INTERNATIONAL MONETARY FUND

KEY ASPECTS OF MACROPRUDENTIAL POLICY

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EXECUTIVE SUMMARY

The crisis has underscored the costs of systemic instability at both the national and the global levels and highlighted the need for dedicated macroprudential policies to achieve financial stability. Building on recent advances, this paper provides a framework to inform the IMF's country-specific advice on macroprudential policy. It recognizes that developing macroprudential policy is a work in progress, and addresses key issues to help ensure its effectiveness.

- The goals and scope of macroprudential policy need to be defined clearly. Macroprudential policy should aim to contain systemic vulnerabilities, and not be overburdened with objectives that it is unsuited to achieve.

- To achieve its goals, macroprudential policy must be supported by strong supervision and enforcement and complemented by appropriate monetary, fiscal and other financial sector policies. In turn, effective macroprudential policy can help these other policies achieve their goals.

- Effective macroprudential policy requires the ability to assess systemic risk, assemble and deploy the toolkit, monitor and close regulatory gaps, and close data and information gaps. While principles and practice can be established in each of these areas, much further work remains.

- Strong institutional and governance frameworks are essential for the effective conduct of macroprudential policy. They can benefit from an appropriate strength of powers and clear accountability. The central bank needs to play an important role, even if the precise arrangements are driven by the political economy and traditions.

- Cross-border implications of macroprudential policies call for international coordination. Such multilateral issues can arise from a lack of national action, differences in the phase of financial cycles, and conflicts between home and host authorities of cross-border financial institutions. A range of mechanisms are available to address these problems, but coordination will remain challenging in practice.

The Fund can play a key role, through its bilateral and multilateral surveillance and in collaboration with standard setters and country authorities, to help ensure the effective use of macroprudential policy for domestic and global stability.

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Glossary

ACE	Allowance for Corporate Equity
AE	Advanced Economy
BCBS	Basel Committee on Banking Supervision
BIS	Bank for International Settlements
BoE	Bank of England
CCB	Countercyclical Capital Buffer
CESEE	Central, eastern, and southeastern Europe
CGFS	Committee on the Global Financial System
CFMs	Capital Flow Management Measures
CFR	Core Funding Ratio
DGI	Data Gaps Initiative
D-SIBs	Domestic Systemically Important Banks
DTI	Debt-to-Income
EME	Emerging Market Economy
ESRB	European Systemic Risk Board
EWE	Early Warning Exercise
FCA	Financial Conduct Authority
FDIC	Federal Deposit Insurance Corporation
FSAP	Financial Sector Assessment Program
FSB	Financial Stability Board
FSC	Financial Stability Contribution
FSOC	Financial Stability Oversight Council
FPC	Financial Policy Committee
FX	Foreign Exchange
GFSR	Global Financial Stability Report
G-SIFI	Global Systemically Important Financial Institution
G-20	Group of 20
IAG	Inter-Agency Group
ISD	Integrated Surveillance Decision
LTV	Loan-to-Value
MSL	Macroprudential Stability Levy
MoF	Ministry of Finance
NSFR	Net Stable Funding Ratio
OECD	Organization for Economic Cooperation and Development
OFCs	Other financial corporations
PRA	Prudential Regulation Authority
SDDS	Special Data Dissemination Standard
WEO	World Economic Outlook

INTRODUCTION

This paper aims to strengthen the basis for practical guidance and country-specific advice in the field of macroprudential policy, through surveillance and technical assistance. It builds on and extends the paper on an "Organizing Framework for Macroprudential Policy" (April 2011), distills lessons from further work since then, and offers further analysis of key issues arising in ensuring the effectiveness of macroprudential policy.

1. The crisis has shown that systemic risks need to be contained by dedicated financial policies. The crisis has fostered a recognition that systemic risks can grow under the surface of apparent economic tranquility. Financial stability need not therefore emerge as a natural by-product of an appropriate macroeconomic policy mix. Rather, achieving the objective of financial stability requires dedicated macroprudential policies.

2. Macroprudential policy is needed to achieve the stability of the system as a whole. Macroprudential policies can build-on, but are not the same as traditional microprudential policies. The traditional focus on idiosyncratic risks and the solidity of individual institutions needs to be complemented by a system-wide perspective as both macro-financial linkages and interconnections within the financial system can give rise to systemic risk.

3. While increasing use is made of macroprudential policy, it remains work in progress. Macroprudential policies have been used with some success in a number of mostly emerging market economies (EMEs) well before the most recent crisis, and often in response to earlier crisis episodes. And while use of macroprudential policy tools is growing rapidly, and many countries are striving to build appropriate institutional underpinnings for such policies (Annex I), the macroprudential policy framework remains work in progress to date.[1]

4. The objective of the paper is to help ensure that macroprudential policy can make an effective contribution to domestic and global stability. In line with the Financial Surveillance Strategy (IMF 2012a) the paper is intended to contribute to a better understanding of the interactions between macroprudential, macroeconomic and other financial and regulatory policies, the effectiveness of macroprudential policies, and their potential costs and side effects, as well as the institutional arrangements to assure adequate governance and accountability of macroprudential policy. In so doing the paper aims to provide a framework that can guide the Fund's country-specific advice. The paper finally contributes by examining the multilateral aspects of macroprudential policy and sets out the role of the Fund in this regard.

5. The paper draws on work undertaken over the past two years. It builds on and extends the paper on the "Organizing Framework for Macroprudential Policy" (IMF, 2011a). In addition to a range of staff policy and research papers produced since then, the paper also draws on insights

[1] The background paper provides detail on the use of macroprudential policy tools across countries. Advances in institutional arrangements underpinning macroprudential policy were also surveyed in Nier and others (2011).

gained in the context of technical assistance, surveillance and Financial Sector Assessment Programs (FSAPs) over the past two years. It also takes account of ideas developed elsewhere (Bank for International Settlements (BIS), Financial Stability Board (FSB), Committee on the Global Financial System (CGFS), country authorities, and academia), and has benefited from discussion with a select group of external experts in the field of macroprudential policy.[2]

6. The paper addresses key issues that need to be considered to ensure that macroprudential policy can work effectively. It first recalls the definition and sets out the scope of macroprudential policy (Section II). It then discusses:

- interactions of macroprudential policy with other public policy areas (Section III);
- operationalizing macroprudential policy (Section IV);
- institutional and governance frameworks (Section V); and
- multilateral aspects of macroprudential policy (Section VI).

7. The paper recognizes that developing macroprudential policy will remain work in progress in the years to come. Throughout, the paper highlights challenges and limitations of macroprudential policy, which are summarized in Section VII. The paper finally sets out the role of the Fund, in partnership with the FSB and national authorities, to help ensure that macroprudential policy can be pursued effectively in support of domestic and global stability (Section VII).

MACROPRUDENTIAL POLICY—DEFINITION AND SCOPE

This section recalls the definition of macroprudential policy offered in previous Board papers (IMF, 2011a), and develops the appropriate scope of macroprudential policy, drawing on a number of further studies. In doing so, it also aims to clarify that the pursuit of a number of other public policy objectives is not necessarily "macroprudential."

8. Macroprudential policy has been defined as the use of primarily prudential tools to limit systemic risk.[3] A central element in this definition is the notion of systemic risk—the risk of disruptions to the provision of financial services that is caused by an impairment of all or parts of the financial system, and can cause serious negative consequences for the real economy.[4]

9. The rationale for macroprudential intervention rests on the presence of three sets of systemic externalities. These arise through: (i) the tendency of the financial system to amplify

[2] IMF staff would like to thank Markus Brunnermeier, E Philip Davis, Ilan Goldfajn, Lex Hoogduin, Anil Kashyap, Donald Kohn, Sir Andrew Large, Nicholas Le Pan, David Longworth, and David Strachan for their valuable comments and suggestions.

[3] See IMF (2011a) and FSB, IMF, and BIS (2011).

[4] See IMF, FSB and BIS (2009).

adverse aggregate shocks; (ii) macro-financial feedback mechanisms that result in an overexposure to such adverse aggregate shocks; and (iii) linkages within the financial system that increase the vulnerability of the system to idiosyncratic or aggregate shocks.

