance, which, in the absence of regulation, encourage banks to take excessive risk.

Limited liability combined with deposit insurance subsidises banks' rate of return on equity by partly insulating their cost of funding from their own

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9 In spite of the presence of deposit insurance, we assume that depositors incur some transaction costs (perhaps due to delays and legal tangles) when their banks fail, so deposit insurance is “partial” in this very sense.
risk-taking. Banks enjoy unlimited upside from success but have the option of leaving very large losses to the deposit insurance fund. As a result of this subsidy, financial institutions become more profitable and more willing to supply loans at lower lending spreads.

Since undercapitalised banks are more likely to fail, the limited liability subsidy discussed above becomes important at low capital ratios. Charts 1 show the effects of an adjustment in capital requirements on the probability of bank default, the limited liability subsidy and the level of the lending rate.

As can be seen from these charts, the implicit subsidy is maximised when capital requirements are low, allowing banks to lend at extremely low rates, possibly leading to excessive and inefficient lending. Banks improve their return on equity but simultaneously increase their default rate, thereby imposing non-internalised deadweight losses on other agents and a potential overextension of credit.

2.3 The main mechanisms and propagation channels

Excessive risk-taking therefore takes the form of credit overextension and is accompanied by excessive default and excessive deadweight losses due to default. In our model, defaults result from the exposure of the various borrowers to both systematic shocks (like total factor productivity and capital depreciation shocks) and idiosyncratic shocks (which capture, for example,
individual income risk and incomplete risk-sharing in the case of households, individual performance shocks in the case of firms, or specialisation and imperfect diversification in the case of banks.

The transmission of shocks occurs through the dynamics of three interconnected net worth channels (the wealth of households, entrepreneurs and bankers, which plays an important role in their borrowing decisions), and a risk premium that makes the cost of banks' deposit funding increasing in the perceived risk of bank failure, (due to the costs not covered by deposit insurance).

In this context, systemic risk is the result of the amplified propagation (via net worth effects, default risk and limited liability distortions) of exogenous shocks throughout an economy with a rich structure of financial linkages organised around banks.

3| MAIN RESULTS

In order to assess the effectiveness of macroprudential capital tools, we expose our model to a rich set of adverse shocks (like total factor productivity, depreciation or bank risk shocks) and study the response of the economy under various levels of bank capital ratios. The model parameterisation is highly tentative though broadly based on euro area data.

3|1 There is generally an optimal level of capital requirements

Our set-up first provides a clear rationale for capital regulation, which is that it arises as a welfare-improving response to excessive risk-taking by banks. Importantly, banks' equity funding in the model is limited by the wealth endogenously accumulated by the bankers who own and manage the banks. So capital requirements reduce bank leverage, bank failure risk and the implicit subsidies associated with deposit insurance. Simultaneously, they also force the banks to make a greater use of bankers' limited wealth. This second aspect means capital requirements have a potential impact on the cost of equity funding (due to its scarcity in the short run) and on the pattern of wealth accumulation by bankers (in the medium to long run). Lower leverage and, in the short run, a higher cost of equity funding lead banks to extend less credit and reduces their fragility. However, at too high a level, capital requirements may become excessively contractionary, so the optimal level of the capital requirements is generally lower (see Chart 2 below, which is taken from the background paper and relies on the notation explained therein). This provides some scope for the countercyclical adjustment of capital ratios, the effectiveness of which then depends on the nature of the shocks affecting the economy and the actual level of the capital ratios.

The analysis first identifies the socially optimal level of capital requirements (for each class of banks in the model, namely mortgage lending and corporate lending banks) and then assesses their contribution (relative to some lower benchmark levels) in terms of both long-term performance (steady state) and short-term performance (modifying the amplification and propagation of aggregate shocks). One conclusion is that the optimal capital requirements provide substantial benefits to the economy by neutralising

Chart 2
Social welfare gains with respect to capital requirements

<table>
<thead>
<tr>
<th>x axis</th>
<th>y axis</th>
</tr>
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<tbody>
<tr>
<td>$q_F$</td>
<td>$q_H$</td>
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</table>

Source: Authors' calculations.

Note: Social welfare gains are the weighted average of the steady-state gains (or losses) experienced by the representative agent of each class (patient and impatient households, entrepreneurs and bankers) measured in certainty-equivalent consumption terms. The weights are given by the consumption shares of each class of agents under the initial reference policy ($q_F = 0.08, q_H = 0.04$), where $q_F$ and $q_H$ respectively stand for the capital requirements on business and household's mortgage loans (or risk-weights). Alternative policies involve the value of $q_F$, described in the horizontal axis, and $q_H (q_H = q_F - 0.04)$

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10 For some empirical evidence on the existence of such a premium, see Brown, Guin and Markoetter (2013).
11 The explored (but not fully developed) blocks on securitisation and liquidity risk would add new sources of contagion and a role for liquidity regulation to the structure of the core model.
the effects of the deposit insurance distortion on the long-run supply of credit. They also imply lower bank fragility and, consequently, lower deadweight losses in the event of default by the final private sector borrowers. As for the short-term effects, the optimal capital requirements insulate the system almost completely from the above-mentioned additional amplification caused by bank fragility (which is only sizeable when banks’ risk of failure is significant). Of course, when the bank failure risk is very small, tightening the capital requirements further has a limited impact on the already tiny residual bank fragility, and continues to depress the supply of loans, generating a negative impact on the real economy and on welfare. So increasing the level of the capital requirements is not an unlimited free lunch.

3|2 High bank leverage is conducive to financial amplification

Default risk increases with leverage, and the deadweight losses caused by a default imply a decline in net worth that conditions the financing capacity of the economy in subsequent periods. In fact, we find that when bank leverage is high (because capital requirements are low), the economy is more responsive to shocks (see Charts 3).

This happens because at low capital ratios, negative shocks have a large impact on bank capital ratios and funding costs, causing negative feedback loops between banks’ financial health and aggregate economic activity. When capital ratios are high, shocks do not affect bank solvency and the feedbacks that drive amplification are eliminated.

3|3 A countercyclical adjustment of capital ratios may significantly improve the benefits of high capital requirements

In this context, it makes a lot of sense to ask whether adjusting capital requirements in response to adverse shocks can reduce amplification or improve welfare.

We find that the countercyclical adjustment of capital ratios may significantly improve the benefits of high capital requirements, but once again only up to
a certain level. Beyond that level, the adjustments are counterproductive as they increase bank fragility (see Charts 4).

In fact, this is what happens when the reference capital requirements are ex ante too low: any further relaxation in response to a negative shock can be harmful. A countercyclical reduction in the requirements should, at first glance, relax bankers’ participation constraints (and allow the bank to charge lower loan rates on a larger amount of loans), but if bank fragility gets more severe, the increase in banks’ funding costs due to the increase in the deposit risk premium, may well offset the intended impact of the countercyclical adjustment, resulting in a net detrimental effect to credit supply and GDP.

Charts 4
Countercyclical capital adjustments at high capital levels

a) GDP

Productivity shock  
Depreciation shock  
Bank risk shock

B) Total credit

Productivity shock  
Depreciation shock  
Bank risk shock

C) Average default banks

Productivity shock  
Depreciation shock  
Bank risk shock

Source: Authors’ calculations.

Note: A bank risk shock is an idiosyncratic shock to each bank’s ability to extract payoffs from its loans. A depreciation shock is a shock to the depreciation rates of capital and housing. ‘High capital requirement’ describes the economy with $\phi_F = 0.11$ and $\phi_H = 0.07$. ‘High capital requirement + countercyclical capital buffer (0.3)’ describes the economy in which the capital ratio reacts to the percentage deviation of total loans (corporate and mortgage) from their steady state values, with a coefficient of 0.3. GDP is defined as net of bankruptcy costs due to default. It is therefore a measure of ‘net output’. 
4 | CONCLUSION

Financial stability is a complex and multi-faceted objective. It is therefore likely that policymakers will need to combine various macroprudential tools to achieve this goal. This article focuses on capital tools. While we generally find value in imposing high capital requirements, we also show that the overuse of these instruments may lead to suboptimal wealth redistribution and too much or insufficient credit. For instance, our analysis suggests that very high capital ratios (e.g. the value of 25% recently proposed by Admati and Hellwig, 2013) might be excessively restrictive. In our model, capital requirements set at such a high level would excessively restrict credit and economic activity while only marginally reducing default rates and their associated distortions, resulting in a net welfare loss. This suggests that the proper design of macroprudential policies requires an explicit assessment of their welfare implications using an appropriate quantitative framework.

Our model is one attempt to develop this type of quantitative framework. It is part of a recent strand of literature which emphasises the role of external financing frictions affecting banks in the propagation of shocks. However, much remains to be done to extend these frameworks to capture features such as the non-linear dynamics that characterise financial crises or the interaction between the regulated and shadow banking systems, which are arguably key aspects of systemic risk. For these reasons we are working on extending our model for future applications, through the introduction of features such as liquidity risk and securitisation.

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The housing market is a central macroprudential policy concern in France due to the significant proportion of residential property loans in bank balance sheets and the high weight of housing in household wealth. The surge in house prices at the start of the 2000s means we cannot rule out the risk of a bubble or a sharp downward correction, even though prices currently seem to be stabilising. However, if the evolution of house prices does start to pose a threat to financial stability, French authorities have access to a number of macroprudential tools that can be used to modify trends in factors such as the provision of housing loans. Using a model, this article attempts to examine the impact of measures which directly or indirectly influence loan interest rates and maturities, or the size of repayments in relation to household income. The empirical results show that these measures have a significant impact on trends in home lending, but a more limited impact on house prices due to the way variations in lending affect housing supply.

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Past experience of booms and busts in house prices and their effect on the banking system (Glaeser, 2013) shows how important the supervision of the housing market is to financial stability. Macroprudential policies play a key role in this supervision. As a result, the European Capital Requirements Directive CRD IV and the French Banking Law of 2013 have introduced macroprudential tools specifically targeted at the property sector, notably sectoral capital instruments and constraints on lending criteria.

In France, the construction sector accounted for 6.3% of value added (in value terms) and 8.3% of jobs in 2012. Households spent an average 24% of their gross disposable income on housing over the period (Institut de l'épargne immobilière et foncière – IEIF, 2013), while 48% of their gross wealth was invested in real estate (Arrondel, Roger and Savignac, 2013). Changes in the housing market can thus have an impact on the French economy, even though their direct influence on household consumption is limited in comparison with other countries (Arrondel et al., 2014).

French banks are primarily exposed to real estate risk through their business of providing housing loans. However, their sensitivity to movements in the housing market depends on the strategies they have in place to secure their lending. More than half the housing loans granted in France are secured with an institutional guarantee (cautionnement) rather than a mortgage (Autorité de contrôle prudentiel et de résolution – ACPR, 2013). This form of guarantee encourages banks to place greater emphasis on the solvency of the borrower than on the quality of the asset pledged as collateral (the mortgage). In the event of a default by the borrower, the company granting the guarantee reimburses the bank out of a pool of funds and then tries to recover its losses from the borrower. Unlike with mortgages, however, their debt has no seniority status. As a result more attention is paid to the probability of a borrower default, leading to the selection of higher quality loans. French banks thus insist on limiting loan repayments (principal and interest) to 33% of a borrowing households’ disposable income. Moreover, the concept of mortgage equity withdrawal is not very widespread in France and the amount that can be provided as a guarantee is restricted to the purchase price of the property and not its market value.¹

This specific feature of the French housing market raises questions over the most efficient levers for macroprudential housing policy. What are the transmission channels for real estate risk? And how can we act on or control these channels?

It is also important to note that housing policy has always been a key government priority in France, even more so over the two-decade period covered by this study (1993-2013). Various measures have been introduced to try to stimulate housing supply, including income-based assistance to individuals, tax exemption of interest on housing loans, interest-free loans, tax credits for renovation work, social housing quotas and the enforceable right to housing (droit au logement opposable).

What are the possible knock-on effects of macroprudential policy tools on the French housing market? Do they conflict with the aims of the government’s housing policy? Or can they in fact be useful to that policy?

In this article we propose using a simplified model to analyse the interaction between macroprudential policy and the French housing market. The model allows us to look at the home lending and housing markets in tandem, and thus enables us to assess the responses of prices and quantities in both these markets to different macroeconomic factors – notably those through which macroprudential policy measures are transmitted. We can thus see how measures such as the tightening of loan-to-value (LTV) and debt-to-income (DTI) ratios, and constraints on overall lending growth, loan maturities and down-payments affect the housing market.

The remainder of the article is structured as follows: Part 1 provides a brief summary of the findings of the existing literature on the subject, followed by a detailed presentation of some stylised facts on the French housing and credit markets since the start of the 1990s. Part 2 describes the model and the results of our estimates and provides an analysis of macroprudential shocks. Part 3 puts previous results into perspective.

¹ These mechanisms mean there is no financial accelerator in the French property market. A financial accelerator (Bernanke et al., 1996) is when an increase in house prices leads to a rise in the provision of housing loans, where the latter are secured against the purchased property via a mortgage lien.
The housing and credit markets: stylised facts

1|1 A brief review of the literature

There are two bodies of literature that examine the links between the housing and credit markets: one that uses structural macroeconomic models, and another that uses the results of actual public policy experience.

In the strand using models, DiPasquale and Wheaton (1994) highlight an adjustment cost effect in the housing market which causes house prices to adjust gradually. They also give a more nuanced assessment than theoretical models of the role played by user cost in investment decisions.2 McCarthy and Peach (2002) examine the impact of financial deregulation on investment in residential property and assess the scale of the impact of credit constraints on the price and volume of real estate investments. However, the effect of interest rates differs depending on the regulation system adopted.

According to Duca et al. (2011), the credit constraints for first-time home buyers play a major role in determining the dynamics of house prices.3 Indeed, while financial innovation helped to drive the boom years in the housing market, the highly restrictive lending policies adopted by the major banks exacerbated the subsequent downturn. Nobili and Zollino (2012) confirm these findings with respect to the Italian housing market, demonstrating that lending criteria have a significant impact on demand for housing via home lending.

In the strand of literature that evaluates public policy experience, Wong et al. (2011) show that the introduction of an LTV ratio cap effectively reduced the systemic risk caused by house price cycles in Hong Kong. According to Igan and Kang (2011), the restrictions imposed on LTV and DTI ratios in Korea slowed the rise in prices and in transaction volumes. Claessens et al. (2013) confirm the effectiveness of DTI and LTV ratios in limiting growth in the financial sector during boom periods. Studies carried out on different panels of countries have also demonstrated the efficiency of macroprudential measures. For example, Kuttner and Shim (2013) evaluate the impact on home lending of measures designed to regulate the debt-service-to-income (DSTI) ratio, the LTV ratio, banks’ exposure to the housing sector and property taxes. In their view, the DSTI ratio is the most effective tool for influencing housing supply, whereas property taxes are the most effective way of stabilising house prices. Lastly, Lim et al. (2011) demonstrate that caps on LTV and DTI ratios, on lending growth, compulsory reserves and dynamic provisioning limit lending procyclicality.

1|2 Housing and credit in France since 1993: some stylised facts

The French housing4 and credit markets grew sharply in the first half of the 2000s, as in many advanced economies (see Chart 1). However, following the financial crisis, the adjustment in the French housing market was very limited, in that no reversal in the trend can be observed. Antipa and Lecat (2013) show that although house prices began to correct after 2008, in 2012 they were still 20% above the equilibrium price based on traditional fundamentals (i.e. household income, demographic factors, user cost, housing stock, etc.).