10. Externalities can arise when the financial system amplifies adverse shocks to the economy (Hanson and others, 2011). This can take the form of a credit crunch where multiple banks respond to a common adverse shock by cutting new lending, in turn reducing investment and employment, with contractionary consequences for the economy. The desire to shrink assets can also lead to fire sale effects, where multiple institutions seek to sell illiquid securities, thereby depressing prices, further weakening balance sheets and increasing the cost of credit.

11. A range of externalities can lead to an overexposure of the system to aggregate shocks (De Nicolò and others, 2012). Endogenous feedback between credit and asset prices can result in excessive leverage and increases the vulnerability of the system when asset prices turn. Competitive pressures and capital flows can fuel credit booms, leading to an erosion of lending standards and increased exposure to macroeconomic shocks. At the same time, overreliance on short-term wholesale funding exposes the system to confidence shocks and sudden stops.

12. Externalities can also arise across the financial system (Acharya and others, 2009). As credit grows, there can be an excessive reliance on short-term wholesale funding provided by banks and non-banks, exposing the system to liquidity risk. A build-up of exposures in funding and derivatives markets can also render individual intermediaries "too interconnected to fail." Exposures to such intermediaries then benefit from implicit guarantees, leading to excessive growth of such exposures, while reducing market discipline and the incentive to control risk on the part of the systemic institutions. The failure of intermediaries that are critical to the functioning of key markets, such as providers of market infrastructure, can also impose an externality on the system as a whole.

13. These externalities give rise to three objectives or 'tasks' for macroprudential policy. First, macroprudential policy seeks to increase resilience of the financial system to aggregate systemic shocks, by building buffers that absorb their impact and help maintain the ability of the financial system to provide credit to the economy. Second, in the *time dimension*, it can seek to contain the build-up of systemic vulnerabilities over time, by reducing procyclical feedback between asset prices and credit and containing unsustainable increases in leverage and volatile funding. Third, in the *structural or "cross-sectional" dimension*, macroprudential policy can seek to control the build-up of vulnerabilities within the financial system that arises through interlinkages between financial intermediaries and the critical role played by institutions in key markets, and can render individual institutions too important to fail.

14. Macroprudential policy uses primarily prudential tools to achieve its objectives. This can include countercyclical capital buffers and provisions, sectoral capital requirements, measures to contain liquidity and foreign exchange (FX) mismatches, and caps on loan-to-value (LTV) and debt-to-income (DTI) ratios. Macroprudential policy can also seek to affect the design of products offered to borrowers in retail markets, and the functioning and institutional underpinnings of wholesale markets. It can finally seek to use tools that are traditionally associated with other policy fields, such

as monetary (e.g., reserves requirements), fiscal (e.g., levies imposed on wholesale funding) and competition policy (e.g., takeover policies), as set out in more detail below.

15. An important distinction is between macroprudential measures and capital flow management measures (CFMs). As set out in IMF (2012b), the prime difference is the objective. CFMs are designed to limit capital flows. Macroprudential measures are prudential tools that are designed to limit systemic vulnerabilities. This can include vulnerabilities associated with capital inflows and exposure of the financial system to exchange rate shocks. While there can therefore be overlap, macroprudential measures do not seek to affect the strength of capital flows or the exchange rate per se.[5]

16. More broadly, macroprudential policy is not well-suited to control asset prices, including the prices of securities (stocks and bonds), or interest and exchange rates. Since these prices are likely to be driven by a range of fundamental and speculative factors—including other policies—affecting them should not be seen as a primary aim of macroprudential policies.

17. Rather, macroprudential policy can seek to contain the vulnerability of the system to asset price reversals, such as from leveraged exposures to asset prices.[6] In the presence of such vulnerabilities, macroprudential policy should take action to increase the resilience of the system to asset price shocks.[7] In their absence, however, macroprudential policy action may not be warranted. For instance, a 'search for yield' that increases investment in risky assets should be a concern for macroprudential policy only to the extent that it leads to the build-up of systemic vulnerability, such as an unsustainable increase in leverage taken by borrowers or investors.[8]

18. Macroprudential policy needs to be geared to containing systemic vulnerabilities and should not be overburdened with broader objectives, such as the management of the level and composition of aggregate demand (IMF, 2013a). Macroprudential policy can contribute to macroeconomic stability by containing unsustainable credit booms and reducing the impact of shocks on the provision of credit to the economy. However, macroprudential policies should not be overburdened with a broader role in macroeconomic management. Moreover, they should not be

[5] As explained in IMF 2012b, there is overlap between macroprudential measures and CFMs. Measures to contain systemic risks from capital inflows can be both macroprudential measures and CFMs. See also Ostry and others (2011).

[6] Vulnerabilities can arise where real or financial assets are used as collateral for credit, such as in mortgage and repo markets. Feedback between asset prices and the supply and demand for credit can then drive up leverage. Vulnerabilities can also arise when the design of debt contracts implies a strong effect of swings in asset prices, or interest and exchange rates, on the likelihood of borrower defaults (as for FX denominated mortgages or interest only loans). Finally, vulnerabilities arise where securities (including stocks and bonds) are held on the balance sheet of banks, or held by other bank-like intermediaries and are ultimately funded short-term.

[7] Such action can, of course, in turn have a measurable effect also on asset prices.

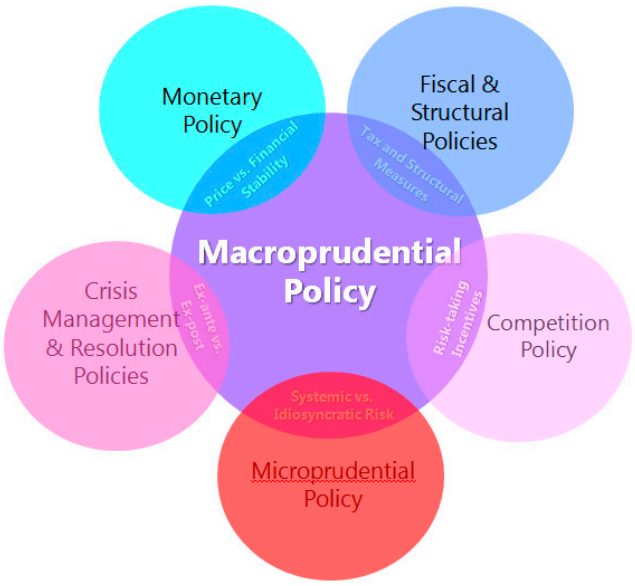
[8] The evidence suggests that stock market busts need not be associated with systemic implications (Hahm and others, 2012). Likewise, the experience suggests that the bursting of a high-yield bubble may have limited consequences for financial stability. The bursting in 1990 of the bubble in United States (U.S.) junk bonds and demise of Drexel Burnham Lambert is an example.

confused with 'credit policies' that subsidize credit for particular sectors of the economy, or other structural policies that can affect the composition of demand. In short, for macroprudential policy to work well, it needs well-defined objectives and should not be co-opted for other purposes.

RELATIONSHIP WITH OTHER POLICIES

Financial stability is affected by a range of policies other than macroprudential policies, both ex ante and ex post. This section sets out the range of these effects across these other policies and discusses the interactions that arise, recognizing that the precise nature and strength of interactions may vary across these other policy fields and with country-specific circumstances (Figure 1).[9]

Figure 1. Relationship between Macroprudential and Other Policies



Source: IMF staff.

A. Monetary Policy

19. Strong complementarities and interactions between monetary and macroprudential policies reinforce the need for a strong macroprudential framework. Complementarities explain why central banks have a strong interest in ensuring the effective pursuit of macroprudential policy and are often at the forefront in the push for the establishment of macroprudential frameworks. Interactions also call for some degree of coordination between monetary and macroprudential policies, while preserving the established independence and credibility of monetary policy.

[9] There may also be interactions between these other policies, such as between competition and resolution policies and between monetary and fiscal policy. However, these are beyond the scope of the present paper.

20. As set out in IMF (2013a), even when monetary policy is set consistent with price stability, the resulting monetary stance may have undesirable side effects for financial stability.

- Where low policy rates are consistent with low inflation, they may still contribute to excessive credit growth and the build-up of asset bubbles and sow the seeds of financial instability.
- In small open economies, increases in interest rates may be necessary in the face of inflationary shocks, but can draw in capital flows that may contribute to excessive financial risks. Conversely, the need for interest cuts to counter subdued domestic demand may lead to large capital outflows that can jeopardize domestic financial stability.

21. Where there is a strong macroprudential policy framework, this can reduce conflicts and create more room for maneuver for monetary policy to pursue price stability.[10] Where macroprudential policy is assigned an appropriate range of tools, it will be better able to address undesired side effects of monetary policy at their source. This can help alleviate conflicts in the pursuit of monetary policy and reduce the burden on monetary policy to 'lean against' adverse financial developments, thereby creating greater room for maneuver for the monetary authority to pursue price stability. However, since macroprudential cannot be expected to be fully effective, the conduct of monetary policy needs also to take account of financial stability considerations.[11]

22. Moreover, to the extent that macroprudential policy reduces systemic risks and creates buffers, this helps the task of monetary policy in the face of adverse financial shocks. It can reduce the risk that monetary policy runs into constraints in the face of adverse financial shocks, such as the zero lower bound—recently hit by many advanced economies—or the risk of strong outflows associated with cuts in interest rates in small open economies.

B. Fiscal and Structural Policies

23. Appropriate fiscal and structural policies are critical to reduce the likelihood of macroeconomic shocks. The build-up of systemic risk can be driven strongly by macroeconomic imbalances—internal or external—and distortions that affect the composition of output.

- Where a consumption boom is fed by capital inflows in the presence of persistent current account deficits, macroprudential policies alone are unlikely to be effective at controlling these underlying forces and prudent fiscal and structural policies are needed to contain these imbalances.
- The crisis also showed that prudent fiscal policies are essential to maintain the safety of sovereign debt and to avoid adverse feedback loops between sovereign risk and the financial system.

[10] Further discussion, evidence, and case studies are provided in IMF (2013b).

[11] See further IMF 2013a, Blanchard and others (2013), and Stein (2013).

While macroprudential policymakers cannot be in control of fiscal and structural policies, they can help analyze the underlying macroeconomic risks and imbalances, draw out systemic implications, and flag their concerns to those policymakers that are in a position to take appropriate action.

24. Existing tax policies can create biases that can contribute to systemic risk (background paper). Macroprudential authorities have an interest to encourage a correction of such biases, since they make it harder for the macroprudential policymaker to achieve its objective.

- First, corporate tax systems generally encourage the use of debt rather than equity finance. Because interest paid is allowed as a deduction in calculating taxable profits, but the return to equity is not, corporate taxes typically create a 'debt bias.'[12] There is evidence that this effect matters for leverage choices of non-financial companies, as well as financial institutions.[13] Thus, there is a basic tension between regulatory measures intended to induce banks to hold more capital than they otherwise would and tax incentives to hold less.
- Second, the tax treatment of housing can make households more vulnerable to shocks and exacerbate systemic risk. Many countries do not (or only lightly) tax imputed rent, while providing generous relief for mortgage interest. This can be a source of significant distortion (and revenue loss), as households are encouraged to borrow against housing assets, either to invest in non-housing assets or to finance immediate consumption. High mortgage debt can make households more vulnerable to shocks, thus exacerbating transmission channels in the financial system leading to a crisis.

25. Pigovian taxes and levies can also be used more directly to address systemic externalities. The "Financial Stability Contribution" (FSC) proposed by the Fund is a key example.[14] Such a levy can help discourage leverage and wholesale funding and at the same time be linked to the financing of a credible and effective resolution mechanism. It could be levied at a flat rate, or varied to reflect individual institutions' contributions to systemic risk, as well as variations in overall risk over time.[15]

26. Taxes can also affect asset prices. As future tax liabilities are capitalized, in principle, imposing taxes during a boom can make bubbles less likely; or the announcement of future tax relief on asset returns can support asset prices during a bust. For example, during the crisis countries

[12] A large empirical literature has found the resulting distortion to corporate leverage choices to be substantial (background paper). Options to address the debt bias include the Allowance for Corporate Equity (ACE), discussed further in the background paper.

[13] Indeed empirically, the average tax response by banks is about as large as it is for non-financial firms: the long-run tax effect on the leverage ratio is estimated between 0.20 and 0.27. This means, for instance, that eliminating the bias to debt finance created by a 25 percent corporate tax rate might increase banks' capital in the long run by, on average, 3.75 percent of their assets: an increase of more than 30 percent over their current levels. See further Keen and De Mooij (2012).

[14] See IMF Report to the G-20, "A Fair and Substantial Contribution."

[15] Around a dozen European countries—including France, Germany and the United Kingdom (U.K.)—and Korea have adopted bank taxes that resemble an FSC as a way to support financial stability.

have used tax measures to bolster house prices by removing stamp duties on housing transactions or extending mortgage interest relief. Stamp duties have more recently also been used in a number of countries to lean against house price appreciation, such as in Singapore and Hong Kong. Such measures may have a role to play in particular when real estate prices are driven by capital inflows that by-pass the domestic financial system. However these measures can also introduce further distortions and may ultimately increase price volatility. Indeed, the practical feasibility of cyclical changes in taxes could be limited due to lags in fiscal decision making and implementation (background paper).

27. Tax measures are usefully complemented by structural measures that affect the supply of housing, such as land use policies, and the functioning of housing markets more generally (IMF, 2011e). While these measures should not be viewed as macroprudential *stricto sensu*, their effect on house price dynamics may have benefits in reducing systemic risks. Macroprudential policy authorities will therefore often have an interest to influence the design of these policies.

C. Competition Policies

28. Competitive processes within the financial sector can create incentives for excessive risk-taking, leading to tensions between competition and financial stability (background paper).[16] It is well-known that, in general, competition is likely to result in more cost-effective production of goods and services and higher efficiency. However, competitive processes within the financial sector can also contribute to systemic risk. This can create tensions between the objectives of competition authorities and those of the macroprudential policymaker, in particular when the macroprudential authority is concerned about the build-up of risk over time (background paper).

- A substantial body of evidence documents that a relaxation of licensing and branching restrictions can lead to an erosion of lending standards and too much risk taking by financial institutions (e.g., Keeley, 1990).
- Foreign entry, increased access to wholesale funding, and greater availability of "hard" (quantifiable) information on borrowers, while in principle desirable, can lead banks to compete aggressively for market share, reducing margins and creating strong incentives to take too much risk.
- The proliferation of "non-bank" providers of credit can increase competitive pressures in credit markets that result in risks to financial stability (Bordo and others, 2011). The credit-card boom-busts in Korea in the early 2000's and more recently in Mexico provide examples.[17]

[16] See also Ratnovski (2013).

[17] In Korea, the number of credit cards issued by credit card companies more than doubled from 39 million to 105 million, from 1999 to 2002, as a result in part of aggressive marketing by non-bank providers (IMF, 2004). Similarly, the number of credit cards issued in Mexico reached its historical maximum (26.5 million) in June 2008, soaring from 6.4 million in March 2002, in part spurred by non-bank providers entering the market (Bank of Mexico, 2009). Both episodes were followed by sharp increases in default rates, due to credit having been granted to borrowers with no or weak credit history and the issuance of multiple credit cards to a single borrower.

29. In the structural dimension, by contrast, the financial stability perspective often reinforces traditional competition concerns. Here, therefore, the macroprudential authority may favor more forceful action than what is justified purely on competition grounds.

- Mergers between financial intermediaries have the potential to create institutions that are "too big to fail." Macroprudential authorities therefore have an interest in the control of mergers and takeovers between financial institutions.
- Large and complex financial institutions may be "too difficult to resolve." This can call for a preventive power to break-up financial institutions or to force changes in their organizational structure, to increase resolvability.[18]

30. In general, therefore, competition policy for the financial sector requires a macroprudential perspective.[19] One way of assuring that the interplay between competition and systemic risk is taken into account is to assign traditional powers of competition policy, including licensing, take-over control and break-up powers to the prudential authorities.[20] Another is to ensure strong mechanisms of coordination and consultation between the prudential and competition authorities and to introduce financial stability as a secondary objective of the latter. Where there is a distinction between the micro-and macroprudential authorities, the macroprudential body should be consulted on the design and application of these policies.