The resilience of house prices in France can partly be attributed to the inertia of the housing stock with respect to prices.5 This observation is confirmed by Caldera Sánchez and Johansson (2011) and by our estimates which show that the responsiveness of housing supply to price changes is low in France due to regulatory barriers to new housing construction.

Demand for housing also rose sharply over the period. Population growth in France accelerated at the start of the 2000s, and the number of households increased at an even faster pace.6 The combination of this demand shock and the housing stock inertia fuelled a rise in prices.

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2 The user cost is a measure of the opportunity cost of occupying a house.
3 Leasure (2013) studies the housing crisis that France experienced as of 1882-1883 and argues that bank failures led to difficulties in the housing market.
4 Chart 1 shows an aggregate index of house prices, which does not reflect the location of houses and thus their strong heterogeneity.
5 Bulusu et al. (2013) demonstrate the importance of supply constraints on house price boom-and-bust cycles in the United States.
6 Between 1975 and 2005, the population of France grew by an average of 0.48% per year whereas the number of households rose by 1.24% per year (Insee Première, 2006).
The housing market was also boosted over the period by the relaxation of constraints on demand for loans. This can be likened to a positive housing demand shock which, all other things being equal, can also cause prices to soar.

It should be remembered that the relaxation of these constraints was primarily the result of an improvement in bank refinancing conditions over the period. The drop in bank refinancing rates was passed through to housing loan rates, giving more households access to the lending market or allowing them to increase the amount of their borrowing.

Moreover, some of the constraints on lending were also relaxed. In France, housing loans can be secured either by a mortgage or by an institutional guarantee. The majority of loans are now secured by guarantees (ACPR, 2013). In the event of a default by the borrower, the guarantee company automatically reimburses the lender and then tries to recover its losses from the borrower. This means the bank is reimbursed rapidly and does not have to wait for the property to be sold. In contrast with mortgages, the risk of a fall in the price of the property is transferred to the guarantee company.

Before even protecting themselves against the risk of borrower default, French banks also reduce their exposure by restricting the debt service ratio to 33% of household income. Therefore, although the level of household debt increased over the period under review, it remained contained relative to other, notably “Anglo-Saxon”, countries. In hindsight, this can be considered a strong justification for the 33% restriction imposed by French banks. The focus on the debt service ratio substantially reduces banks’ risk exposure on their housing loan portfolios. Even though it varies widely across market segments, the ratio of gross non-performing loans for these portfolios is considerably lower than for household loans in general. After peaking at 1.55% in 2001, the non-performing loans (NPL) ratio fell consistently up to 2007 (0.98%), before rising steadily again in the period up to 2012, when it reached 1.47%, close to its 2001 level. The focus on borrower solvency also explains why more than 90% of housing loans in France are fixed rate (ACPR, 2013).

Chart 1 illustrates the importance of this constraint in determining the dynamics of home lending in France. Household borrowing capacity rose almost constantly, decelerating only slightly at the end of the period. Up to 2007, borrowing capacity and home lending remained on almost parallel trajectories.

Banks have been able to continue meeting the 33% debt service ratio thanks to a sharp rise in nominal household income over the period, but also by gradually extending the duration of housing loans. The average initial maturity for housing loans increased from 14 years in 1999 to 20 years (19.8 years) in 2012. Thus, according to Antipa and Lecat (2013), if we take into account the extension of loan maturities, the majority of the rise in house prices can be explained by the relaxation of constraints on lending.

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7 In contrast with other countries, in France, if housing loans are securitised via the Caisse de refinancement de l’Habitat (CRH), they remain on the balance sheet of the originating bank. The largest French banks are shareholders in the CRH, which is a securitisation vehicle for housing loans. The shareholders pledge a pool of their loans to the CRH which in turn issues debt securities, and then uses the funds it raises to provide loans on similar terms to those of the usual debt securities. However, the loans remain on the banks’ balance sheets and the credit risk is not transferred to the CRH, which is not a liquidity vehicle. It is therefore important to control lending criteria adequately.

8 In certain sub-periods, the amount of credit exceeds household borrowing capacity, contrary to what we would expect if lending criteria were applied uniformly across the population. Households with low incomes are directly excluded from the housing market. By contrast, a small portion of borrowers are considered to have sufficiently high revenues for banks to exceed the 33% debt service ratio. However, the dynamics of the market are primarily determined by the portion of the population to which the 33% ratio is applied.

9 Sources: Banque de France and author's calculations.
attributed to the borrowing capacity of households and to traditional fundamentals.

As a result, a macroprudential policy comprising limits on the DTI ratio or on the maturity of housing loans could have a lasting effect on the French housing market.

2) Macroprudential policy shocks and the housing market

In order to assess the impact of macroprudential policy shocks, we propose a model that looks at both the French home lending and housing markets over the period 1993-2013 (see Box 1 for a detailed description of the equations). The proposed framework is based on the assumption that the two markets are closely linked. Macroprudential measures primarily target credit supply, but in analysing their impact it is important to take into account the feedback effects between the housing and credit markets. This study adopts a pragmatic approach in that the equations are not derived from the resolution of a sector or agent optimisation programme. However, the relationships between the variables of interest are economically intuitive: the expected correlations are listed in Table 1. Moreover, only the long-run relationships are presented in detail in this article, even though there may be a lag in the adjustment of the housing market (DiPasquale and Wheaton, 1994).

The main theoretical characteristics of the equations in the benchmark model are as follows (see Table 1):

- House prices are a positive function of levels of household income and home lending and a demographic factor, which in this case is the population level. They are negatively linked to housing stock and to the user cost of homeownership. This latter factor reflects changes in the cost of owning a house (net of expected capital gains) and the tax policy on housing.

- The housing stock is a positive function of home lending and house prices, and is negatively linked to long-term interest rates which represent the cost of financing for homebuilders.

- Demand for housing loans reacts negatively to interest rates or to an indicator of lending criteria, which reflects household borrowing capacity, excluding income. This indicator is defined as a combination of interest rates, the maturity of the loan and the maximum share of income that will be used for loan repayments (see Box 1). It is positively correlated with household income and house prices.

- Lastly, interest rates on housing loans are positively correlated with the level of long-term interest rates but negatively correlated with house prices (the house value provides collateral for credit institutions) and bank’s capital levels (which reflect their solvency).

### Table 1
**Expected relationships between variables**

<table>
<thead>
<tr>
<th>Equation</th>
<th>Endogenous variables</th>
<th>Explanatory variables</th>
<th>Expected correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand for housing</td>
<td>House prices</td>
<td>Housing stock</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gross disposable income (GDI)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Home lending</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>User cost</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Population</td>
<td>+</td>
</tr>
<tr>
<td>Housing supply</td>
<td>Housing stock</td>
<td>House prices</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Home lending</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-year OAT</td>
<td>–</td>
</tr>
<tr>
<td>Demand for credit</td>
<td>Home lending (Change in outstanding amount)</td>
<td>Housing loan rates</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>House prices</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lending criteria</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gross disposable income (GDI)</td>
<td>+</td>
</tr>
<tr>
<td>Credit supply</td>
<td>Housing loan rates</td>
<td>10-year OAT</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EONIA</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>House prices</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ratio of capital to assets</td>
<td>–</td>
</tr>
</tbody>
</table>

*Note: Endogenous explanatory variables are indicated in bold.*
Box 1

The model

The model comprises 4 equations: a supply and demand equation for both the housing market and the credit market. We use quarterly volume data (deflated by the implicit price of household consumption, except where indicated otherwise) and logs (except for rates). The logs of each variable (except rates) are indicated in small letters. The model reflects long-term behaviours as the housing market can take a long time to adjust.

Housing market

- Inverted demand
  \[ p_t = \beta_0 + \beta_1 p_{it} + \beta_2 crd_t + \beta_3 s_t + \beta_4 uc_t + \beta_5 pop_t + \epsilon^0_t \]

where \( p_t \) is the price of existing property (the Insee data series has been extrapolated backwards using a series from the French association of estate agents or FNAIM); \( p_{it} \) is permanent income, proxied here by gross disposable household income, \( crd_t \) is the amount of outstanding housing loans, \( s_t \) is the stock of housing calculated using household wealth data and deflated by the implicit price of residential investment and using residential investment for the quarterly profile, \( uc_t \) is the user cost and \( pop_t \) is the population level.

The user cost reflects the cost of owning a property, which includes the opportunity cost of holding it and any expected future capital gains:

\[ UC_t = P^n_t (i_t - av_t + t_{prop} + \delta_t - \Delta P_t) \]

\( P^n_t \) is the level of house prices, \( i_t \) is the interest rate on housing loans, \( av_t \) is the rate of public aid granted to house builders (grants and tax breaks), \( t_{prop} \) is the rate of property tax, \( \delta_t \) is the rate of depreciation of housing derived from household wealth data, and \( \Delta P_t \) is the anticipated increase in house prices estimated as the average house price inflation over the past two years (adaptive forecasts).

- Housing supply
  \[ s_t = p_0 + p_1 crd_t + p_2 OAT_t + p_3 p_t + \epsilon^0_t \]

where \( OAT_t \) is the 10-year OAT rate.

Home lending market

- Demand for credit
  \[ \Delta crd_t = \sigma_0 + \sigma_1 \Delta p_{t-1} + \sigma_2 \Delta p_{t-1} + \sigma_3 \Delta p_{t-1} + \epsilon^c_t \]

The equation uses variations to take into account the order of integration of the variables.

- Credit supply: interest rates
  \[ i_t = \theta_0 + \theta_1 OAT_t + \theta_2 p_{t-1} + \theta_3 CAP_t + \epsilon^i_t \]

where \( CAP_t \) is the banks' ratio of capital to total assets.

In the credit equations, \( i_t \) and an indicator of lending criteria \( COND_t \) are used alternately. This latter indicator reflects the borrowing capacity of households, excluding income, based on the combination of the loan maturity, the interest rate and the maximum share of income devoted to loan repayments. We take the inverse to be consistent with the measurement of interest rates.

\[ COND_t = 1 / \left[ \sum_{t=1}^{T} \frac{1}{1 + i_t} \right] \]

where \( T \) is the average initial maturity of housing loans and \( REP \) is the maximum share of income devoted to loan repayments (we use 33%, in line with French banks’ lending practices).

The equations are estimated using three-stage least squares. Due to the low number of observations, they were also estimated using ordinary least squares and two-stage least squares. \( p_t, crd_t \), and \( s_t \) are deemed to be endogenous.
2|1 Empirical results

The results of our estimates (Table 2) are in line with our expectations. Indeed, in the case of demand for housing, the response in prices is slightly less than proportional to the change in lending volumes; as expected, prices fall when housing stock and user cost rises. The elasticity of prices to household income is spontaneously greater than 1. It was restricted to one with no significant loss in accuracy or explanatory power. The elasticity of prices to population levels is relatively high. This provides a good reflection of the dynamics in household numbers in relation to the total population over the period; it is consistent with the negative elasticity of housing stock.

In the case of housing supply, a 1-point increase in long-term interest rates ultimately lowers the housing stock by close to 2 points. The elasticity of housing stock to house prices is low, which reflects the constraints on housing supply in France as mentioned earlier (Caldera Sánchez and Johansson, 2011).

Regarding demand for credit, the level of interest rates on housing loans has a permanent impact on lending growth, with a 1-point rise in rates leading to a 0.2-point reduction in growth. The impact exerted through the lending criteria indicator is similar in scale. Interest rates on housing loans largely depend on long-term rates. A high level of bank capitalisation enables a reduction in interest rates as it reflects a stronger capacity to incur risk.

To check the robustness of our benchmark model, we also estimated the equations for an alternative model specification where the variables of interest are growth rates. Housing supply is inelastic to house prices, which is normal in a relationship based on variations.

Table 2
Results of the estimations

<table>
<thead>
<tr>
<th>Period: Q1 1993-Q2 2013</th>
<th>OLS</th>
<th>2SLS</th>
<th>3SLS-Rates</th>
<th>3SLS-Cond.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Housing demand: house prices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross disposable income</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Home lending</td>
<td>0.847*** (0.0991)</td>
<td>0.907*** (0.122)</td>
<td>0.706*** (0.118)</td>
<td>0.689*** (0.122)</td>
</tr>
<tr>
<td>Housing stock</td>
<td>-2.087*** (0.261)</td>
<td>-2.182*** (0.322)</td>
<td>-2.185*** (0.327)</td>
<td>-2.296*** (0.339)</td>
</tr>
<tr>
<td>User cost</td>
<td>-0.567*** (0.0327)</td>
<td>-0.584*** (0.0377)</td>
<td>-0.544*** (0.0338)</td>
<td>-0.531*** (0.0350)</td>
</tr>
<tr>
<td>Population</td>
<td>4.773** (1.957)</td>
<td>4.538* (2.430)</td>
<td>6.663*** (2.401)</td>
<td>7.319*** (2.485)</td>
</tr>
<tr>
<td><strong>Housing supply: housing stock</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home lending</td>
<td>0.240*** (0.0129)</td>
<td>0.253*** (0.0166)</td>
<td>0.226*** (0.0221)</td>
<td>0.226*** (0.0205)</td>
</tr>
<tr>
<td>10-year OAT</td>
<td>-2.386*** (0.217)</td>
<td>-1.741*** (0.194)</td>
<td>-2.028*** (0.219)</td>
<td>-2.083*** (0.219)</td>
</tr>
<tr>
<td>House prices</td>
<td>0.0488*** (0.0159)</td>
<td>0.0689*** (0.0180)</td>
<td>0.0897*** (0.0247)</td>
<td>0.0853*** (0.0234)</td>
</tr>
<tr>
<td><strong>Demand for credit: housing loans</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>△Gross disposable income</td>
<td>0.154* (0.0828)</td>
<td>0.151* (0.0798)</td>
<td>0.665** (0.262)</td>
<td>0.525** (0.259)</td>
</tr>
<tr>
<td>△House prices</td>
<td>0.263*** (0.0485)</td>
<td>0.264*** (0.0631)</td>
<td>0.303*** (0.0628)</td>
<td>0.360*** (0.0591)</td>
</tr>
<tr>
<td>Interest rates on housing loans</td>
<td>-0.200*** (0.0285)</td>
<td>-0.191*** (0.0237)</td>
<td>-0.218*** (0.0326)</td>
<td>- (0.0591)</td>
</tr>
<tr>
<td>Lending criteria</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1.062*** (0.159)</td>
</tr>
<tr>
<td><strong>Credit supply: interest rates/lending criteria for housing loans</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-year OAT</td>
<td>0.882*** (0.0785)</td>
<td>0.812*** (0.0722)</td>
<td>0.783*** (0.0592)</td>
<td>0.0988*** (0.09916)</td>
</tr>
<tr>
<td>House prices</td>
<td>-0.0200*** (0.00375)</td>
<td>-0.0303*** (0.00613)</td>
<td>-0.0239*** (0.00395)</td>
<td>-0.0384*** (0.00612)</td>
</tr>
<tr>
<td>Capital to assets</td>
<td>-0.719*** (0.0897)</td>
<td>-1.898*** (0.401)</td>
<td>-0.517*** (0.149)</td>
<td>-0.584*** (0.0214)</td>
</tr>
</tbody>
</table>

Notes. Figures in parentheses are robust standard deviations. * p ≤ 0.1, ** p < 0.05, *** p < 0.01.
All series are deflated and in logs (except rates). A constant is included in each column. Columns 1 to 4: the GDI coefficient is restricted to 1 in the housing demand equation. Columns 1 and 2: the residuals are stationary (augmented Engle-Granger tests). Column 2: the null hypothesis of exogeneity for these tools cannot be rejected by the Sargan-Hansen test.