D. Microprudential Policies

31. In principle, microprudential supervision should work "hand in glove" with macroprudential policy. Revisions made in the wake of the crisis to the Basel Core Principles now place a much stronger emphasis on the need for a macroprudential perspective in supervision.[21] A key recommendation is that supervisory agencies are tasked not only to ensure the safety and soundness of individual institutions, but also to contribute to the stability of the system as a whole. Shared information, joint analysis of risks and strong dialogue can reinforce the complementarities between microprudential supervision and macroprudential policy. Indeed, strong supervision is essential both to ensure that macroprudential policymakers can draw on supervisory information in

[18] Such powers have recently been assigned to the U.S. Federal Reserve, and have been recommended by the FSB, to ensure that the supervisory authorities have ways of increasing the resolvability of systemic institutions.

[19] This also includes the actions of competition policies in crisis management. Where competition authorities impose bank restructuring following the receipt of state aid, this needs to be mindful of the need to avoid abrupt deleveraging that may adversely impact the economy.

[20] In some countries, the prudential authorities have long been involved in the control of mergers between banks; in others the prudential authorities have only recently been assigned such powers (as in the U.S.).

[21] In addition, the work of international standard setters, such as the Basel Committee on Banking Supervision (BCBS) is increasingly guided by the need for a macroprudential perspective in financial regulation, a key example being the establishment of the countercyclical capital buffer as part of Basel III.

risk assessment and to ensure that the macroprudential policy stance adopted is effectively enforced across institutions.

32. Tensions between microprudential and macroprudential perspectives may also arise, especially in "bad times" (Osiński and others, 2013). Microprudential and macroprudential requirements work through similar transmission mechanisms and it is their joint effects that will determine the outcome.[22] In "good times," the microprudential supervisor may often agree that it would be prudent for banks to build up buffers, even though there may not be the same sense of urgency when non-performing loans are small and profits ample. In "bad times" tensions can be stronger, since the macroprudential perspective may call for a relaxation of regulatory requirements that impede the provision of credit to the economy or contribute to fire-sale effects, while the traditional microprudential perspective may seek to retain or tighten these requirements to protect the interest of depositors of individual banks.

- One way of addressing conflicts in "bad times" is to establish in "good times" sufficient prudential buffers. The macroprudential authority may then be in a position to reduce buffers in a manner that respects microprudential objectives.

- Where buffers are not adequate to start with, conflicts can sometimes still be resolved through well-designed prudential action. Microprudential authorities may call for increasing capital ratios in bad times, while macroprudential authorities will be concerned that this leads to excessive deleveraging with adverse effects on the economy. Encouraging increases to be implemented by higher capital levels (privately or publicly provided) avoids that deleveraging and can align microprudential and macroprudential objectives.
- Another way of dealing with these conflicts is to establish institutional mechanisms that allow for their resolution. In particular, where the macroprudential decision-maker is established as a macroprudential committee, this allows for supervisory agencies to participate in macroprudential decision-making, allowing for supervisory perspectives to be brought to bear (Nier and others, 2011).

E. Crisis Management and Resolution Policies

33. Crisis management and resolution policies are complementary to macroprudential policy. The management of crises may require monetary easing and emergency liquidity assistance by the central bank, the effective resolution of failing banks by dedicated resolution or deposit insurance agencies, and potentially public guarantees and capital support provided by the fiscal authorities.

34. Proper design of resolution regimes can support the objectives of macroprudential policy. Effective and credible resolution regimes can strengthen market discipline and reduce incentives to take excessive risks, mitigating the need for macroprudential intervention. By contrast,

[22] Institution-specific capital buffers under Pillar 2 of the Basel framework are an example.

where difficulties in the resolution of specific financial institutions remain, this will require more forceful macroprudential action, which can in turn lead to greater incentives for circumvention.

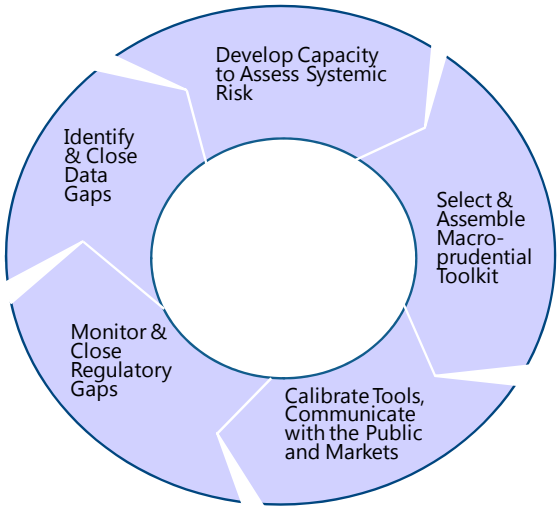
35. Crisis management requires close coordination among all financial sector authorities. Macroprudential authorities are likely to continue to provide advice, based on their assessment of the evolution of the level and sources of systemic risk. They may also use instruments in their purview to contain amplification of risks. However, in a systemic crisis, the fiscal authorities are likely to take the lead in coordinating the overall policy response, as taxpayer money would need to be used.

OPERATIONALIZING MACROPRUDENTIAL POLICY

This section sets out key steps in operationalizing macroprudential policy at the national level. It is informed by a growing body of contributions by national central banks and the CGFS, the ongoing work of the FSB and standard setters, as well as recent analytical work of the Fund and experience in a range of recent FSAPs. While progress is being made, important challenges and knowledge gaps remain.

36. Operationalizing macroprudential policy is challenging and can usefully be broken down into key steps or "tasks" that need to be tackled (Figure 2). While for expositional purposes it is useful to think of these as being followed in sequence, all of these tasks will in reality require ongoing analytical and policy development on the part of the macroprudential policymaker. In particular, assuring access to the appropriate data and information is critical to enable the policymaker to properly perform all other tasks required to make macroprudential policy operational.

Figure 2. Five Steps to Operationalize Macroprudential Policy



Source: IMF staff.

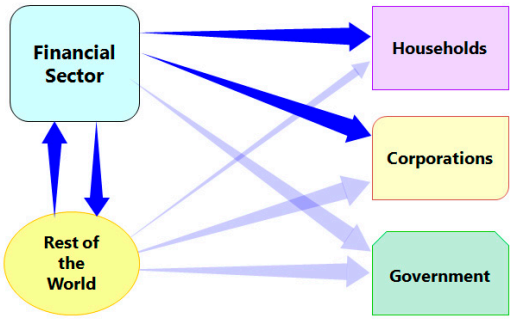
- The authorities need to *develop the capacity to analyze systemic risk*, including the build-up of risks through time and interconnectedness within the financial sector.
- The authorities need to *select and assemble* a *set of macroprudential instruments* that can be used to address systemic risk.
- The authorities need to *calibrate the tools* acquired, in a manner that takes account of their likely benefits and costs, and *clearly communicate* the basis for policy judgments to the public and the markets.
- In view of the tendency for the financial system to arbitrage regulatory constraints, the authorities need to continuously *monitor regulatory gaps* and take timely action to close them if needed.
- The authorities need to *fill data gaps* that impede the analysis of macro-financial linkages, the design and calibration of macroprudential tools and the detection of regulatory gaps.

A. Assessing Systemic Risk

37. An effective framework for monitoring systemic risk is key to operationalizing macroprudential policy. It needs to consider (i) the growth in total credit and macroeconomic drivers of imbalances; (ii) financial linkages between the financial and domestic real sectors (household and corporate), and between each sector and the rest of the world; and (iii) the structure of the financial system and linkages within and across key classes of intermediaries and market infrastructures (Figure 3). The assessment will often draw heavily on supervisory and statistical data, and make use of empirical methods, but needs also to make full use of market intelligence and soft supervisory information on trends and market developments.

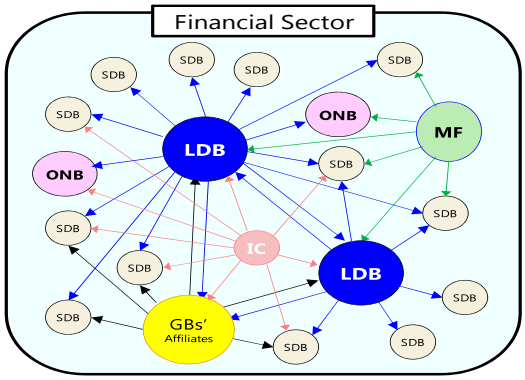
Figure 3. Systemic Risks in Time and Structural Dimension

Time Dimension



Source: IMF staff.
Note: Arrows denote size of exposures.