Macroprudential policies: implementation and interactions
Banque de France • Financial Stability Review • No. 18 • April 2014
201
Housing supply and demand are most responsive to housing credit. The cost of credit is determined by short-term rates and adjusted to an extent by movements in house prices. Demand for credit appears to vary according to the intensity of the constraints on the debt service ratio. Indeed, it rises markedly as the maturity of housing loans and gross disposable income increase. The economy thus depicted is one in which credit affects house prices both directly and indirectly over the short term, via housing stock. Relaxing lending criteria tends to push house prices upwards, while a downward adjustment in interest rates on housing loans has a stabilising effect. Estimating these equations using the same methods produces results that are consistent with those of our reference model (Table 3), even though certain relationships have been deliberately simplified (for example, supply inertia).

2|2 The effects of macroprudential policy shocks

The French Financial Stability Board and ACPR have several macroprudential policy tools at their disposal (see Box 2). Some of these increase the interest on housing loans, while others aim to prevent excessive growth in asset prices or in debt.

Box 2

Macroprudential tools for the housing market

The purpose of macroprudential policy is to maintain financial stability by preventing excessive growth in credit. Under the French Banking Law of July 2013, the Haut Conseil de stabilité financière can tighten lending criteria to prevent excessive growth in asset prices or in debt, while the Regulation adopted on 28 June 2013 by the European Parliament authorises the ACPR to increase the risk weighting of housing loans if there is a threat to financial stability. French authorities thus have two types of macroprudential tool which they can use to control the housing market.

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The housing market: the impact of macroprudential measures in France
Sanvi Avouyi-Dovi, Claire Labonne and Rémy Lecat

Tools targeted at the borrower reduce the risk associated with financial assets. This category includes caps on the LTI, LTV and DSTI, or on the initial maturity of loans. They limit the risk exposure of the lender and help to ensure that, in the absence of a major shock known to the borrower, the loan will be repaid.

Tools aimed at the lender oblige banks to increase their ability to withstand a shock. Thus, by increasing the risk weighting of residential property market exposures, the supervisor forces banks to increase their capital cushion, and thus their ability to absorb shocks. As capital is expensive, this tool could even cause banks to scale back their lending (see Brun, Fraisse and Thesmar, 2013 on the impact of a rise in the cost of capital on corporate lending).

We simulate three types of shock: a shock to interest rates on housing loans, a shock to the initial maturity of housing loans and a shock to the DSTI ratio. These shocks correspond to the implementation of macroprudential policies specifically targeted at housing loans. Thus, the rise in loan interest rates is not accompanied by a rise in the OAT rate, in order to provide as close as possible a simulation of a tightening of capital requirements; the shock to the DSTI ratio has no impact on household income.

All three shocks are calibrated to have a similar impact on demand for credit: a one-point rise in interest rates on housing loans, the restriction of the DSTI ratio to 30% and a two-year reduction in the initial maturity of loans. These last two shocks are implemented via the lending criteria indicator.

The shocks are applied to the average values of these variables. As a result the evolution of the variables does not accurately capture specific constraints on the margin of loans that are very long term, or those with a DSTI ratio much higher than 33%. The effect of the shocks could be underestimated if they had a significant impact on household expectations of house prices which would substantially increase the user cost of homeownership.

Charts 2
Macroprudential policy shocks
(% deviation from baseline scenario; number of quarters)

a) One-point increase in housing loan interest rates

Rates on housing loans, for example by increasing the risk-weighting of this type of loan in the calculation of a bank’s capital adequacy ratio. Other tools lead to a reduction in the amount of debt repayments as a share of disposable income or in the initial maturity of housing loans (measures affecting the LTI, LTV or DSTI ratios, or directly affecting loan maturities).

We simulate all three types of shock (see Box 2 and Charts 2): a shock to interest rates on housing loans, a shock to the initial maturity of housing loans and a shock to the share of repayments in disposable income – the debt service to income ratio or DSTI.

A rise of one percentage point in the interest rate on housing loans would slow the rate of growth in lending. The immediate effect is a 0.13% fall in house prices, then the persistent reduction in lending begins to weigh on house prices and on housing stock, which in turn has a stabilising effect on prices – the pace of decline slows, but the elasticity of housing stock is insufficient to stimulate a rise in prices.

A two-year reduction in the average initial maturity of housing loans will limit the maximum amount that a household can borrow at a given interest rate and with a given level of income. As the impact of a variation in loan maturities on the maximum borrowing amount depends on the level of interest rates, we apply the shock to current rates.
The housing market: the impact of macroprudential measures in France
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Charts 2
Macroprudential policy shocks (cont’d)
(% deviation from baseline scenario, number of quarters)

<table>
<thead>
<tr>
<th>b) Two-year reduction in loan maturities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>-2.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c) Lowering of DSTI ratio to 30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>-2.5</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations.

of interest. The impact on lending is progressive – the immediate result is a 0.16% reduction and then the effect is gradually amplified due to the persistent decline in loan maturities and in house prices. The fall in lending leads to a fall in housing stock and in house prices, as the lack of elasticity in housing supply prevents prices from returning to equilibrium.

Reducing the maximum share of disposable income that can be used for loan repayments (the DSTI ratio) from the current French standard of one third to 30%, would have a similar impact to the previous shock. The shock is transmitted via the lending criteria indicator and results in a 0.2% decline in lending, which is then reinforced by the continuing effect of the DSTI ratio and the decline in prices.

Ultimately, the impact of these measures on house prices is limited by the adjustment in housing stock caused by the decline in lending. However, their effect on home lending is persistent.

3 | CONCLUSION:
MACROPRUDENTIAL POLICY
AND ACCESS TO HOMEOWNERSHIP

The particular structure of the French housing market means there is no immediate call for specific macroprudential policies. However, they could be used if destabilising trends were to emerge in the broader economic environment. The home lending market in France appears to be structurally sound. The French preference for institutional guarantees and the corresponding focus on the credit quality of the borrower (notably via the 33% cap on the DSTI ratio) suggest the French financial system is particularly resilient to residential property risk (IMF, 2012). The risk of individual borrower default also remains limited, as shown by the low rate of defaults over the past five years – although it rose sharply after 2007, it has remained below 2%. The potential side-effects of a long-term restrictive macroprudential policy on the housing market also justify taking a cautious approach. The introduction of new constraints would exclude new segments of the population from the housing market, which goes against the goal of increasing homeownership.

That said, recent regulatory changes could undermine the current preponderance of institutional guarantees and the associated focus on borrower solvency. In this case, placing caps on LTV and DTI ratios could prove a useful tool for containing the risk of individual borrower default. A previous study of the home lending market shows that these measures could be complemented with a limit on the duration of residential property loans.

Thus, if destabilising trends were to emerge in the French housing credit market, the introduction of macroprudential constraints would have a non-negligible impact on lending growth and, to a lesser extent, on house prices.
The housing market: the impact of macroprudential measures in France
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Three criticisms of prudential banking regulations

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The new prudential regulations known as Basel III, introduced in the aftermath of the financial crisis, place four (actually five, in practice) new constraints on banks. These are a solvency ratio, three liquidity constraints and a leverage ratio. The purpose of this regulatory straitjacket is to enhance the financial soundness of banks, prevent a reoccurrence of the contagion seen in 2008 and reduce systemic risk. Unfortunately, these arrangements have some undesirable consequences and shortcomings. This article highlights three of the problems. The first is that the growing number of constraints, and the parameters applied, will drive up borrowing costs and shrink the supply of credit, even after the period of adaptation and transition is over. Financing market activity could become difficult as the regulations themselves provide an incentive for disintermediation. The second criticism focuses on increased collateral requirements in a world where real mistrust now exists between participants in the financial system. In addition to the collateral requirements for certain transactions, we wish to draw attention to the “hidden” collateral constraint, which requires adequate unencumbered assets to properly cover “unsecured” borrowing. This constraint is no longer merely theoretical; it will affect the banking system’s viability in the medium-term. Finally, we show how, in an economy that is risk-free at the macroeconomic level, the fact that banks are interconnected may generate contagion risk and self-fulfilling prophecies. This situation is less likely to occur in the case of a creditor outside the system. However, each bank’s risk of failure will depend on the structure of cross-financing and the correlation with risks incurred by other banks. No matter how many constraints are imposed, it is unrealistic to think that regulations applying to banks on an individual basis will be able to ward off systemic risk.

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We are struggling to emerge from a banking and financial crisis that signalled the failure of regulations brought in over several decades. These regulations were unable to prevent or eliminate major problems that affected the banking sector in 2007 and then spread to the real economy.

To prevent such a disastrous situation from reoccurring, governments and the financial community have proposed a new architecture for prudential supervision. The blueprint has since become clear.

The first aspect is curative, determining how to deal with the crisis once it happens. There were no plans for coping with the last crisis, which means that much of the response has been pure improvisation. Today, two principles seem to be prerequisites:

- deposit-guarantee schemes covering a minimum sum (EUR 100,000 in Europe) to prevent small customers from being ruined and maintain public confidence in the currency;

- orderly liquidation of failed banks, with shareholders, lenders and even large depositors (as was the case with Cypriot banks) bearing losses; bail-ins, whenever possible, seem preferable to bail-outs, where taxpayers' money is used to prop up troubled banks. The euro crisis showed all too well how bail-outs could turn distrust of banks into distrust of governments.

At the same time, the role played by central banks had to be reconsidered. The simplistic view of monetary policy, where central bankers concern themselves solely with interest rates and monetary aggregates, has been shattered. The crisis has lent legitimacy to “constructive ambiguity” about the central bank’s role as lender of last resort in order to mitigate the moral hazard associated with such a guarantee. The idea is to have such a weapon, so that it never needs to be used.

This means the preventive aspect of the architecture is very important. The measures introduced since 2008 are once again based on two pillars:

- changes to market structures, starting with the most speculative activities to insulate the rest of banking business from them: this is the approach taken in the United States and the United Kingdom. Derivatives markets should see the introduction of initial margin requirements or obligatory clearing through a central counterparty (CCP) clearing house and greater transparency;

- the Basel III prudential policy, which seeks to increase banks’ capital, as well as increasing liquidity.

This is the aspect of the architecture we would like to examine here in order to say that it is not above reproach. Three caveats need to be emphasised:

- the ratios introduced under Basel III are actually a straitjacket that banks will be forced into. These ratios are likely to lead to a long period with a tightly constrained banking system. There are valid theoretical and practical reasons to fear adverse effects on the volume and cost of financing for economic activity;

- the financial community’s spontaneous response to the crisis was to introduce new guarantees based on more extensive use of collateral. Many borrowing and lending transactions, in addition to transactions with the central bank, are now collateralised using high-quality assets plus haircuts. Far from strengthening the safety of the financial system, this newfound passion for collateral, encouraged by Basel III, actually undermines it;

- in fact, Basel III follows the same philosophy as its predecessors, Basel I and Basel II. It tries to enhance the stability of the financial system through measures that apply to individual institutions in isolation from their peers. Yet, as recent events have shown, banks that have impeccable credentials and pass stress tests with flying colours can be brought low in the turmoil of a systemic crisis. Financial shocks are easily propagated in an interconnected and crowded system, where banks not only interact with each other, but also with participants in the shadow banking system that lies beyond regulatory reach. The liquidity of an individual bank (its holdings of easily realised assets) is not the same as the liquidity of the asset market where it expects to sell them. A liquid market requires substantial demand and an equilibrium price. The so-called macroprudential component of regulatory policy, focusing on the system as a whole and not just the individual parts, deserves closer attention.
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Vivien Levy-Garboua and Gérard Maarek

1| BASEL III OR “ADMINISTERED” ASSET AND LIABILITY MANAGEMENT FOR BANKS

To have an idea of how Basel III will influence banks and the economy, let us start with the example of a “universal bank” with the following balance sheet:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans</td>
<td>600</td>
</tr>
<tr>
<td>Securities</td>
<td>150</td>
</tr>
<tr>
<td>Reverse Repos</td>
<td>150</td>
</tr>
<tr>
<td>Reserves</td>
<td>100</td>
</tr>
<tr>
<td>Deposits</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,000</td>
</tr>
<tr>
<td>Total</td>
<td>1,000</td>
</tr>
</tbody>
</table>

On the assets side, the bank has outstanding loans, holdings of securities and reserves held in the form of deposits with the central bank. On the liabilities side, it has capital and the market borrowings needed to supplement the deposits it takes from non-financial customers. It also obtains funds through short-term repurchase agreements (repos) with other banks, investment companies and insurers. It then generally relends some of these funds for a somewhat longer term, maintaining a matched book. It may also seek central bank refinancing in the form of repos.1 This bank is representative of today’s European banks in three of its characteristics: outstanding loans that are greater than deposits (with a loan-to-deposit ratio of approximately 110%); a large repo portfolio to finance its “Corporate and Investment Banking” business’s trading activities; reserve deposits with the central bank that are much larger than strictly necessary for compliance with reserve requirements.

This commercial bank will now be subject to four distinct types of constraints under Basel III:

- the solvency constraint;
- the two liquidity coverage ratio (LCR) constraints;
- the net stable funding ratio (NSFR) constraint;
- the leverage ratio constraint.

Not all these requirements will necessarily restrict the bank’s actions – at least not all at once. The bank will need to adapt to achieve compliance.

We carried out the following exercise. Starting with the situation described above, and based on parameters corresponding to what we know about the rules adopted or planned by the regulators (see Box 1), we first try to see which of the initial constraints our bank already complies with and which ones it does not. Then, in a second step, starting with the same situation, we show what the ultimate effect on the balance sheet will be, once the bank has achieved full compliance, while maximising its return on equity.

1|1 Starting situation

To assess the constraints, we make three assumptions:

- the term structure of the bank’s lending must be specified to calculate the LCR and NSFR constraints. Based on data from the European Central Bank (ECB), we can break down monetary financial institutions’ lending into loans with terms of less than one month (7% of total lending), loans with terms of one month to one year (38%) and loans with terms of one year or more (the remainder, or 55%). This is the term structure we use;

- off-balance sheet exposures need to be considered. These exposures are used to calculate average risk-weighted assets and, more importantly, for calculating the LCR and the NSFR. We assume that off-balance sheet exposures account for 20% of total lending;

- the bank primarily uses its eligible loans as collateral for its central bank refinancing, after applying the central bank haircuts.

Under these assumptions, the main finding is that the LCR is the constraint that bites. It is not met initially, but compliance can only be achieved through massive investment in assets that are accepted as high quality liquid assets (HQLA), primarily excess reserves (89, in addition to the 11 for reserve requirements) and the securities deemed to be the safest (sovereign bonds come to mind). This means a loss of return on excess reserves (which earn little or no interest), and a stronger link between banking risk and sovereign risk, which is the very link we would like to break.

1 We have omitted the derivatives portfolio. The present value of such portfolios can be very substantial, but assets and liabilities generally balance each other out.
A bank’s balance sheet shows the following:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans (L)</td>
<td>Capital (CE)</td>
</tr>
<tr>
<td>– short-term (L_s)</td>
<td>Market debt (MD)</td>
</tr>
<tr>
<td>– intermediate term (L_i)</td>
<td>Deposits (D)</td>
</tr>
<tr>
<td>– long term (L_l)</td>
<td>Repos (Repo)</td>
</tr>
<tr>
<td>Securities (S)</td>
<td>Refinancing (RF)</td>
</tr>
<tr>
<td>Reserves (Res)</td>
<td></td>
</tr>
</tbody>
</table>

On the assets side, the bank has loans (L), securities (S) and reserves (Res). We need to distinguish loans by their residual maturity to calculate the regulatory constraints. Three terms are distinguished: up to one month (L_s), one month to one year (L_i), and one year or more (L_l). We assume that:

1. \( L_s = a_1 L \)
2. \( L_i = a_2 L \)
3. \( L_l = (1 - a_1 - a_2) L \) with \( 0 < a_1, a_2 < 1 \)

On the liabilities side, the bank finances its assets with capital (CE), medium-term market debt (MD), deposits (D), wholesale deposits or repos (Repo), collateralised with securities,\(^1\) and central bank refinancing (RF). Furthermore, the bank has given guarantees and granted back-up lines of credit that may be drawn on at the initiative of the customer. These are shown as off-balance sheet exposures (OB).

The bank’s balance sheet constraint is written: \( L + S + Res = CE + MD + D + Repo + RF \)

The five regulatory constraints are added to this: the first is the solvency ratio:

\( CE > kL + k'(S - e'(S - Repo/(1 - h'))) \)

Capital must be equal to or greater than a fraction of the average weighted assets. \( k \) and \( k' \) denote the regulatory coefficients for loans and securities. In the case of loans, we assume that the “average risk-weighted assets” ratio for “loans” is 0.7. And, in the case of securities, the \( k' \) coefficient (10%) applies to securities that are not accepted as high quality liquid assets (HQLA). In (5), \( e' \) denotes the fraction of securities accepted as collateral and \( h' \) denotes the haircut applied to repos.

The liquidity coverage ratio (LCR) breaks down into two constraints:

\( Q + CI ≥ CO \)

\( CI = \gamma_1 L_s + \gamma_2 L_i + \gamma_3 S \)

\( CO = \alpha_1 D + \alpha_2 Repo + \alpha_3 OB \)

\( Q ≥ 0.25 CO \)

\( Q = (Res - gD) + e'S \)

Equations (6) to (10) express the complexities of the LCR constraint.

In (6), the sum of HQLA (Q) and capital inflows (CI) must be greater than capital outflows (CO), whereas (9) reminds us that the regulator requires \( Q \) to be more than 25% of capital outflows. (7) and (8) define CI and CO, as the regulator.../...
evaluates them in a stressed situation: the regulator imposes the coefficients on banks ($\gamma$'s and $\alpha$'s). It should be noted that the regulator does not consider repayment of RF to be a cash outflow. (10) defines HQLA (Q) that is the sum of excess reserves (reserves in excess of requirements, which are a fraction $g$ of deposits) and eligible securities ($e'S$).

The fourth constraint is the net stable funding ratio (NSFR): (11) $L + \mu S + \eta_2 OB < CE + MD + \eta_1 D$

Long-term commitments (loans with terms of more than one year, plus a fraction $\mu$ of securities with maturities of more than one year and a fraction of the off-balance sheet commitments that could be called on) must be less than funding with maturities of more than one year (capital, market debt and a proportion $\eta_1$ of deposits considered to be very stable).

The fifth constraint is the leverage ratio: (12) $CE > l \left[ L + S + Res + \beta OB \right]$

Capital must be greater than 1% of all assets, plus a fraction ($\beta$) of off-balance sheet items.

Furthermore, we make the ad hoc assumption that: (13) $OB = u L$

Off-balance sheet transactions are primarily guarantees provided by the bank and commitments for back-up lines of credit. These are generally closely associated with long-term lending. $u$ denotes the proportion of the line of credit that customers could theoretically draw.

The bank seeks to maximise return on equity (ROE), which is defined as follows:

$$ROE = \left[ r_L L + r_S S + r^* Res – r_D D – r_B MD – \left( r Repo \right) – r_f RF – C \right]/CE$$

where $r_L$, $r_S$, $r^*$, $r_D$, and $r_f$ denote the interest rates on loans, securities, reserves, repos, deposits, market debt and refinancing respectively and $C$ denotes the bank’s operating costs.

$\eta_L \geq \eta_B \geq \eta_2 \geq \eta', r \geq r_f \geq r^*$.

### Calibration

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Interest rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a_1 = 7%$</td>
<td>$r_L = 4.50%$</td>
</tr>
<tr>
<td>$a_2 = 38%$</td>
<td>$r_S = 3.50%$</td>
</tr>
<tr>
<td>$a_3 = 55%$</td>
<td>$r^* = 0.25%$</td>
</tr>
<tr>
<td>$k = 8%$</td>
<td>$r_f = 0.50%$</td>
</tr>
<tr>
<td>$k' = 10%$</td>
<td>$r = 0.50%$</td>
</tr>
<tr>
<td>$\gamma_1 = 0.5$</td>
<td>$\gamma_2 = \left( 1/12 \right) 0.5$</td>
</tr>
<tr>
<td>$\alpha_1 = 0.05$</td>
<td>$\alpha_2 = 0.8$</td>
</tr>
<tr>
<td>$g = 2%$</td>
<td>$e = 0.1$</td>
</tr>
<tr>
<td>$\eta_1 = 0.67$</td>
<td>$\eta_2 = 0.05$</td>
</tr>
<tr>
<td>$l = 3%$</td>
<td>$\beta = 0.3$</td>
</tr>
</tbody>
</table>

2. For the sake of simplicity, we have assumed that all the securities accepted as HQLA are unencumbered, meaning that the bank has not used them as collateral for central bank refinancing or repos.

### 1|2 Long-term equilibrium

To calculate the long-term equilibrium, we assume that the bank is acting as a price taker, adapting to the interest rates imposed on it. The bank is not risk averse and maximises its return on equity under all the regulatory constraints. In addition, it meets the imperative of maintaining equilibrium between assets and liabilities on its balance sheet and preserves the term structure of lending specified above. With a reasonable term structure of interest rates (see Box 1), we obtain the following spectacular result: even though lending rates are substantially higher than return on securities, the equilibrium is characterised by:

- a dramatic contraction of balance sheet assets (from 1,000 to 623);
- complete elimination of loans and repos;
- no need for medium-term market financing.
This is a narrow-bank situation. Deposits are used to finance safe securities. The result is a classic consequence of linear programming: it leads us into a “corner”. To re-establish the normal banking asset structure, with both lending and securities, we need to increase the return on lending. In this case, securities and repos decrease dramatically. In addition to the fact that the solutions of the optimisation equations are corner points, the obvious lesson is that the cost of borrowing needs to rise and market activities are severely penalised.

1|3 Macroeconomic analysis

If, instead of looking at an individual bank in isolation, we consider the banking system as a whole, and we reason in terms of deposit and loan amounts corresponding to those desired by non-financial agents, we would have to consider:

- the central bank, where equilibrium of its balance sheet imposes a further equation:

Banknotes + reserves = refinancing + other counterparties

- the government, which issues government debt securities that are purchased by the private sector or banks;

- private non-financial agents, which allocate their assets between capital, securities, risk-free assets (bonds, deposits and banknotes) and their demand for credit.

In this case, we have taken the bank balance sheet data provided by the ECB (Table 2 below), and we have attempted to construct a very simple macroeconomic model, where the financial system is required to satisfy the aggregate demand for credit ($L$ is imposed) and where the financial system and the non-financial sector combined have to meet the government’s borrowing requirement. Based on the starting situation shown in the table, we first analyse the regulatory constraints, using the same regulatory parameters as in the previous example. We see that all of them have been satisfied, except for the LCR, which falls far short.

We then impose compliance with the LCR and we see how the banks, in their attempt to maximise return on equity, distort their balance sheets to adapt to this new constraint. This time, we allow them to adjust the term structure of their assets and liabilities. Not surprisingly:

- the term structure of lending is distorted with more short-term loans (less than one month);

- repos and reverse repos have to be cut back substantially;

- long-term market financing and capital are increased;

- compliance with the LCR requires banks to hold a large stock of HQLA.

Within the structure of a simple general equilibrium model, we see the same type of result as above, which confirms the findings in the case of a universal bank.

2| The “hidden” collateral constraint

In our analysis of the regulatory constraints above, we have not considered collateral and its impact on the bank. In the real world, one of the features of developments in banking and shadow banking has been the extraordinary growth of collateralisation. Banks’ mistrust of each other and of other financial system participants has intensified the phenomenon. The Basel II and, more especially, the Basel III regulations have provided an added incentive for seeking collateral and making margin calls. So much so, that we are starting to reason in terms of collateral supply and demand, and there are growing concerns about the risk of shortages.

### Table 2

Euro area banks’ balance sheet

<table>
<thead>
<tr>
<th>Liabilities</th>
<th>Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans</td>
<td>13,062</td>
</tr>
<tr>
<td>Securities</td>
<td>6,675</td>
</tr>
<tr>
<td>Reverse repos</td>
<td>6,627</td>
</tr>
<tr>
<td>Deposits</td>
<td>12,255</td>
</tr>
<tr>
<td>Reserves</td>
<td>564</td>
</tr>
<tr>
<td>Market debt</td>
<td>4,592</td>
</tr>
</tbody>
</table>

**Total** 26,928

**Source:** ECB
The logical way to approach the issue of collateral shortages is to wonder how and at what cost (M. Singh, 2010) financial players can obtain the assets that their counterparties demand to (i) securitise loans, (ii) obtain the central bank refinancing that they may need, (iii) underlie the repos needed to finance their market activities and lending, (iv) be a backstop for covered bonds that they issue on the market, (v) accumulate the reserves of high-quality assets that the regulators demand for their liquidity management and (vi) put up the initial margins or respond to margin calls from clearing houses or their counterparties in market transactions. Naturally, this matter is complicated by the different haircuts applied to different assets and the specific features of the eligible assets for this or that use. It has become so complicated that banks are now setting up actual collateral management departments.

Even if we assume that such collateral management is satisfactory, and there is no certainty that it will be, we still have to deal with another collateral constraint, which we call the “hidden constraint”.

This constraint stems from the externality created by this collateralisation of lending: once all the pledges have been made, can we be sure that the unencumbered assets remaining will cover the banks’ unsecured borrowing in the form of deposits or conventional debt?

The findings based on the euro area data published by the ECB are spectacular. In the middle of 2011, euro area banks had EUR 10,335 billion in deposits and EUR 3,160 billion in unsecured borrowing, representing total exposure of EUR 13,495 billion for their depositors and lenders. What assets did they have to secure repayment of this debt? Of their EUR 16,679 billion in assets, a fraction was pledged. Central bank refinancing accounted for EUR 538 billion, repos accounted for EUR 440 billion and covered bonds accounted for EUR 1,587 billion, for a total of EUR 2,565 billion. When we include the haircuts, we can consider that some EUR 3,000 billion in assets were pledged as collateral. If we assume banks want to keep half of their refinancing in the form of eligible assets to cover contingencies, this may add another EUR 300 million to the encumbered assets, making the total EUR 3,300 billion. Ultimately, this leaves only EUR 16,679 billion – EUR 3,300 billion = EUR 13,379 billion to cover EUR 13,495 billion in unsecured borrowing. And since the secured loans are already collateralised with the best assets, there is reason to fear that the unencumbered assets are also the riskiest assets. If we assume that the provisions to be set aside for these loans are 3% of the principal, the collateral shortfall stands at approximately EUR 500 billion. This gives the “hidden constraint” and it is binding, even if we accept a low margin of safety: the banking system’s unsecured deposits and borrowing are not covered by its holdings of unencumbered assets. Now this does not constitute an infringement of the standards imposed by regulators, which makes it a virtual threat, but it is a real constraint nonetheless, since it determines the long-term viability of banks. And we already know that, sooner or later, the market will take notice, and, once it does, it will not let go of the problem until it has been remedied.

These findings have two consequences. In terms of banks’ financial structure, they show that unsecured borrowing, particularly medium-term and stable borrowing, is critical for financial stability. Not only because it can be substituted for certain capital functions, but also because it ensures the sustainability of the bank’s growth. Once again, what seems to be a virtue on a microeconomic scale is actually harmful on a more global scale.

The second consequence of these findings relates to monetary policy. Because of this constraint, all else being equal, the supply of bank lending is smaller. With no change in the level of credit demand, this constraint is bound to lead to wider credit spreads and become a drag on economic growth. But there are more serious effects: any increase in uncertainty and fear leads to demands for more collateral and larger haircuts, simultaneously in most cases. The collateral constraint is strengthened, which accentuates the credit crunch. This multiplier effect is seen in interbank transactions and can freeze the market.

Unfortunately, nobody seems to be seriously concerned about this matter.

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Bank panics are never the primary cause of financial crises, but they are the most spectacular manifestations of such crises. Diamond and Dybvig explained this phenomenon with a model that is still a benchmark for economists. However, the events of 2007-2008 in the United States, and the events of 2011 in the euro area were of a different nature: retail customers and business customers did not withdraw their money from banks, but institutional investors, insurance companies, investment funds and banks did. The bank run occurred within the financial system first. The size of the financial system and the dense network of relationships between banks and the shadow banking system made for a violent implosion and terrifying contagion. Therefore, regulators need to address this new type of systemic risk, which starts in the financial economy and spreads, infecting initially sound institutions and, ultimately, spilling over into the real economy. For regulators, the fear is that conventional prudential policies, applied to each institution individually, will be inadequate. Either the infectious agents will be beyond the regulators' control or else a benign imbalance will “snowball” and become unstoppable as it is propagated throughout the system. This means that macroprudential policies are required.

A simple model provides a spectacular view of the danger in the financial system. Imagine that \( N \) identical economic agents (banks) each hold an initial capital stock \( K_0 \) (which may be a portfolio of loans and securities) and that each one lends to \( N-1 \) other banks the same sum \( L/(N-1) \), where \( L \) denotes the aggregate claims and debt of each of the \( N \) banks. The representative bank, therefore, has two assets, \( N-1 \) identical claims on the other banks, and assets financed with its capital (equal to the initial capital endowment \( K_0 \)). Its liabilities are its debt towards other banks (in the form of \( N-1 \) identical deposits of \( L/(N-1) \) each). The value of capital stock is a random variable \( K_1 \) at the end of the period, but \( K_1 \) is always positive.

Let us also assume that the interest rate on risk-free assets is zero, which means that \( L \) is the sum due at maturity.

### Box 2

**Systemic risk**

The table below describes claims and debts in the universe under consideration, under the assumptions specified above. The table is filled in for Bank 1 only to make it easier to read, but it could easily be filled in for each of the \( N \) banks.

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
<th>Bank 1</th>
<th>Bank 2</th>
<th>…</th>
<th>Bank j</th>
<th>…</th>
<th>Bank N</th>
<th>Capital</th>
<th>Total liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank 1</td>
<td>0</td>
<td>L/(N-1)</td>
<td>L/(N-1)</td>
<td>K</td>
<td>K + L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank 2</td>
<td>L/(N-1)</td>
<td>0</td>
<td></td>
<td>K</td>
<td>K + L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>…</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank i</td>
<td>L/(N-1)</td>
<td></td>
<td></td>
<td>K</td>
<td>K + L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank N</td>
<td>L/(N-1)</td>
<td></td>
<td></td>
<td>K</td>
<td>K + L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productive capital</td>
<td>K</td>
<td></td>
<td></td>
<td>K</td>
<td>K + L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total assets</td>
<td>K + L</td>
<td></td>
<td></td>
<td>K</td>
<td>K + L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Let the interest rate on risk-free assets be zero. The market value of \( L \) is the sum due at maturity. This value is equal to the expected value of the pay-off (denoted \( \text{PO}(L) \), which is a random value since \( K_1 \) is also random. More specifically:

\[
\text{PO}(L) = L \text{ if the bank's net situation is positive at maturity, i.e. } K_1 + \sum_i \text{PO}_i(L/(N-1)) > L
\]

---

6 Log \( K_0 \), for example, is a lognormal random variable with an expected value of log \( K_0 \) and a standard deviation of log \( \sigma \) that is always positive.
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Vivien Levy-Garboua and Gérard Maarek

If we look at this economy in aggregate, there is no risk of bank failure. The banks may lose money or gain money, depending on whether $K_1$ is smaller than or greater than $K_0$, but the banks remain solvent under all circumstances. And yet, the network of debts and loans created gives rise to a microeconomic risk of bank failure. This finding holds true, even if hazards are independent of each other and there is no correlation between risks.