Structural Dimension



Source: IMF staff.
Note: Large Domestic Bank (LDB), Small Domestic Bank (SDB), Mutual Fund (MF), Insurance Company (IC), Global Bank (GB), and Other Non-Banks (ONB).

38. Strong increases in credit can signal a build-up of systemic risk. The empirical literature finds that increases in the ratio of private sector credit to GDP, as measured by the growth in credit relative to GDP or by the deviation from its long-run trend, is the best single indicator of an increase in the probability of a crisis over a horizon of 1 to 3 years (Drehmann and others, 2011; Drehmann and Juselius, 2012; IMF, 2011b; Lund-Jensen, 2012). Use of broad measures of credit, including credit provided by non-banks and cross-border, can improve the indicator (Drehmann and others, 2011; IMF, 2011b; Arregui and others, 2013). However, it is also found that not all credit booms end in a bust, as they may be justified by better fundamentals, and that loan growth can contribute to a healthy financial deepening (Dell'Ariccia and others, 2012).

39. It is important to consider the macroeconomic environment that gives rise to increases in credit and additional indicators of the build-up of systemic risk. Combining the analysis of credit growth with other indicators can help in deciding whether excessive credit growth poses systemic risk. These indicators include:

- the prices of *assets* that are used as collateral for secured lending and that may contribute to feedback between increases in leverage and asset prices; [23]
- the *leverage* taken by borrowers in those asset markets, on average as well as on new loans, since the latter will be a more timely measure of credit conditions;[24]
- changes in *lending standards*, as can be captured by decreases in lending margins and increases in household and corporate leverage;
- measures of *balance sheet stretch* in the household and corporate sectors, as can be captured by debt-service to income ratios for each sector (Drehmann and Juselius, 2012);
- increases in exposure of the household and corporate sectors to *interest rate* and *currency* risks that create vulnerabilities to aggregate shocks; and[25]
- *external imbalances*, as reflected in current account deficits and an appreciation of the real exchange rate, that can increase the probability of crises. [26]

[23] See Borio and Lowe (2003), Drehmann and others (2011) and IMF (2011b) on combining credit growth with equity price growth, and Arregui and others (2013) and Lund-Jensen (2012) on combining credit growth and house price growth.

[24] Geanakoplos and Pedersen (2011) point out that the data to construct these indices are often not collected.

[25] Country experiences suggest that exposures to tail risks, including sharp changes in interest rates, house prices and exchange rates, tend to increase in the run-up to crises as lending standards fall and the terms of financial contracts change. The increased prevalence ahead of the crisis of interest-only and adjustable rate mortgages in the U.S. and of FX denominated or indexed mortgages in some countries in Central, Eastern, and Southeastern Europe (CESEE) are prominent examples.

[26] Kaminsky and Reinhart (1999) show that weak exports and a resulting current account deficits are frequently observed before financial crises. Barrell and others (2010) find strong evidence on the ability of current account deficits and housing prices to predict banking crises. Jordan and others (2010) show that credit growth emerges as the single best predictor of financial instability, but that the correlation between lending booms and current account imbalances has grown much tighter in recent decades. Lund-Jensen (2012) finds evidence that real appreciations are a predictor of banking crisis, in model that also uses the credit to GDP gap.

40. Close analysis of the build-up of vulnerabilities within the financial sector is essential. This analysis needs to consider whether an increase in credit to GDP is sustainable, or stretching the system and subjecting it to unsustainable increases in credit, FX and liquidity risks. It should consider:

- the capacity of the financial system to absorb *default risk* and *changes in asset valuations*, as can be measured by leverage ratios and measures of profitability, and assessed through various types of stress tests; and
- the extent to which banks increase reliance on wholesale funding to finance credit expansion, thereby exposing the system to *liquidity shocks*, as measured by the ratio of non-core to core funding or the ratio of credit to deposits.

41. In the structural dimension the analysis needs to consider the extent to which linkages within the financial system pose a threat. The crisis has shown that new products, such as credit default swaps, can lead to rapid changes in risk-concentrations across the financial sector and increased exposure to tail risks for some institutions, which in turn render these institutions "too important to fail." It also highlighted changes in the structure of the financial system where non-banks, such as money market mutual funds, become important sources of funding for banks, while the liquidity mismatches of such institutions can contribute to endogenous fire sale dynamics that weaken the financial system.[27]

42. Monitoring and analysis of these interconnections is important to assess the need for a macroprudential response. This needs to recognize that connections within the financial system can act both as shock absorber and as shock transmitter and that an increase in connectivity is not always associated with increases in systemic risk. Recent advances in techniques to assess risks arising from interconnections (such as network analysis), and methods based on market prices (such as contingent claims analysis), can help assess the risk from interconnectedness (Arregui, Scarlata, and others, 2013). However, such analysis is often still hampered by gaps in the data available to the authorities.

43. A range of indicators and methods need to be combined with qualitative judgment to arrive at the decision on when to act. While slow-moving indicators are useful for detecting the build-up of risks, high-frequency and market-based indicators are better in predicting an imminent materialization of systemic risk and can help prepare the authorities to respond to stresses several months in advance (Blancher and others, 2013; Arsov and others, 2013).

44. The systemic risk monitoring framework is work in progress in a number of key dimensions. Tools exist to assess most sectors and levels of aggregation (Annex II). However, these tools provide only partial coverage of potential risks and only tentative signals on the likelihood and

[27]By contrast, where credit provision and investment does not involve leverage or liquidity mismatch, this can lead to greater resilience as non-bank institutions, such as insurance companies and pension funds, act as a shock absorber (FSB 2012).

impact of systemic risk events. As such, they may not provide sufficient comfort to policymakers. Further progress is needed in the following areas:

- **Early warning.** The forward-looking properties of systemic risk measures are generally weak, even though some measures appear relatively promising, such as combinations of credit-to-GDP and asset valuation measures.
- **Thresholds.** Policymakers need clear and reliable signals indicating when to "worry" and when to take action, and allowing them to monitor the impact of such action over time. For example, empirical evidence suggests that when credit and property prices grow beyond certain levels the probability of a financial crisis over 2 to 3 years increases considerably (Annex IV). Despite recent progress, further work is needed in this area.
- **System's behavior.** The capacity to model the system's behavior is limited in several areas, including endogenous responses to the materialization of aggregate shocks, such as feedback and multi-round effects, and nonlinear risk correlations during periods of financial distress.

B. Selecting and Assembling the Macroprudential Toolkit

45. The authorities need to select and assemble a set of macroprudential instruments that can help address the key potential sources and dimensions of systemic risk. Since the manifestations of systemic risk can depend on country-characteristics, no specific set of tools can readily be identified as "best practice." Equally, since risks can build-up rapidly, and acquiring and implementing new tools takes time, there is merit in considering and introducing a range of tools ex ante. Interlocking use of several tools can help overcome the shortcomings of any one single tool and enable the policymaker to adjust the overall policy response to a range of risk profiles, thereby promoting the effectiveness and efficiency of the policy response.

46. In the time dimension, consideration should be given to three sets of tools (Figure 4): (i) countercyclical capital buffers and provisions, to increase resilience to shocks; (ii) sectoral tools, to contain a build-up of risks in particular sectors; and (iii) liquidity tools, to contain funding risks. These three sets of tools can reinforce and complement each other in addressing the build-up of risks through time.