This paradoxical result is found simply by calculating the probability of failure $p$ for each bank in two ways. Either by identifying the value of the debt as $(1-p)L$. Or explicitly, by calculating the probability that the bank’s net situation will become negative, meaning that the value of the bank’s assets ($K_1$ plus the value of the $N-1$ loans made to other banks) falls below $L$. This gives us a second equation for the probability of bank failure, $p$.

Ultimately, $p$ is obtained as the root of the equation:

$$p = \sum_{y=0}^{N-1} \frac{(1-p)^y p^{N-1-y}}{(N-1)! y!(N-1-y)!} F(L-y\frac{L}{L-1})$$

The equation takes the form $x = f(x)$, and applies the interval $(0,1)$ to itself. This means that it has at least one fixed point solution.

Simulations:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Log-normal distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of banks</td>
<td>$N$ 11</td>
</tr>
<tr>
<td>Capital stock</td>
<td>$K_0$ 50</td>
</tr>
<tr>
<td>Each bank’s debt</td>
<td>$L$ 175</td>
</tr>
<tr>
<td>Claims on each bank</td>
<td>$L/N-1$ 17.5</td>
</tr>
<tr>
<td>log $K_0$</td>
<td>3.91</td>
</tr>
<tr>
<td>log $\sigma$</td>
<td>15%</td>
</tr>
</tbody>
</table>

The simulation concludes that the probability of failure $p$ is 16.5%...

... whereas, with no debt, the probability of failure would have been zero, since $\text{Prob}(K_1<0) = 0$, because of the log-normal distribution. The claims and debts give rise to a risk of bank failure, even though the system has no debt towards the exterior.
Three criticisms of prudential banking regulations
Vivien Levy-Garboua and Gérard Maarek

The chart above illustrates this discussion.

To interpret this result, we merely have to realise that the equality above leads to three solutions illustrated in the chart: at fixed point $A$, the solution of $p=0$ is rational (and stable); at the other extreme, at fixed point $C$, the solution is $p=100\%$ if each bank is convinced that its peers will fail. In this case, bank failure is certain, but irrational (and stable). Finally, there is a solution between the two extremes (at fixed point $B$), where $p$ has an intermediate value. With this solution, a “belief” can take hold and becomes a self-fulfilling prophecy. This solution is possible, yet unstable: any arbitrarily small deviation drives $p$ to one of the extreme solutions.

One way to avoid finding ourselves in a world where self-fulfilling prophecies determine equilibriums is to introduce an “exogenous agent” that can lend to banks, but cannot borrow from them. Such agents may be savers/depositors (as long as they do not borrow); or, more simply, the central bank that refinances the banking system (without taking its reserve deposits). This exogenous lender (of last resort?) may help stabilise the financial system, but it does not eliminate the risk of bank failure. We can then show[7] that:

(i) there is only one equilibrium with a non-zero probability of bank failure;

(ii) the probability of bank failure depends on the financial structure of the economy. For example, when the capital and borrowed principal are given for each bank, $p$ increases as the gross debt increases, even though net debt is invariant. Increasing capital then becomes the preferred way of reducing the probability of bank failure;

(iii) the probability of bank failure is a decreasing function of the number of banks, all else being equal.

These results are obtained under the assumption of independent hazards. If hazards were correlated, the risk should be greater. For example, if too many banks are exposed to real estate risk, systemic risk is bound to increase.

This model can be generalised by eliminating the assumption of the banks’ symmetry. In this case, a probability vector $p_1, p_2, \ldots, p_N$ would have to be determined. A new kind of stress test would calculate the risk of failure of major banks by mapping their reciprocal dealings and their exposures to various types of economic risks.

4 | Conclusion

The moral of this story is simple. The complicated measures under Basel III aimed at constraining banks have hardly any impact on two key aspects of prudential policy: stopping banks from taking bad risks and preventing systemic risk and the propagation of bank failures. It is vain to think that we can construct individual constraints that are effective enough to stop banks from ever creating situations that are dangerous for the rest of the economy. Such thinking could even be counterproductive. In the case of Basel III, the constraints are so strict that they will probably create and perpetuate other inefficiencies that will burden the economy. These criticisms do not mean that all reform is pointless, or, for example, that it is not a good idea to increase capital or place greater emphasis on liquidity. But it would be fruitful to consider the concerns expressed here during the application phase and come up with the necessary remedies.

Macroprudential policy and credit supply cycles

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Western Europe and the United States have recently experienced a major banking crisis, followed by a severe economic recession with significant costs in terms of aggregate output and employment. These phenomena are not unique: banking crises are recurrent phenomena, triggering deep and long-lasting recessions. The main channel by which weaknesses in banks’ balance sheets affect the real economy is via a reduction in the supply of credit, i.e. a credit crunch. Importantly, banking crises are not random events that stem from exogenous risks, but arise after periods of very strong private credit growth. Therefore, for systemic risk, it is crucial to understand the determinants and implications of credit in good and bad times – the so-called credit cycles. This paper analyses the relationship between credit cycles and systemic risk and, in particular, whether macroprudential policies affect credit supply cycles (i.e. credit cycles stemming from credit supply rather than demand). Moreover, the author reviews the impact on credit supply from one macroprudential policy: countercyclical bank capital requirements (based on the Spanish dynamic provisioning).

NB: José-Luis Peydró is also Professor of Banking and Finance at Cass Business School, City University, London, Affiliated Professor at Barcelona Graduate School of Economics and Research Fellow of the Centre for Economic Policy Research. Email: jose.peydro@upf.edu. This article is mainly based on author’s book (with Xavier Freixa and Luc Laeven, forthcoming) on systemic risk and on author’s papers on credit cycles and systemic risk, in particular: Iyer and Peydró (2011), Jiménez et al. (2012), Jiménez et al. (forthcoming), Jiménez, Ongena, Peydró and Saurina (2013), Jiménez, Mian, Peydró and Saurina (2013), Iyer et al. (forthcoming), Maddaloni and Peydró (2011 and 2013), Ciccarelli, Maddaloni and Peydró (2013a and 2013b) and Peydró (2013). These are author's views and do not necessarily reflect those of co-authors.
Westem Europe and the United States have recently experienced a major banking crisis, followed by a severe economic recession with significant costs in terms of aggregate output and employment. These phenomena are not unique: banking crises are recurrent phenomena, triggering deep and long-lasting recessions. The main channel by which weaknesses in banks' balance sheets affect the real economy is via a reduction in the supply of credit, i.e. a credit crunch. Importantly, banking crises are not random events that stem from exogenous risks, but arise after periods of very strong private credit growth. Therefore, for systemic risk, it is crucial to understand the determinants and implications of credit in good and bad times – the so-called credit cycles.

Given the externalities of credit cycles for systemic risk, it is crucial to understand how macroprudential policy, in particular countercyclical capital requirements, affects the supply of bank credit in good and bad times. The damaging real effects associated with financial crises has generated a broad agreement among academics and policymakers that financial regulation needs to acquire a macroprudential dimension that ultimately aims to lessen the potentially damaging negative externalities from the financial to the macroeconomic real sector, as for example in a credit crunch. Countercyclical macroprudential policy tools could be used to address these cyclical vulnerabilities in systemic risk, by slowing credit growth in good times and especially by boosting it in bad times. Under the new international regulatory framework for banks – Basel III – regulators agreed to vary minimum capital requirements over the cycle, by instituting countercyclical bank capital buffers (i.e. procyclical capital requirements). As part of the cyclical mandate of macroprudential policy, the objective is for capital requirements to increase during booms and decrease during busts, thus increasing the capital buffers that banks have when a crisis hits.

Introducing countercyclical bank capital buffers aims to achieve two macroprudential objectives at once. First, boosting equity or provisioning requirements during booms provides additional buffers in downturns that help mitigate credit crunches. Second, higher requirements on bank own funds can cool credit-led booms, either because banks internalise more of the potential social costs of credit defaults (through a reduction in moral hazard by having more “skin in the game”) or charge a higher loan rate due to the higher cost of bank capital. Countercyclical bank capital buffers could therefore lessen the excessive procyclicality of credit, i.e. those credit supply cycles that find their root causes in banks' agency frictions. Smoothing bank credit supply cycles will generate positive firm level real effects if bank-firm relationships are valuable and credit substitution for firms is difficult in bad times.

Despite the significant attention now given by academics and policymakers alike to the global development of macroprudential policies, except for that of Jiménez, Ongena, Peydró and Saurina (2013), no empirical study has so far estimated the impact of countercyclical capital requirements on the supply of credit and on real activity. One interesting example is the series of pioneering policy experiments with dynamic provisioning in Spain: from its introduction in 2000 and modification in 2005 during good times, to its amendment and response in 2008 when a severe crisis shock struck causing bad times.

First, I will briefly analyse credit supply in good times, its implications for the endogenous building-up of excessive bank risk-taking, and I will also analyse credit supply during financial crises. Second, based on Jiménez, Ongena, Peydró and Saurina (2013), I will summarise the main results of our paper on the Spanish experience with dynamic provisioning on credit supply over the period 2000-2013.

1 Credit supply cycles, moral hazard and systemic risk

Schularick and Taylor (2012) (and their following papers with Oscar Jordà) show that ex ante credit growth is strongly correlated with the likelihood of a financial crisis, and conditional on a crisis, the real effects are worse when a credit boom

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1 See Kindelberger (1978) and Reinhart and Rogoff (2008) for historical evidence.
2 Systemic risk is defined, based on Freixas, Laeven and Peydró (2014), as “the risk of threats to financial stability that impair the functioning of the financial system as a whole with significant adverse effects on the broader economy.”
precedes the crisis. For a sample of fourteen major developed countries over the last 140 years, they find that the cycles in credit growth consist of periods during which the economy is performing well and credit growth is robust (on average 7%) and periods when the economy is in recession and credit contracts (on average ~2%).

Credit cycles stem from either: (i) non-financial borrowers’ agency frictions and investment opportunities (credit demand) as in, for example, Kiyotaki and Moore (1997), Lorenzoni (2008), and Jeanne and Korinek (2010), where better investment opportunities or the higher value of the collateral and net worth of firms and households result in higher credit, or (ii) banks’ agency frictions (credit supply) as in, for example, Rajan (1994), Holmstrom and Tirole (1997), Diamond and Rajan (2006 and 2011), Allen and Gale (2007), and Adrian and Shin (2011), where changes in bank capital, liquidity and competition allow changes in credit supply.

The main explanation of credit supply cycles is based on an agency view. The agency view highlights agency problems at the core of the build-up of systemic risk that have to do with the difficulties in aligning the incentives between the principal (for instance, bank bondholders or the taxpayers) and the agent (bank managers or shareholders). First, the basic agency problem stems from the fact that most financial intermediaries have limited liability (their losses are limited) and invest money on behalf of others (the final investors). Moreover, they are highly leveraged, notably banks that are funded almost entirely with debt. These frictions create strong incentives for excessive risk-taking as there is little skin in the game for bank shareholders but high potential upside profits. Second, excessive risk-taking notably increases when there are explicit and implicit guarantees and subsidises from the government (taxpayers) in the event of negative ex-post risks (such as a financial crisis). This increases the ex-ante agency problems of financial intermediaries as financial gains are privatised, but losses are in great part socialised. The agency view implies that, in good times, when banks have abundant liquidity they may undertake excessive risky lending projects, as they do not fully internalise the potential loan defaults or the externalities to taxpayers and other banks. In bad times, banks enter the crisis with little capital at stake, which leads to less bank liquidity, thereby causing a potential credit crunch in the economy, with negative real effects.

2| Empirical evidence

Dynamic provisions – initially also called “statistical” later on “generic” provisions as a statistical formula is mandating their calculation that is not related to bank-specific losses – are forward-looking provisions that, before any credit loss is recognised on an individual loan, build up a buffer (i.e. the dynamic provision fund) from retained profits in good times that can then be used to cover the realised losses in bad times. The buffer is therefore countercyclical. The required provisioning in good times is over and above specific average loan loss provisions and there is a regulatory reduction of this provisioning (to cover specific provision needs) in bad times, when bank profits are low and new shareholders’ funds through for example equity injections are costly. Dynamic provisioning has been discussed extensively by policy makers and academics alike and dynamic provision funds are considered to be Tier 2 regulatory capital.

I provide here a summary of Jiménez, Ongena, Peydró and Saurina (2013), where we analyse: (i) the introduction of dynamic provisioning in Q3 2000, which by construction entailed an additional non-zero provision requirement for most banks, but – and this is crucial for our estimation purposes – with a widely different formula-based provision requirement across banks; and (ii) one policy experiment is in bad times (the sudden lowering of the floor of the dynamic provision

3 Granted credit is not as forward-looking as change in the supply of committed credit as it is also affected by credit demand, notably drawn from existing credit lines; instead, change in lending standards from lending surveys is more forward-looking (see Maddaloni and Peydró, 2011 and 2013).
4 Another important view is the preference channel, in particular behavioural biases (see Stein, 2003 and Preuss et al., 2004).
6 We also analyse a modification that took place in Q1 2005, which led to a net modest loosening in provisioning requirements for most banks, and a shock in 2011 that tightened provisioning requirements. See the paper. In the paper we also analyse further heterogeneous effects across firms and banks.
Macroprudential policy and credit supply cycles
José-Luis Peydró

In good times we find that banks that have to provision relatively more (less) cut committed credit more (less) to the same firm after the experiment – and not before – than banks that need to provision less (more). These findings also hold for the extensive margin of credit continuation and for credit drawn, maturity, collateral, and credit drawn over committed (as an indirect measure of the cost of credit). Hence, procyclical bank capital regulation in good times cuts credit availability to firms.7

But are firms really affected in good times by the average shock to the banks that they were borrowing from before the shock? We find that this is mostly not the case. Though total committed credit received by firms drops almost immediately following the introduction of dynamic provisioning (and commensurately increases following its modification), three quarters after the policy experiments there is no discernible contraction of credit available to firms. Accordingly, we find no impact on firm total assets, employment, or survival, suggesting that firms find ample substitute credit from less affected banks (both from new banks and from banks with an existing relationship) and from other financiers.

In bad times the situation appears very different. Banks with dynamic provision funds close to the floor value in Q4 2008 (and hence that benefited most from its lowering in the third policy experiment) and banks with ample dynamic provision funds just before the start of the crisis permanently maintain their supply of committed credit to the same firm after the shock at a higher level than other banks. Similar findings hold for credit continuation, drawn and drawn over committed (i.e. at a lower cost of credit). At the same time these banks shorten loan maturity and tighten collateral requirements, possibly to compensate for the higher risk taken by easing credit volumes during the crisis.8

Funds in Q4 2008 from 33 to 10 percent such that the minimum stock of dynamic provisions to be held at any time equals 10 percent of the latent loss of total loans, which allowed for a greater release of provisions, and hence a lower impact on the profit and loss of the additional specific provisions made in bad times) and concurrently the (mostly unforeseen) crisis shock in Q3 2008, where we analyse the workings of the dynamic provision funds built up by banks as of Q4 2007.