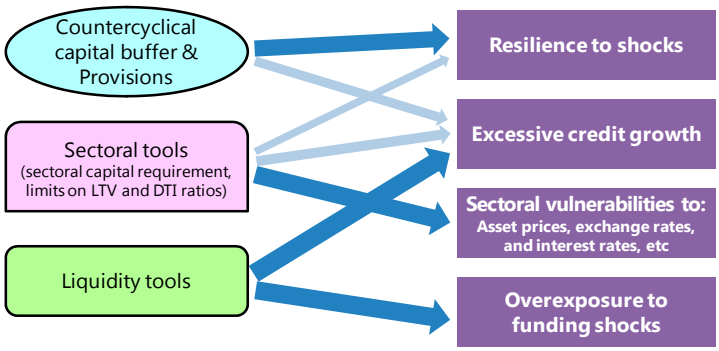
47. Countercyclical capital buffers and provisions. The countercyclical capital buffer (CCB) will be available in many countries through implementation of Basel III. [28] The advantage of the CCB is that it can be activated to increase the resilience of the system to a whole range of shocks. The release of the buffer is expected to avoid credit crunch effects by reducing the pressure on banks to deleverage in times of financial stress. [29] While experience with these tools is still to be gained,

[28] The requirement will be phased in gradually from 2016 to 2019. However, countries may consider an accelerated phase in. Early adopters include China, New Zealand, Switzerland and the U.K. See further the background paper.

[29] Jiménez and others (2012) show that the effects of varying dynamic provisions on credit in Spain were much stronger in crisis times than they were ahead of the crisis, providing evidence of the effectiveness of dynamic provisioning in buffering shocks.

simulation exercises suggest that activation of CCBs would have been triggered by increases in credit to GDP well ahead of the crises in Ireland and Spain, providing additional resilience and complementing dynamic provisions in the case of Spain (see Figure 7 in Annex III and background note). However, the CCB is a blunt tool, applied uniformly to all exposures and is likely to be slow to react to the build-up of risks in particular segments of the credit market. In addition, where banks hold voluntary buffers above the minimum, or can easily generate capital through strong earnings, the activation of the buffer may not markedly slow down overall credit growth.[30]

Figure 4. Mapping Tools to Objectives: Time Dimension



Source: IMF staff.

48. Sectoral capital requirements. Increases in risk weights for lending to particular segments of the credit market can complement the CCB. In principle, a targeted increase in risk weights can be applied to any category of loans for which strong credit growth gives cause for concern. This can include mortgage lending, unsecured consumer credit, or specific segments of such credit, as in Brazil and Turkey, and corporate lending or specific corporate segments, such as lending to commercial property, as proposed in the U.K. (background paper). An increase in risk weights is expected to increase loan interest rates for lending to the targeted sector and can also increase the resilience of lenders to a deterioration in credit quality.[31]

49. LTV and DTI ratios. The international experience justifies a particular emphasis on tools that can contain vulnerabilities in residential housing markets. A number of countries have found that the pass-through of an increase in capital requirements on mortgage loans to loan growth can be limited when strong increases in asset prices and credit feed each other (e.g., Israel, Korea). This suggests the use of additional tools that act on the demand for credit and directly increase the resilience of borrowers to shocks.

[30] The Basel CCB applies to risk-weighted exposures. Where the calculation of such risk weights is subject to gaming, consideration should be given to introducing additional capital tools that apply to all exposures equally, such as a leverage ratio.

[31] Minimum haircut and margining requirements can also be thought of as sectoral tools, aiming to affect the leverage cycle in specific markets, and are further discussed below.

- An LTV ratio introduces a cap on the size of a mortgage loan relative to the value of a property, thereby imposing a minimum down payment.
- A DTI ratio restricts the size of a mortgage loan to a fixed multiple of household income, thereby containing unaffordable and unsustainable increases in household debt.

The available research (surveyed in the background paper) suggests that these tools can reduce feedback between credit and prices in upswing, as well as improve resilience to shocks, thereby reducing default rates and boosting recovery values when the housing market turns. However, they can also be seen as more intrusive and calibration can seek to soften their impact, e.g., by exempting first-time buyers (as in Korea, background paper). Moreover, the evidence suggests that LTV ratios can have a relatively strong effect on house prices and aggregate demand (IMF 2013b), which can justify a gradual approach to tightening of such ratios (as in Canada and the Netherlands).

50. Liquidity tools. The crisis has highlighted the systemic externalities associated with funding liquidity risk (Perotti and Suarez, 2010; Shin, 2010a; Huang and Ratnovski, 2011) and sparked a greater emphasis on liquidity tools that reduce vulnerabilities from a system-wide increase in wholesale, short-term and FX funding. These tools can be quantity-based or price-based constraints that aim to reduce reliance on vulnerable non-core funding. While Basel III includes prudential measures to reduce funding risks (Liquidity Coverage Ratio and Net Stable Funding Ratios (NSFRs)), additional tools can be adapted to local conditions.[32] Examples are the Macroprudential Stability Levy introduced in Korea and the Core Funding Ratio (CFR) introduced in New Zealand, as well as the use of (marginal) reserves requirements for macroprudential purposes in a number of emerging markets. An additional benefit of liquidity tools is their effect on loan growth. Since core funding, such as retail deposits, grows slowly, credit booms will often be funded by increases in wholesale funding. By constraining such funding, liquidity tools can then also contribute to a slowing of overall credit growth, complementing the effects of the countercyclical capital buffer or provisions and sectoral tools.

51. A range of complementary tools can contain structural risks from interconnectedness and contagion within the financial system (Figure 5). First, to improve resilience and resolvability of those institutions whose failure poses systemic risks to the system, prudential requirements can be tightened on those firms. Capital surcharges for global and domestic systemically important institutions are the key example. Second, to reduce the contagious effect of the failure of such institutions, prudential tools can be used to discourage exposures to such institutions or excessively large exposures within the financial system more generally (Arregui, Scarlata, and others, 2013).

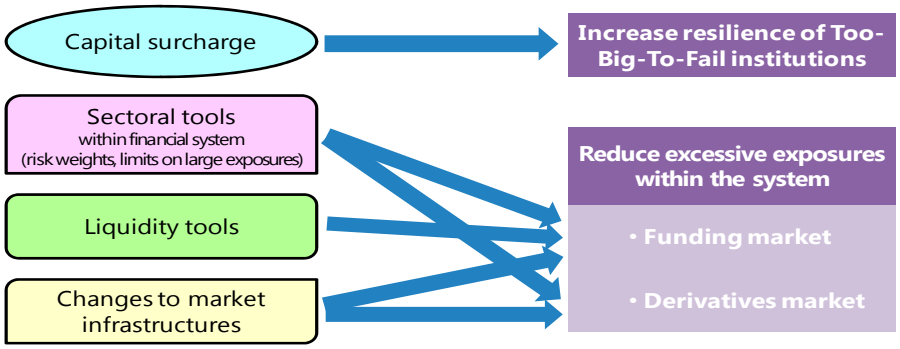
- This can take the form of increased sectoral capital requirements for exposures within the financial system or specific types of exposures that are growing rapidly, as proposed for the U.K. Financial Policy Committee (FPC).

[32] The NFSR that will be introduced as part of Basel III can serve as an international benchmark for quantity-based tools. Perotti and Suarez (2011) discuss the relative merits of price-based and quantitative constraints. See also the background paper for further discussion.

- It can also take the form of quantitative limits on the size of such exposures relative to capital, extending existing large exposure regimes to exposures within the financial system, as is currently being discussed by the Basel Committee.
- Since non-core funding is often raised in wholesale financial markets, liquidity instruments can contribute to a reduction of domestic or cross-border exposures among financial institutions (Shin, 2010a and 2010b).

52. Changes can also be made to the market infrastructure, including payment, settlement and clearing arrangements, to reduce the build-up of credit exposures arising from transactions within the financial system. Growing counterparty credit risks from derivatives transactions have been the main concern in the aftermath of the crisis and spurred efforts to introduce central counterparties for the clearing of derivatives as part of the G-20 led reform initiative. These entities need to be designed prudently and supervised closely, however, since while they reduce interconnectedness they also concentrate systemic risk. Finally, since contagious effects are often strengthened by a lack of information, mandating increased transparency over exposures can be a particularly useful measure in the structural dimension.

Figure 5. Mapping Tools to Objectives: Structural Dimension



Source: IMF staff.

C. Calibrating Macroprudential Tools

53. Use of macroprudential tools needs to trade off their benefits and costs. It needs to bring together the analysis of changes in the sources and level of systemic risk; an understanding of the transmission of the available macroprudential policy tools; and an assessment of the costs and distortions arising from macroprudential policy action (CGFS, 2012; Arregui and others, 2013). While macroprudential action in the structural dimension will often take the form of a sustained initiative that imposes new constraints, action in the time dimension can involve dynamic changes to evolving conditions, with tightening of constraints followed by a relaxation as risks abate or crystallize.