To identify the availability of credit we employ a comprehensive credit register that comprises loan (i.e. bank-firm) level data on all outstanding business loan contracts, loan applications for non-current borrowers, and balance sheets of all banks collected by the supervisor. We calculate the total credit exposures of each bank to each firm in each quarter, from Q1 1999 to Q4 2010. Hence the sample period includes six quarters before the first policy experiment (essential to run placebo tests) and more than two years of the financial crisis. We analyse changes in committed credit volume, on both the intensive and extensive margins, and also credit drawn, maturity, collateral and cost. By matching firm balance sheets with the business mortality register, we can also assess the effects on firm-level total assets, employment and survival.

Depending on their credit portfolio (i.e. the fraction of consumer, public sector and corporate loans mostly) banks were differentially affected by the policy experiments. Therefore, we perform a difference-in-differences analysis where we compare before and after each shock differently affected banks’ lending at the same time to the same firm. Though we analyse the same bank before and after the shock, we further control for up to thirty-two bank variables and also key bank-firm and loan characteristics.

7 Results are robust to numerous perfunctory alterations in the specification (e.g. adding bank and loan characteristics and firm*bank type fixed effects), the sample (e.g. restricting it to firms with balance sheet information), and the level of clustering of the standard errors (e.g. multi-clustering at the firm and bank level). Even though for the first policy experiment for example we apply the dynamic provision formula to each bank’s credit portfolio in Q4 1998, rather than in Q3 2000 when the policy became compulsory for all banks, usual endogeneity concerns could persist. Policy makers capable of accurately predicting the aggregate and especially heterogeneous changes in bank credit could have devised the formula to maximise the credit impact for example. In that case excluding either the savings banks (that are often of direct interest to politicians) or the very large banks (i.e. four banks that represent almost 60 percent of all bank assets), and instrumenting realised bank provisions with the formula-based provisioning on the basis of banks’ past loan portfolios (shown not to be a weak instrument) allays any remaining endogeneity concerns as the estimates are not affected.

8 Results are again robust to alterations in the specification, the sample, the level of clustering of the standard errors, and to the exclusion of the very large banks. Importantly, given that more cautious banks could choose levels of provisioning higher than those stemming from regulation, the results are robust to the instrumentation of the (potentially endogenous) dynamic provision funds in Q4 2007 with the formula-based dynamic provision funds required for the bank’s portfolio as far back as Q3 2000!
Even more strikingly different in bad times than in good times is that the changes in loan level credit are binding at the firm-level, i.e. credit permanently contracts especially for those firms that borrowed more from banks that at the start of the crisis had lower dynamic provision funds. Hence, firms seemingly cannot find a substitute for the lost bank financing. Indeed, we find that the granting of loan applications to non-current borrowers in bad times is almost 30 percent lower than in good times. Consist with this interpretation we find that firm total assets, employment, or survival are negatively affected as well.

The estimates are also economically relevant. Following the crisis shock, firms with banks whose dynamic provision funds is 1 percentage point higher (over loans) prior to the crisis obtain credit growth that is 6 percentage points higher, growth that is 2.5 percentage points higher asset, employment growth that is 2.7 percentage points higher, and a likelihood of survival that is 1 percentage point higher.

All in all, Spain introduced dynamic provisioning unrelated to specific bank loan losses in 2000 and modified its formula parameters in 2005 and 2008. In each case, individual banks were impacted differently. The resulting bank-specific shocks to capital buffers, coupled with comprehensive bank-, firm-, loan-, and loan application-level data, allow us to identify its impact on the supply of credit and on real activity. The estimates show that countercyclical dynamic provisioning smoothes cycles in the supply of credit and, in bad times, strongly upholds firm financing and performance. Therefore, the very large positive effects of countercyclical capital requirements for the macroeconomy appear in crisis times, when accessing equity markets for banks is costly, bank profits are low, and the substitution of financial sources for non-financial firms and households is difficult.
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Interactions between monetary and macroprudential policies

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This article reviews the potential tensions between monetary and macroprudential policies and tries to quantitatively evaluate their importance. Both types of policies have overlapping transmission mechanisms, since they primarily work through the financial system. One policy shapes the playing field of the other. Thus, the effects of one policy need to be considered in the conception and implementation of the other, very much the same way as policy makers already take into account other structural economic features that affect the level and composition of output.

In order to evaluate how quantitatively important these interactions are we simulate a dynamic stochastic general equilibrium model that we calibrate to euro area data. The model encompasses, among others, financial frictions that manifest themselves as a collateral constraint. Macroprudential policy is modeled as a countercyclical variation in the intensity of the latter. We embed three macroeconomic shocks that illustrate the key propagation and amplification mechanisms of the Great Recession. Finally, we explicitly consider the zero lower bound (ZLB) on nominal interest rates. Given this set-up, our main findings are:

- macroprudential policies act as a useful complement to monetary policy during crises, by attenuating the decrease in investment and, hence, output;
- forward guidance is very effective at the ZLB, by providing a substantial boost to demand and reducing the costs of private deleveraging at the same time;
- overall, countercyclical macroprudential policies do not undo the benefits of forward guidance, but rather sustain them.
Prior to 2007, there was a broad consensus on policy objectives, the tools necessary to attain them, and their implications for stabilising the economy. The recent financial turmoil has completely undermined this consensus showing that price stability does not guarantee financial or, for that matter, macroeconomic stability. Economists and policy makers now largely agree that policies explicitly targeted at reducing the frequency and gravity of financial crises are necessary to ensure macroeconomic stability. Yet, experience and knowledge of these policies and their interactions with other public policies, and notably monetary policy, are still limited.

This article, therefore, offers a review of the literature in an attempt to examine the potential tensions between these two types of policy. It then presents a series of quantitative simulations to study these tensions under a crisis scenario. More specifically, we simulate a dynamic stochastic general equilibrium model subject to shocks that trigger a recession similar in amplitude to the Great Recession. We use these simulations to assess whether a countercyclical macroprudential policy might jeopardise monetary policy and show that, contrary to what might have been expected, both policies seem to be largely complementary. This turns out to be particularly true for the scenarios in which the central bank can engage in forward guidance.

1 | HOW DO INTERACTIONS BETWEEN MONETARY AND MACROPRUDENTIAL POLICIES ARISE?

1|1 The role of different distortions

The ultimate goal of policy is to ensure the highest attainable level of welfare, which implies an efficient level and composition of output. In the presence of distortions, economic policy will target intermediate goals – such as price or financial stability – that entail mitigating these welfare-reducing distortions. When price rigidities are the only distortion to which the economy is subject, monetary policy aims to stabilise inflation in order to eliminate the fluctuations of output generated by price rigidities (Woodford, 2003). Thus, by keeping monetary policy focused on price stability, output stability is guaranteed and the best feasible outcome for welfare is obtained.1

Financial market imperfections give rise to distortions that manifest in the form of excessive risk-taking ex ante and negative asset-price or exchange-rate externalities ex post. When these distortions vary over time, respond to economic conditions, or affect one sector of the economy more than others, the composition of output is affected (Curdia and Woodford, 2009; Carlstrom and Fuerst, 2010). Welfare maximisation then requires adding financial stability as an intermediate goal for policy, as this mitigates the distortions in the level and/or composition of output caused by financial market imperfections.2

1|2 Side effects of monetary and macroprudential policies

In a perfect world where monetary and macroprudential policies completely meet their targets, side effects of one tool on the target of the other might be negligible. A more realistic framework is, however, one in which distortions respond to economic conditions and in particular to policy: changes in the policy rate, for instance, affect incentives to take excessive leverage, while leverage is an intermediate target for macroprudential policies. Side effects from monetary policy on macroprudential targets, and from macroprudential policies on output and inflation, therefore, need to be considered (for an overview, see IMF, 2013).

1|3 What monetary policy can entail for financial stability

Monetary policy can have an effect on financial stability through a host of channels:

- changes in the monetary stance affect the tightness of borrowing constraints and the probability of

1 For the importance of real wage rigidities and the resulting trade-off between stabilising output and inflation, see Blanchard and Gali (2007).
2 Note that some types of financial distortions or their conjunction give rise to systemic risk, which cannot effectively be addressed by macroprudential regulation. See Bianchi (2011), Caballero and Krishnamurthy (2003, 2004), Lorenzoni (2008), Mendoza (2010), Korinek (2010) and De Nicolò et al. (2012) for a review of them.
default. While monetary easing relaxes collateral constraints, tightening can adversely affect the quality of borrowers, leading to higher default rates (Allen and Gale, 2000; Goodhart et al., 2009);

• monetary policy can influence the risk-seeking behaviour of financial intermediaries. Low interest rates can create incentives to expand balance sheets, reduce screening efforts (Borio and Zhu, 2008), and seek more risk in order to achieve higher returns (Rajan, 2006; Challe et al., 2013). In addition, if monetary policy is expected to be accommodative in case of financial turmoil, this creates additional incentives to correlate risks (Farhi and Tirole, 2012);

• by affecting aggregate financial prices, monetary policy can potentially exacerbate externalities. Low interest rates can lead to increases in asset prices, which can trigger further increases in leverage and lead to asset price booms, amplifying the financial cycle (Bernanke and Gertler, 1989). Conversely, a tightening of the monetary stance can cause collateral constraints to bind and fire sales to follow (Shin, 2005). In open economies, interest rate hikes can attract capital flows, lead to excessive borrowing in foreign currency, and lay the ground for exchange rate externalities (Bruno and Shin, 2012; Hahm et al., 2012).

The intensity of these effects depends on the point in the financial cycle and the financial structure and capital account openness of an economy. As financial imbalances build up, low policy rates can induce risk-taking and increase leverage. Interest rate hikes close to the peak of the financial cycle, can cause borrower defaults. More generally, in open and financially-integrated economies, domestic monetary policy has a weaker influence over domestic long-term rates and asset prices, but exchange rate externalities may become more important.

1|4 How macroprudential may influence the conduct of monetary policy

Well-targeted macroprudential policies can contain the undesirable effects of monetary policy, thereby reducing policy dilemmas and creating additional room for manœuvre for monetary policy. For instance, limits on debt-to-income (DTI) ratios can attenuate the impact on defaults from a tightening of monetary policy (Igan and Kang, 2011); capital requirements or leverage ratios can help contain increases in bank leverage in response to low policy rates and reduce risk-taking incentives (Farhi and Tirole, 2012); limits on loan-to-value (LTV) ratios can lessen asset price booms, when accommodative monetary policy drives up asset prices (IMF, 2011); limits on foreign exchange lending can reduce the systemic risk associated with capital flows (Hahm et al., 2012).

In addition, macroprudential policies can affect the composition and level of output and inflation, since they have an effect on credit flows.

• Dynamic capital buffers can increase the resilience of the banking system and contribute to the proper transmission of monetary policy. This reduces the need for monetary policy makers to offset the effects of tighter credit conditions on output, as the buffers can help sustain the provision of credit to the economy and reduce the depth of the downturn.\(^3\) Conversely, in the absence of sufficient buffers, an erosion of capital may lead banks to reduce the supply of credit. This may even be the case when policy rates are lowered substantially.

• Limits on LTV and DTI ratios contain house price accelerations and changes in household debt more broadly. In this sense they also dampen the associated changes in aggregate demand to which monetary policy may have to respond.

• These tools also allow the appropriate transmission of monetary policy when house prices are falling. As a low LTV can mitigate the probability that the principal exceeds the value of the property, borrowers may refinance their loans by taking advantage of lower mortgage rates, thus helping to sustain the flow of credit when losses materialise.

\(^3\) When high credit growth triggers an increase in the dynamic capital buffer in good times, the buffer can cushion the effect of losses on bank balance sheets and thus help maintain the flow of credit when losses materialise.

Macroprudential policies: implementation and interactions
Banque de France • Financial Stability Review • No. 18 • April 2014

227
• Reserve requirements (RR) restrain excessive credit growth without attracting capital inflows that may lead to an appreciation of the exchange rate. When used as a macroprudential tool, they might, hence, be a useful complement to monetary policy, especially in open economies (Tovar et al., 2012).

2|2 Where one type of policy is constrained, the demands on the other will be exacerbated

Weaknesses in the application of macroprudential policies make it more likely that monetary policy may need to respond to financial conditions. In models where macroprudential policy is absent or time invariant, it may be optimal for monetary policy to respond to financial conditions. By extension, to reduce the effects of imperfectly targeted or less effective macroprudential policy, it could be desirable for monetary policy to respond to financial conditions (IMF, 2013).

Conversely, where monetary policy is constrained, the demands on macroprudential policy may be greater. Financial distortions can manifest themselves in the form of an inefficient composition of output, including across member countries of a currency union. In such cases, macroprudential policies need to address the adverse side-effects of monetary policy on financial stability. In addition, macroprudential policies would preferably be coordinated inside the currency union, as acknowledged by the founders of the European Systemic Risk Board. Finally, macroprudential policies will need to be supplemented by fiscal and structural policies.

2|3 From the Tinbergen to the separation principle

Given the potentially high degree of interconnectedness between the two types of policies, it is essential that macroprudential policies be assigned clear targets and given adequate and distinct instruments to attain them. A straightforward application of Tinbergen’s principle, thus, stipulates that the objective of financial stability has to be paired with the necessary toolkit. This contributes to avoiding trade-offs between the goals of financial and price stability.

Furthermore, it should be emphasised that macroprudential and monetary policies are not only technically but also conceptually separate. Their goals and instruments differ, which means that both types of measures have to be assessed and decided upon independently. When policy rates move in response to
the inflationary outlook, this does not necessarily mean that there will be consequences for macroprudential decisions. Reciprocally, depending on systemic risk developments, macroprudential measures can be implemented or phased-out without implied consequences for interest rate decisions.

This is an application of the separation principle – initially developed to distinguish conventional from non-conventional monetary policies – to macroprudential policies (Trichet, 2013). The separation principle is especially pertinent when, in the presence of certain types of shocks, one type of policy has to be tightened while the other has to be loosened (De Paoli and Paustian, 2013; Quint and Rabanal, 2013). It also becomes applicable when one type of policy is constrained, for instance, when nominal interest rates hit the zero lower bound (ZLB), as the remaining policy options are, by definition, assessed independently (Goodhart, 2010).

The above reflects the tensions that are inherent in the simultaneous implementation of monetary and macroprudential policies. Although their intermediate targets and tools differ, both types of policies have overlapping transmission mechanisms, since they primarily work through the financial system. One policy shapes the playing field of the other. Thus, the effects of one policy need to be considered in the conception and implementation of the other, very much in the same way as policy makers already take into account other structural economic features that affect the level and composition of output. At the same time, distinct policy goals call for separate tools to achieve them, and the various possible economic conditions require that both types of measures be decided upon independently.

**Why central banks make good macroprudential supervisors**

Historically, several central banks have been in charge of financial stability (Bordo, 2007; Goodhart, 2010). Moreover, even when central banks were assigned a relatively narrow mandate, such as that of inflation targeting in recent years, they often played a decisive role when financial instability struck. In particular, their ability to act as lender of last resort in the financial system and to manage liquidity in the interbank market typically made them a key player in crisis management.

As liquidity and crisis management, on the one hand, and systemic risk and financial stability, on the other, are intrinsically linked, central banks are also well suited to take a leading role in macroprudential oversight and regulation. What is more, there are a number of benefits from assigning banking supervision and broader macroprudential policy-making to a central bank:

- data collected and analyses conducted as part of banking supervision – micro- or macroprudential in nature – provide valuable additional information about the financial sector and the state of the economy (Peek et al., 1999). The value added of this information becomes even more critical in a crisis, given its importance for the transmission of monetary policy;

- supervisory data broaden the basis for assessing monetary policy options. This is especially the case in the euro area, where bank lending accounts for almost two-thirds of the total financing of non-financial corporations. Hence, monetary transmission channels through the banking sector are particularly important in understanding the effects of monetary policy;

- a single institution can avoid conflicts and coordination problems between separate policy authorities, while taking into account the interactions between monetary, supervisory and regulatory policies. This might be particularly important in a crisis and in a multi-country setting;

- a central bank has strong incentives to supervise rigorously, as this reduces the likelihood of crises and, therefore, of lender-of-last-resort interventions. In addition, rigorous supervision counters the credit and interbank market related risks implied by weak financial institutions. Finally, close banking supervision ensures the soundness of counterparties in monetary policy operations, which protects the central bank’s balance sheet, safeguarding its independence and credibility.

4 Reciprocally, the analyses of money and credit are essential to preserving financial stability (Issing, 2003).

5 White (2011) points out how the fragmented supervisory system in the United States led to "competition in laxity" among regulators and "regulatory arbitrage" by banks.
The financial and fiscal dangers for monetary policy

Despite the advantages of macroprudential and monetary policies being conducted by the same institution, having both under the same roof comes with its own risks. These stem mainly from the fact that a financial stability objective may have distributional and fiscal consequences.

- An effective macroprudential supervisor might have to impose sanctions or levy taxes. These actions, however, hinge on and are embedded into national democratic legislations. In practice, the systemic supervisor will, thus, have to closely engage with government(s) in order for sanctions and/or taxes to be implemented (Goodhart, 2010).

- Governments insure the systemically important parts of their financial systems. As the ultimate provider of such insurance, governments should be expected to maintain a close involvement with the conduct of systemic stability (Goodhart, 2010).

- Conflicts of interest could arise regarding the resolution of insolvent banks. In particular, central banks could be inclined to continue lending to weak banks for fear that winding them up would trigger losses, and political interference could seek to avoid costly bank restructurings (Brunnermeier and Gersbach, 2012; Gerlach, 2013).

In order to avoid financial or fiscal dominance over monetary policy, it is, therefore, essential that governance structures for the monetary and supervisory functions be strictly separated. This should entail a separation of the decision-making bodies. As already pointed out, it should also involve distinct policy goals and instruments. These safety devises should go a long way to solve potential conflicts of interest (Cœuré, 2013).

In addition, beyond a clear functional separation inside the central bank, supervisory and macroprudential policies also need to be distinctly separated from resolution authorities. A well-functioning bank resolution mechanism endowed with an appropriate set of tools and an adequate financial backstop limits risks to governments' balance sheets. Hence, such an outside mechanism alleviates the risk of fiscal dominance, contributing to the central bank's credibility and independence.

Quantitative evidence on the interactions between monetary policy and macroprudential policy in crisis times

The previous section discussed tensions that are inherent in the simultaneous implementation of monetary and macroprudential policies. As we saw, these tensions stem mainly from the fact that both types of policies have overlapping transmission mechanisms working through the financial system. Tensions between both types of policies might turn particularly acute in crisis times, when monetary policy runs out of standard ammunition. Once the ZLB on the nominal interest rate has been reached, monetary policy is left with non-standard tools. Be it credit easing, quantitative easing, or forward guidance, these tools aim at stimulating credit by affecting the yield curve (either through a compression of credit and term premia or by directly trying to flatten the yield curve).\(^6\)

Thus, by their very nature they may run into conflicting objectives with macroprudential policy at some point. The intuition behind this is straightforward: non-standard monetary policy tries to boost credit in the recovery phase, while countercyclical macroprudential policies mechanically undo part of the credit boom. Although this tension seems well established from a theoretical point of view, it remains to be seen whether it is quantitatively relevant.

In the remainder of the paper we address this issue by quantifying the interactions between monetary and macroprudential policies in times of crisis. Addressing this question requires a model that we can use as a “laboratory” to compare alternative policies. To this end, we develop a dynamic

\(^6\) In the euro area, the bulk of non-standard interventions took the form of longer term refinancing operations (LTROs). While these policies operate through the same transmission channels as those of credit easing, they also have specific features. See Calm et al. (2014) for a quantification of the macroeconomic effects of LTROs.
stochastic general equilibrium (DSGE) model, which we calibrate to euro area data.

3|1 The quantitative framework

The model considered here is an extension of the one developed by Liu, Wang and Zha (2013), which itself is a variation of Iacoviello (2005). As in the other setups, there are two distinct types of agent: households and entrepreneurs.7

3|2 The protagonists

Households supply labour, consume, invest in housing, and lend funds to financial intermediaries (not modelled explicitly). Financial intermediaries, in turn, lend funds to entrepreneurs. This process is subject to financial frictions. The latter manifest themselves as a collateral constraint that financial intermediaries impose on entrepreneurs (and which might be thought of as resulting from similar constraints imposed by households on financial intermediaries).

Entrepreneurs consume, produce and borrow to finance purchases of new housing units and capital units used for production. Production is undertaken by combining labour, capital, and residential investment. While highly stylised, this framework has been shown to capture, in a quantitatively convincing way, essential characteristics of the business cycle (Iacoviello, 2005; Liu et al., 2013).

3|3 More frictions accounted for in our framework

Our model is then augmented by introducing sticky prices and wages. These nominal rigidities create distortions in the competitive equilibrium that justify the intervention of a central bank. In our framework, as in the discussion of the previous section, the central bank has the specific objective of price stability. Yet, as nominal rigidities affect both prices and wages, it is not possible to perfectly stabilise the business cycle by just stabilising prices. We capture how the central bank dynamically responds to economic circumstances through a simple Taylor rule.

In addition, our model features a large number of additional frictions. In particular, we allow for partial indexation of inflation and wage inflation to past inflation. Both entrepreneurs and households have preferences characterised by habit formation,8 a feature often discussed in the literature as necessary to capture aggregate persistence. There are also dynamic adjustment costs to investment, which allow us to reproduce the hump-shaped response of investment to a number of shocks.

3|4 Modelling macroprudential policy

Macroprudential policy is modelled as a countercyclical variation in the intensity of the collateral constraint. We view this as a useful modelling device since it allows us to capture the main characteristic of macroprudential policies, without having to specify a complete setup rationalising the advent and design of such policies.

In particular, in boom periods, i.e. when asset and house prices increase, it becomes easier to borrow large amounts against collateral. Macroprudential policy then leans against the wind by tightening the collateral constraint, thus, mitigating the effects of raising asset prices. Conversely, in periods of depressed activity, i.e. when asset prices are decreasing, countercyclical macroprudential policy softens the collateral constraint, hence, stimulating investment in housing and capital.

Finally, for parameter values of the above we rely on Beau et al. (2011), as the authors estimate a simplified version of our model on euro area data. The Box below offers a complete description of the model. For further details, a technical appendix is available from the authors upon request.

7 Beau et al. (2011) consider a similar model. Here, however, the collateral constraint features both housing and capital, as in Liu et al. (2013). This apparently innocuous elaboration turns out to be essential to generate the crisis episode that we discuss in this paper.

8 Under habit persistence, an increase in current consumption lowers the marginal utility of consumption in the current period and increases it in the next period. Intuitively, the more the consumer eats today, the hungrier she wakes up tomorrow.
Box

**Details on the DSGE Model**

This box briefly presents the model used for the simulations outlined above. A more complete description is available upon request.

The economy is populated with a representative household and a representative entrepreneur.

The representative household has a utility function of the form:

\[
E_t \sum_{t=0}^{\infty} \beta_t \left( \ln(c_{S,t} - \eta c_{S,t-1}) + e^{\phi t} a_t \ln(h_{S,t}) - \frac{a_t}{1 + \chi} \int_0^1 I(u) du \right)
\]

where \(c_{S,t}\) is consumption, \(\eta c_{S,t-1}\) is the external stock of consumption habits (a bar stands for the aggregate counterpart of the associated variable), \(h_{S,t}\) denotes housing services, and \(I_t(u)\) is the labour supply by member \(u\) (there is a unit-mass continuum of such members). \(\beta_t\) represents the household’s subjective discount factor. Finally, \(\phi_{c,t}\) and \(\phi_{h,t}\) are shocks to the discount factor and housing-demand respectively.

The representative household maximises utility subject to the sequence of nominal budget constraints (one for each period of time):

\[
P_t c_{S,t} + P_{H,t} (h_{S,t} - h_{S,t-1}) + R_{t-1} B_{S,t-1} = B_{S,t} + F_t + \int_0^1 W_t(u) I_t(u) du
\]

where \(P_t\) is the aggregate price level, \(P_{H,t}\) denotes housing price, \(R_t\) is the nominal interest rate on one period bonds \(B_{S,t}\) issued at \(t\) and maturing at \(t+1\), \(F_t\) denotes the dividends received from monopolistic firms, and \(W_t(u)\) is the nominal wage paid on labour of type \(u\). Each household member is the monopolistic supplier of its labour type. As such, they can set wages. We assume, however, that wage re-optimisation happens infrequently, with probability \(\alpha_{w}\). This process is the source of nominal wage stickiness.

The representative entrepreneur has utility of the form:

\[
E_t \sum_{t=0}^{\infty} \beta_{E,t} \ln(c_{E,t} - \eta c_{E,t-1})
\]

where \(c_{E,t}\) is consumption, \(\eta c_{E,t-1}\) is the external stock of consumption habits. \(\beta_{E,t}\) is the representative entrepreneur’s subjective discount factor, which we assume is smaller than \(\beta_t\). As a consequence, in equilibrium, households are net lenders and entrepreneurs are net borrowers.

The representative entrepreneur maximises utility subject to the sequence of budget constraints:

\[
P_t (c_{E,t} + i_t) + P_{H,t} (h_{E,t} - h_{E,t-1}) + R_{t-1} B_{E,t-1} + W_t I_t = B_{E,t} + P_{E,t} y_t
\]

\[
y_t = (e^{\phi k} k_{t-1})^{\phi} h_{E,t}^{\phi} I_{E,t}^{1-\phi}
\]

\[
k_t = (1 - \delta) e^{\phi k} k_{t-1} + i_t \left( 1 - S \frac{I_t}{I_{t-1}} \right)
\]

.../...
Interactions between monetary and macroprudential policies

Pamfili Antipa and Julien Matheron

\[
R_t B_{E,t} \leq \xi_t E_t \left( P_{H,t+1} h_{E,t} + P_{K,t+1} e^{\varphi_{k,t+1}} k_t \right)
\]

where \( \xi \) denotes non-residential investment, \( B_{E,t} \) is the amount of funds borrowed by the entrepreneur at the end of date \( t \); \( W_t \) is the aggregate nominal wage; \( \eta \) is the input of aggregate labour (a combination of all labour types, with imperfect substitutability); \( P_{H,t} \) is the nominal price of the good produced by entrepreneurs in quantity \( y_t \); \( k_t \) is the quantity of capital purchased at the end of \( t \) and usable next period; \( h_{E,t} \) is the quantity of housing services purchased at \( t \) and usable next period; \( P_{K,t} \) is the shadow price of capital (Tobin’s Q), and \( \varphi_{k,t} \) is a capital quality shock.

The first equation is the representative entrepreneur’s budget constraint; the second describes the production function; and the third equation stipulates the law of motion for capital, where \( S \) is an adjustment cost function on investment. Finally, the last inequality represents the collateral or borrowing constraint. The latter states that borrowed funds (inclusive of interest payments) cannot exceed a fraction \( \xi_t \) of the expectation at \( t \) of the entrepreneur’s assets in the next period.

Entrepreneurs sell their good to intermediate goods producers. Each of the latter produces a good that is imperfectly substitutable. As such, they have monopoly power and can set prices. However, price re-optimisation happens infrequently, with probability \( \alpha_p \). This process is the source of nominal price stickiness.

Monetary policy is set according to the Taylor rule:

\[
R_t = \rho R_{t-1} + (1 - \rho) (a_\pi \pi_t + a_y g_t)
\]

where \( \rho \) is the degree of interest rate smoothing, \( a_\pi \) is the reaction to year-on-year inflation \( \pi_t \), and \( a_y \) is the reaction to year-on-year output growth \( g_t \). We set \( \rho = 0.7 \), \( a_\pi = 1.5 \), and \( a_y = 0.5/4 \), consistent with the traditional values assigned to these parameters.

Macroprudential policy takes the form:

\[
\xi_t = \xi B_{E,t}^{\tau} B_{E,t}^{-1}
\]

where \( \xi \) is the steady-state intensity of the borrowing constraint, \( \tau \) is the reaction to deviations of borrowing from a target path \( B_{E,t} \) corresponding to the steady-state evolution of nominal borrowing. Thus, whenever borrowing is above its “normal” path, macroprudential policy tightens the collateral constraint in an attempt to lean against the wind. In the benchmark simulation, we set \( \tau = 0.5 \).

3|5 Simulating a great recession: the role of different shocks

Instead of adding a full stochastic structure to the model, we focus on three distinct, macroeconomic shocks that can be thought of as capturing crudely the essential features of the Great Recession. As we discuss later, the effects of these shocks also offer a neat illustration of the key propagation and amplification mechanisms of the model. In particular, the shocks we consider are:

- a capital quality shock implies an exogenous change in the productivity of capital as in Gertler and Karadi (2011). A crisis is then an event in which capital suddenly proves much less productive than initially planned. As a result, Tobin’s Q declines sharply, resulting in a severe tightening of the collateral constraint. In turn, this tightening depresses asset prices even further by deterring investment. This amplification loop resembles the phenomenon of fire sales often encountered in crisis times;

- the second shock we consider affects the demand for housing. A crisis is then an event in which housing demand declines exogenously. This broadly captures a macroeconomic situation characterised by large-scale individual bankruptcies and associated foreclosures. The sudden decrease in
housing demand triggers a sharp fall in residential prices, resulting in a tightening of the collateral constraint. By the same logic as before, this generates an amplification loop conducive to a simultaneous decrease in Tobin’s Q, a further tightening of the collateral constraint, and an even sharper decline in the demand for housing and in investment;

- finally, we consider an exogenous shock to the discount factor of households, which generates a fall in consumption. This type of shock is widely used in the DSGE literature to generate a demand-driven crisis, characterised by a simultaneous decline in production and the aggregate price level. In particular, it is often used as a modelling devise that can generate a large recession resulting in the occurrence of a liquidity trap, due to the ZLB on the nominal interest rate (Eggertson and Woodford, 2003).

3|6 Crisis scenarios and the ZLB

A central ingredient of the model considered here is that we take the ZLB explicitly into account. In particular, we consider a combination of the three shocks discussed above that result in a sufficiently sharp decline in production and inflation that the Taylor rule prescribes a negative nominal interest rate. Yet, due to the ZLB the nominal interest rate cannot reach such levels. Monetary policy can, therefore, not completely accommodate the crisis, which ultimately renders the latter even more severe.9

To make sure that we reach the ZLB, we set the steady-state value of the nominal interest rate to 2% and assume that inflation is zero in steady state.10 This implies that for a deviation of the nominal interest rate equal to –2%, the ZLB has been met. Note also that the amount of time at the ZLB is endogenously determined. Thus, policy actions are susceptible to shorten the duration of the liquidity trap.

In the following, the simulation is undertaken in a way that the recession triggered by the shock is much larger than the Great Recession. This is done in order to rapidly reach the ZLB. Charts 1 opposit

report the benchmark path of key aggregate variables for versions of the model in which macroprudential policy is switched off – label “no MP” – and activated – label “with MP” – respectively. In period 1, all the variables are at their steady-state value. In period 2, the shocks to capital quality, households’ discount factor and housing demand hit the economy. The dynamics are reported in percent deviations from steady-state values.