54. The transmission mechanism of macroprudential action is subject to considerable uncertainty. While it is possible to map the channels of transmission of macroprudential tools conceptually, the strength of these effects is still uncertain. A growing literature—reviewed in detail

in the background paper—documents that macroprudential actions transmit to resilience, as well as the growth in credit and asset prices (Lim and others, 2011; Vandenbussche and others 2012; CGFS, 2012; IMF 2013b; Arregui and others, 2013). An emerging literature also assesses the short-run costs of variation in macroprudential tools on output (CGFS, 2012; IMF, 2013b; Arregui and others, 2013).[33] However, the relative strength of these effects across tools and their precise quantitative impacts are difficult to measure. Moreover, while progress is being made, the benefits of macroprudential action for the ultimate objective of reducing the probability and depth of future crises, remains difficult to quantify (Annex IV). Further research is essential to improve the policymaker's understanding of the benefits and costs of each tool. In addition, the authorities need to monitor the transmission of macroprudential action on key indicators of vulnerability in real time, so as to adjust the calibration in light of emerging indications of their effects.

55. Efficient calibration requires a degree of judgment, to enable a response to evolving risks. A key advantage of a static or rules-based calibration is the reduced need to overcome political opposition to the discretionary variation of macroprudential tools. However, to provide sufficiently strong defenses against a build-up of systemic risk, a static calibration may need to be inefficiently tight at all times, distorting financial activity and creating incentives for circumvention (Goodhart, 2008). One way of balancing these considerations is to introduce "guided discretion", based on key indicators, but complemented by judgment that takes account of all available information (Swiss National Bank 2012; Bank of England (BoE), 2013; background paper). Another is to complement tools that work as automatic stabilizers (such as dynamic provisions) with a range of other tools that can be targeted and adjusted to evolving risks.

56. Access to multiple tools can improve policy trade-offs. The marginal benefit of tightening any one tool is likely to be decreasing as aggressive use of any tool is likely to create distortions and incentives for circumvention (CGFS, 2012). Interlocking use of complementary tools can reduce such costs and can be more closely tailored to the prevailing profile of risks, thereby reaping more efficiently the desired benefits of macroprudential action. For instance, a targeted tightening of sectoral tools can suffice when risks are confined to particular segment, while broader impact tools can address risks from a more pervasive growth of credit (Lim and others, 2011).

57. Use of macroprudential policy tools needs to be supported by clear communication. Communication with markets and the public can foster an understanding of the benefits of specific macroprudential tools. It can also be used to steer market expectations on how and under what circumstances any given policy tool will be used, for instance by mapping 'presumptive indicators' for the use of each tool (Goodhart, 2011).[34] An impact on expectations can in turn condition

[33] This literature finds that short-run effects on output are acceptable even for broad-based tools, such as capital and liquidity requirements. Moreover, some of these costs can be countered by appropriate variation in monetary policy, unless monetary policy itself is constrained (IMF 2013a).

[34] For example, policymakers could use two thresholds for credit growth—a lower threshold that would reduce the chance of missing crises (IMF, 2011b) and a higher threshold that would reduce the chance of a false positive signal (Dell' Ariccia and others, 2012). Starting at a lower threshold and escalating concern and gradually implementing

(continued)

behavior and reduce costs associated with variation in macroprudential tools (CGFS, 2012, Giese and others 2013). However, communication of a policy strategy needs to balance the need for flexibility in the deployment of macroprudential tools.

58. Trade-offs in the calibration of macroprudential tools may be particularly stark in stressed conditions. In periods of financial stress, the macroprudential policymaker will want to relax those macroprudential constraints that impede the provision of credit to the economy, lead to fire sale dynamics and exacerbate a vicious feedback between deteriorating economic and financial conditions. At the same time, relaxation of macroprudential constraints needs to maintain confidence and ensure an appropriate degree of resilience against future shocks.

59. These trade-offs may differ across macroprudential tools. For instance, using tools that relax liquidity constraints can help sustain credit in periods of stress (IMF, 2013b). It can also accommodate investors' preference to shorten the maturity of funding provided to banks in stressed conditions and need therefore not entail a loss of confidence. A relaxation of sectoral constraints that is confined to new lending can strike a balance between the need to maintain resilience and the desire to promote the provision of credit to the economy. Finally, dynamic provisioning regimes act as automatic stabilizers, since the draw-down of the provisioning pool is built into the design of the regime.

60. Trade-offs can be improved when macroprudential policy action is complemented by policy action in other areas. For instance, robust resolution frameworks and disclosure of stress test results for individual banks can allow the authorities to credibly deal with individual weak institutions, thereby allowing for a relaxation of system-wide capital buffers in a manner that maintains confidence (Osiński and others, 2013). Similarly, liquidity requirements can be more readily relaxed when there is a strong commitment on the part of the central bank to provide emergency liquidity.

D. Monitoring and Closing Regulatory Gaps

61. Authorities need to monitor the migration of activity outside of the reach of macroprudential tools and close regulatory gaps. The authorities need to monitor and assess the extent of such migration and respond, by expanding the scope of macroprudential action as necessary. The extension of prudential tools to non-bank and market activity needs to be guided by economic function, rather than legal form, and be proportionate to the risks to financial stability posed by such activity (FSB 2012).

62. Macroprudential policy intervention needs to be aware of 'boundary problems.' If regulation is effective but its reach is confined to certain types of regulated institutions, it will constrain the regulated firms from achieving their preferred position and lower their return on

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policies somewhere in between the two could influence private sector expectations and mitigate the need for stronger policy action (Arregui and others, 2013).

equity (Goodhart, 2008). This will tend to lead to a switch of business activity to less constrained intermediaries that are outside the scope of the regulation. It can also lead to a shift toward market-based financing and efforts by regulated firms to open up connected operations in the less regulated sector. This problem is generic, and applies to all financial regulation. [35]

63. In principle, a macroprudential approach is well-suited to address the boundary problem. It is less focused on protecting bank depositors, but takes a system perspective that encompasses all individually systemic institutions and all providers of financial services that are collectively systemically important (IMF 2011a; Nier, 2011). A macroprudential intervention or an extension of the regulatory perimeter that is motivated by macroprudential concerns, rather than the desire to protect investors, need therefore not imply an extension of the "safety net."

64. A macroprudential approach calls for an extension of tools to all provision of credit that is ultimately dependent on short-term funding and leverage cycles in markets.

- In line with recommendations by the FSB, equivalent prudential intervention should be extended to "bank-like" intermediaries that do not take deposits, but whose economic function is the provision of credit to the economy and who depend on short term debt funding.
- Regulation should also extend to providers of leverage in markets that are dependent on short term funding or secured funding (e.g., broker dealers).
- A macroprudential approach calls for the regulation of credit products traded in financial markets. This can include the regulation of securitization activity in a manner that creates transparency and 'skin in the game' across the intermediation chain.
- A macroprudential approach finally calls for the regulation of haircuts in securities lending and repo markets, as well as margin requirements in derivatives markets, to avoid margin spirals that contribute to excess leverage and procyclicality (Geanakoplos, 2010; Longworth, 2010; Hanson and others, 2011; FSB 2012).

65. While some of these approaches are new, there is growing practical experience, as countries have encountered the need to respond to arbitrage and the growing provision of credit by non-banks and in markets when deploying macroprudential tools. Annex V highlights the experience in Croatia, Korea, New Zealand and the U.S.