The top panel reports the dynamics of output and investment; the middle panel displays the responses for year-on-year inflation and for the annualised nominal interest rate. The bottom panel reports the dynamics of the real prices of capital and housing. The simulation shows clearly that macroprudential policy acts as a useful complement to monetary policy during the crisis. In particular, in the absence of macroprudential policy, output declines by close to 7% and investment decreases by about 15%. The ZLB is reached in three periods and lasts for four quarters. As outlined before, the severity of the crisis stems in part from the very large decline in asset prices, depicted in the bottom panel.

By contrast, when macroprudential policy is activated (see Box for parameter values), the recession is less pronounced, even though macroprudential policy does not suffice in itself to undo the crisis. Output now declines by about 5.5%. More importantly, investment decreases by only half as much, 8%. Under this alternative scenario, the ZLB is also less protracted: it is reached after four periods and binds only for two periods.

This more benign scenario is the consequence of a less stringent collateral constraint, softened due to the countercyclical nature of macroprudential policy. This also generates a second-round effect through which asset prices decline by less, in turn rendering the borrowing constraint less severe. In addition, by attenuating the recession and, thus, by reducing the lapse of time spent at the ZLB, macroprudential policy generates a third effect that consists in freeing standard monetary policy from its constraint.

The exercise undertaken suggests that macroprudential policies have a quantitatively significant effect in

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9 As a practical matter, the model is log-linearised. We solve it by resorting to the Fair-Taylor approach in order to deal with the ZLB.
10 This value is probably too low compared with the historical record. However, having a higher steady-state nominal interest rate would require much more dramatic shocks to hit the ZLB.
Interactions between monetary and macroprudential policies

Pamfili Antipa and Julien Matheron

mitigating the impact of shocks that would otherwise have triggered a recession about as severe as the Great Recession. Thus, far from being in conflict, monetary and macroprudential policies are complementary in attenuating the recession under this benchmark simulation.

3.7 Simulating a great recession with unconventional monetary policy

We now modify the previous simulation by allowing monetary policy to engage in forward guidance at the onset of the crisis (the crisis is triggered by the exact same shocks as before). Hence, at the first period of the simulation, monetary authorities drive the nominal interest to zero and announce (credibly) that it will stay there for seven quarters.

Simultaneously, we consider two alternative settings for macroprudential policy. In the first one, we use the same degree of countercyclicality as in the previous benchmark simulation, labelled “benchmark MP” (see Box). In an alternative scenario, the degree of “leaning against the wind” is half as strong, labelled “alternative MP”. For ease of comparison, we also report the dynamics obtained under the “no MP” setting.

The results of this simulation are reported in Charts 2 below. The top left panel reports the dynamics of output; the top right panel displays the response of investment; and the bottom left and right panels report the dynamics of year-on-year inflation and the annualised nominal interest rate respectively. By construction, all the reported trajectories have a common pattern in the initial 7 periods of the simulation, due to the assumed path for the nominal interest rate under forward guidance.

It is evident from this simulation that in the DSGE model considered here, forward guidance is very effective at combating the effects of the crisis. Now, even under the “no MP” scenario, output declines by 4.6% instead of 7%, since forward guidance substantially enhances demand and reduces the costs of private deleveraging at the same time. The dynamics of investment are a clear illustration of this mechanism.

However, when during the recovery phase borrowing is stimulated by an accommodative monetary

Charts 1
Impulse response function to a combined series of shocks to capital quality, household’s discount factor, and housing demand

a) Output and investment
(percent deviation from steady state; x-axis: number of quarters)

b) Inflation and nominal interest rate
(deviation from steady state; x-axis: number of quarters)

c) Real price of capital and housing
(percent deviation from steady state; x-axis: number of quarters)

Source: Authors’ calculations.
Note: Dynamics triggered by a series of shocks to capital quality, to housing demand, and to the discount factor of households. The shocks hit the economy for three consecutive periods. The figures reported are all in percentage.
Policy stance, the presence of a countercyclical macroprudential policy might partly offset the benefits of forward guidance. Our simulations confirm that such concerns are not founded. Under the calibration considered here, a countercyclical macroprudential policy actually assists forward guidance: the (expected) inflationary burst triggered by forward guidance occurs earlier and is of greater magnitude than when macroprudential policy is absent.

The benefit of forward guidance stems from inflation contributing to re-inflating asset prices, thus, mitigating the effects of a tighter collateral constraint in the recovery phase. At the height of the crisis, the countercyclical macroprudential policy then contributes to relaxing the collateral constraint, attenuating the drop in investment, just as in the benchmark scenario. Signs of conflicting policy appear only much later in the simulation, after about 25 quarters. Past this point, investment is higher when macroprudential policy is switched off. The magnitude of this latter effect is, however, dwarfed by the gains in the recovery phase.
4| CONCLUSION

This paper reviews the known tensions between macroprudential and monetary policies. As put forward in the literature, these tensions might become particularly acute in times of severe crisis, i.e. when the zero lower bound on the nominal interest rate is reached, and monetary policy runs out of standard ammunition. Non-conventional monetary policies, be it credit easing, quantitative easing, or even forward guidance, aim at stimulating credit. Thus, by their very nature they may run into conflicting objectives with countercyclical macroprudential policy at some point.

Based on simulations drawn from a canonical DSGE model, we show that these tensions are not quantitatively significant. Quite to the contrary, we find that a countercyclical macroprudential policy actually magnifies the benefits of forward guidance. As these results stem from a highly stylised model, it remains, however, to be investigated whether our results hold in a more elaborate setup.
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<table>
<thead>
<tr>
<th>Published Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>November 2004</strong></td>
</tr>
<tr>
<td>Assessment of “stress tests” conducted on the French banking system</td>
</tr>
<tr>
<td>Insurance and financial stability</td>
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<td>Oversight of non-cash payment schemes: objectives and implementation procedures</td>
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<td>The resilience of post market infrastructures and payment systems</td>
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<td>Credit risk management and financial stability</td>
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<th><strong>June 2005</strong></th>
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<td>The CDO market</td>
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<td>Functioning and implications in terms of financial stability</td>
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<td>Public debt sustainability and crises in emerging market countries: a presentation of the concepts and diagnostic tools</td>
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<td>Interest rate risk in the French banking system</td>
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<td>Interest rate risk management by life insurance companies and pension funds</td>
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<td>Analysis, by simulation, of the impact of a technical default of a payment system participant</td>
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<th><strong>November 2005</strong></th>
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<td>Prudential supervision and the evolution of accounting standards: the stakes for financial stability</td>
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<td>Regulatory capital and economic capital</td>
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<td>Significance and limitations of the VAR figures publicly disclosed by large financial institutions</td>
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<td>The impact of stock market shocks on credit in France since the mid-1990s</td>
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<td>Sovereign debt (Re)structuring. Where do we stand?</td>
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<th><strong>May 2006</strong></th>
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<td>Better capturing risks in the trading book</td>
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<td>Market liquidity and its incorporation into risk management</td>
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<td>Productivity and stock prices</td>
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<td>Corporate equity and financial stability: An approach based on net worth at risk</td>
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<td>Recent developments in monetary and financial integration in Asia</td>
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<td>Implications of globalisation for financial stability</td>
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<th><strong>December 2006</strong></th>
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<td>Commodities: an asset class in their own right?</td>
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<td>Do emerging market economies still constitute a homogenous asset class?</td>
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<td>Capital flows and credit booms in emerging market economies</td>
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<td>Can risk aversion indicators anticipate financial crises?</td>
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<td>Bank liquidity and financial stability</td>
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<td>Microstructure of financial and money markets</td>
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<td>The Basel II framework: the role and implementation of Pillar 2</td>
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**April 2007**

**Hedge funds**

Hedge funds, credit risk transfer and financial stability
The evolution and regulation of hedge funds
Regulating hedge funds
Hedge funds and financial stability
Hedge funds and systemic risk
Hedge fund replication strategies: implications for investors and regulators
Hedge funds and prime broker dealers: steps towards a "practice proposal"
Transparency requirements and hedge funds
Risks and return of banking activities related to hedge funds
Indirect supervision of hedge funds
Hedge funds: what are the main issues?
Monitoring hedge funds: a financial stability perspective
The world of hedge funds: prejudice and reality
*The AMF’s contribution to the debate on alternative investment strategies*
Financial conditions, alternative asset management and political risks: trying to make sense of our times
Hedge funds in emerging markets
Fund of hedge funds: origins, role and future
Hedge funds: a central bank perspective

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**Liquidity**

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Musical chairs: a comment on the credit crisis
Market liquidity and financial stability
Ten questions about the subprime crisis
What happened to risk dispersion?
Liquidity risk management
Liquidity regulation and the lender of last resort
Liquidity shortages: theoretical underpinnings
Liquidity in global markets
The impact on financial market liquidity of the markets in financial instruments directive (MiFID)
Market liquidity and banking liquidity: linkages, vulnerabilities and the role of disclosure
Liquid assets, liquidity constraints and global imbalances
Financial innovation and the liquidity frontier
Financial market liquidity and the lender of last resort
Recent developments in intraday liquidity in payment and settlement systems
Valuation and financial stability

Valuation challenges in a changing environment
Should financial institutions mark-to-market?
Setting the right framework for modern financial markets
- Lessons learned from the recent crisis
Revisiting valuation practices throughout the business cycle: some symmetry is needed
Valuation and fundamentals
Taking into account extreme events in European option pricing
Fair value accounting and financial stability: challenges and dynamics
How should we respond to asset price bubbles?
Regulation, valuation and systemic liquidity
Fair value accounting and financial stability
Procyclicality of financial systems: is there a need to modify current accounting and regulatory rules?
Valuation in insurance and financial crisis
Bringing transparency to financial reporting: towards an improved accounting framework in the aftermath of the credit crisis
Improving fair value accounting

The future of financial regulation

Regulating finance after the crisis
The shadow banking system: implications for financial regulation
Managing the transition to a safer financial system
Reform of the global financial architecture: a new social contract between society and finance
Implementing the macroprudential approach to financial regulation and supervision
Minimising the impact of future financial crises: six key elements of regulatory reform we have to get right
On the efficacy of financial regulations
The treatment of distressed banks
Credit default swaps and financial stability: risks and regulatory issues
The future of financial regulation
The future of financial regulation: an exchange of views
Emerging contours of financial regulation: challenges and dynamics
Regulation-supervision: the post-crisis outlook
Beyond the crisis: the Basel Committee’s strategic response
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**Derivatives – Financial innovation and stability**

Redesigning OTC derivatives markets to ensure financial stability

Credit default swaps: what are the social benefits and costs?

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Derivatives: an insurer's perspective

Credit default swaps and financial stability

Credit default swaps

Financial innovation or financial dysfunction?

Is there a case for banning short speculation in sovereign bond markets?

Over-the-counter derivative markets in India

Issues and perspectives

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21st century finance cannot do without a sound regulation of the OTC derivatives markets

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Under-collateralisation and rehypothecation in the OTC derivatives markets

Silos and silences. Why so few people spotted the problems in complex credit and what that implies for the future

Mitigating systemic risk in OTC derivative markets

What risks and challenges do credit default swaps pose to the stability of financial markets?

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Global imbalances: the perspective of the Banco de México
Complementarity and coordination of macroeconomic and financial policies to tackle internal and external imbalances
Global imbalances: common problem to solve for both advanced and emerging market economies
Global balance and financial stability: twin objectives toward a resilient global economic system
Global imbalances: the perspective of the Bank of England
Global imbalances and developing countries
A South African perspective on global imbalances
Global imbalances, volatile capital inflows and proposed further IMF roles
Global imbalances and financial stability
Global imbalances and current account imbalances
Global imbalances through the prism of savings and investment
Global imbalances: the perspective of the Reserve Bank of India
Intellectual challenges to financial stability analysis in the era of macroprudential oversight
Securing stability and growth in a post-crisis world
Revisiting the Tinbergen Rule: use the macroprudential tools to maintain financial stability
On savings ratio
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Public debt, monetary policy and financial stability

Central banking in a context of high public debt
Fiscal outlook and fiscal sustainability risks
When Western sovereign risk is in play
The return of financial repression
A tale of two overhangs: the nexus of financial sector and sovereign credit risks
Banks, moral hazard, and public debts
Sovereign creditworthiness and financial stability: an international perspective
Stability, growth and regulatory reform
Is sovereign risk properly addressed by financial regulation?
Contagion and the European debt crisis
Monetary policy and public debt
Does monetary cooperation or confrontation lead to successful fiscal consolidation?
Fiscal challenges to monetary dominance in the euro area: a theoretical perspective
Central bank independence and sovereign default
The sovereign debt crisis and monetary policy
Sustainability of government debt: preconditions for stability in the financial system and prices
The importance of confidence in macroeconomic stabilisation efforts
Policies on sovereign debt
Hazardous tango: sovereign-bank interdependence and financial stability in the euro area
Rebuilding growth and optimism in a new fiscal era
Gaps in the institutional structure of the euro area
The euro crisis: some reflexions on institutional reform
April 2013

OTC derivatives: new rules, new actors, new risks

Foreword
Completing the G20 reform agenda for strengthening over-the-counter derivatives markets
Regulatory reforms for OTC derivatives: past, present and future
Overview of international work towards OTC derivatives markets reform and remaining challenges
International cooperation: a sine qua non for the success of OTC derivatives markets reform
Containing extraterritoriality to promote financial stability
International swaps market reform – Promoting transparency and lowering risk
CPSS-IOSCO Principles for financial market infrastructures: vectors of international convergence
A transparency standard for derivatives
New infrastructures for a sounder financial system
The importance of data quality for effective financial stability policies
Legal entity identifier: a first step towards necessary financial data reforms
Transparency and financial stability
Assessing contagion risks in the CDS market
Why the Greek CDS settlement did not lead to the feared meltdown
CCPs as instruments of stability and risk mitigation
Incentive compatible centralised clearing
Access to central counterparties: why it matters and how it is changing
Central counterparties in evolving capital markets: safety, recovery and resolution
Collateral and new offers for an optimised management: an industrial revolution
Collateral scarcity and asset encumbrance: implications for the European financial system
OTC derivatives market – regulatory developments and collateral dynamics
OTC derivatives: ensuring safe, efficient markets that support economic growth
Consequences of the new regulatory landscape on OTC derivatives trading
Will the new regulatory regime for OTC markets impede financial innovation?
Macroprudential policies: implementation and interactions

Macroprudential policy: from theory to implementation
Five questions and six answers about macroprudential policy
Governance of macroprudential policy
From tapering to preventive policy
Collective action problems in macroprudential policy and the need for international coordination
A macroprudential perspective on regulating large financial institutions
The impact of macroprudential policy on financial integration
European macroprudential policy from gestation to infancy
Macroprudential policy in France: requirements and implementation
Implementing macroprudential policies: the Swiss approach
The effects of macroprudential policies on housing market risks: evidence from Hong Kong
Macroprudential policies in Korea – Key measures and experiences
Framework for the conduct of macroprudential policy in India: experiences and perspectives
Learning from the history of American macroprudential policy
Macroprudential policy and quantitative instruments: a European historical perspective
Macroprudential policy beyond banking regulation
Principles for macroprudential regulation
Macroprudential capital tools: assessing their rationale and effectiveness
The housing market: the impact of macroprudential measures in France
Three criticisms of prudential banking regulations
Macroprudential policy and credit supply cycles
Interactions between monetary and macroprudential policies