E. Closing Data and Information Gaps

66. Effectiveness of macroprudential policy will benefit from a sustained effort to close information gaps. Data and information gaps can hinder the early detection of systemic risk and increase uncertainty on the need for a response to identified concerns, impede the design and enforcement of macroprudential instruments, and complicate the policing of the regulatory

[35] For instance, the introduction of Basel I is thought to have spurred the rise of securitization in the U.S. (Goodhart, 2008).

perimeter. While the most pressing data and information gaps can vary across financial systems, the crisis has thrown such gaps into sharp relief, in both advanced and emerging markets.[36]

67. Information gaps can impede the assessment and mitigation of risks in the household and corporate sector. Data on the household sector is scarce in many countries, and greater granularity is needed to assess and mitigate risks. For instance, to implement and enforce effective LTV and DTI ratios, information on real estate prices, preferably at a regional level is needed.[37] In addition, credit registers are required to provide information on pre-existing senior loans, enabling the overall ratios to be computed. Similarly, to assess the need for and enforce measures that contain FX exposures on the part of the corporate sector, granular data is needed on cross-border credit flows to such institutions. More generally, loan-level data that would allow computation of indicators of leverage and vulnerabilities to asset price and interest rate shocks across borrower and asset classes are often not available.[38]

68. Gaps also hamper the assessment of interconnectedness and the mitigation of risks in the structural dimension. Information is often missing on domestic and cross-border exposures between financial institutions, including between those that are potentially systemically important. Detailed information on counterparties and maturities in funding markets is often not collected. In addition, information on exposures arising in over-the-counter derivatives markets is often missing, reducing the ability of the authorities to assess risk concentrations and design and enforce regulatory constraints, such as on potentially systemically important institutions.

69. Information gaps often also hinder the policing of regulatory boundaries. For instance, there is a lack of information on "Other financial corporations" (OFCs), where typically only statistical data is available and this information only captures very basic indicators, such as the total assets of such institutions. [39] Information is missing in particular on money market mutual funds, where little is known about investment portfolios and maturities (Heath, 2013).

70. Closing information gaps requires improvements in both statistical and supervisory data. This requires not just new data, but also improvements in the granularity, frequency, and timeliness of existing data. In closing information gaps, it is important to ensure homogeneity and comparability of data at the international level and to leverage existing official databases, such as those maintained by the IMF and BIS. Consideration needs also to be given to the costs of information collection for both the financial industry and the official sector, which calls for well-targeted improvements in national and international data. The IMF/FSB/G20 Data Gap initiative and special data dissemination standard (SDDS) Plus represent important advances in this regard (see further Annex VI).

[36] See further Cerutti and others (2011), and Heath (2013).

[37] Progress is being made on collecting real estate prices, with about 64 countries reporting to the BIS.

[38] See Geanakoplos and Pedersen (2011).

[39] Data on the balance sheets of OFCs are available in the standardized reporting forms (SRFs). However, OFC data are currently reported only by 30 countries.

INSTITUTIONAL ARRANGEMENTS

This section summarizes key considerations in the design of effective institutional frameworks. Most of these were developed in existing work, notably IMF (2011a), Nier and others (2011), and IMF (2013a), and discussed by the Board on previous occasions. The section also draws on the growing country experience and staff advice provided in technical assistance, e.g., IMF (2012a).

71. A strong institutional framework is essential to ensure that macroprudential policy can work effectively. The framework needs to foster the *ability to act* in the face of evolving systemic threats, assuring access to information and an appropriate range and reach of macroprudential instruments. It needs to establish strong accountability, based on clear objectives that can guide the exercise of macroprudential powers, and strong communication to create public awareness of risks and understanding of the need to take mitigating action. It needs finally to assure *willingness to act* and counter biases for inaction or insufficiently timely action that can arise from difficulties in quantifying the benefits of macroprudential action, and are often exacerbated by lobbying by the financial industry, political pressures, and the need for coordination among agencies.[40]

A. Macroprudential Powers

72. Where financial systems evolve dynamically, limiting systemic risk requires powers to foster the ability to act. Where linkages with the real sector and between financial institutions change with time, a macroprudential policymaker requires powers to adjust its approach accordingly. Powers are needed to ensure the policymaker can obtain the necessary information; influence the strength of regulatory constraints placed on the financial system; designate individual institutions as systemically important; and initiate changes in the regulatory perimeter to expand the reach of macroprudential policies to collectively important providers of credit and liquidity (IMF, 2011a).

73. The strength of such powers can vary and be

- "hard" (direct), enabling the policymaker to have direct control over the calibration of specific macroprudential tools,
- "semi-hard," enabling the policymaker to make formal recommendations, coupled with a 'comply or explain' mechanism, or
- "soft," enabling the policymaker to express an opinion, or a recommendation that is not subject to comply or explain.

Each type of power can be useful and the effectiveness of the policy frameworks can benefit from a combination of these powers.

[40] As set out in IMF (2011a), the benefits of action accrue in the future and are highly uncertain, while the costs of imposing macroprudential constraints are felt immediately, by both borrowers and providers of funds. As a result, macroprudential policy is subject to strong lobbying and political pressures.

74. Hard powers are usefully assigned over the calibration of a well-defined set of macroprudential tools.[41] Such powers can avoid delay and other frictions in implementation that arise when there is a need for cooperation by other policymakers. They will therefore often be considered in particular for tools that control the rapid build-up of risks in the time dimension. Direct powers can also increase effectiveness of policy since they enable the policymakers to communicate credibly with the financial markets. Direct powers over a well-defined set of tools provide the macroprudential policymaker with a "stick" that she can credibly threaten to use.

75. The advantage of a power to recommend actions, coupled with a 'comply or explain' mechanism, is that it is broad. Recommendations can be used to influence the whole range of regulatory actions that can be taken by other supervisory and regulatory agencies. In particular such recommendations may be used to address the structural component of systemic risk, where macroprudential interventions may be less frequent, or where implementation requires further judgment by the supervisory agency. The 'comply or explain' mechanism is important for effectiveness since it increases the chance of compliance and ensures transparency and public accountability as regards cooperation by other agencies. When separate supervisory agencies can point to the recommendation by the macroprudential authority this can also strengthen their hand and help overcome industry opposition or political pressure.

76. Soft powers are useful to extend the influence of the macroprudential policymaker beyond existing prudential tools. A soft recommendation is appropriate when the macroprudential policymaker addresses the legislature to initiate the establishment of new macroprudential tools, or changes in the legal framework to extend the regulatory perimeter. Soft tools, such as 'opinions' can also be appropriate when the macroprudential policymaker is concerned that the build-up of systemic risk is fed by broader macroeconomic imbalances. They can then be used by the macroprudential authority to urge policy action by the government to contain such imbalances. However, soft powers alone are unlikely to be sufficient to ensure the effectiveness of the overall policy framework.

77. Information collection powers need to complement powers over policy tools. Information collection powers are needed to close information gaps. In order to avoid duplicative costs on the financial industry, the macroprudential authority should seek to obtain information that is available to other agencies and legal impediments to such exchange of information will often need to be reviewed. Since financial activity can migrate in response to regulation in unintended ways, the policymaker needs to have the power to collect information beyond the regulatory perimeter. It can therefore be useful to establish a broad back-up power that enables the authority to collect information directly from financial firms, such as provided to the Office for Financial Research in the United States.

B. Objectives and Accountability

[41] Hard powers can also be useful for the designation of systemically important institutions, as provided to the Financial Stability Oversight Council (FSOC) in the U.S.

78. The exercise of macroprudential powers needs to be guided and constrained by a well-defined objective. This can form the basis for a framework to hold the policymaker accountable for achieving the objective. A well-defined objective can also guard against the risk of abuse of macroprudential policy, and its use as a substitute to escape more difficult policy choices in other policy areas, such as fiscal and structural policy.

- The objective can articulate the scope of responsibilities of the macroprudential policymaker in both the time and structural dimension. For instance, it might specify that the policymaker should (i) ensure the overall resilience of the system; (ii) contain risks from unsustainable increases in credit, leverage and asset prices; and (iii) contain structural risks from inter-linkages within the financial system.
- To help ensure that the macroprudential policymaker recognizes trade-offs in the pursuit of financial stability, it can be appropriate to specify secondary objectives, such as the need to maintain the contribution of the financial system to the long-run growth of the economy, or the need to protect the interests of depositors.

79. In addition to a well-defined objective, an accountability framework can include a range of communication tools. Such tools can help the public to establish whether the authority is taking appropriate action to achieve its objective. They can also influence the conduct of the macroprudential policymaker in ways that foster the effective pursuit of the objective.

- Publication of a policy strategy. The framework can encourage the development and publication of a policy strategy that the decision-maker intends to follow in the deployment of specific macroprudential tools over which it has direct control. Such a strategy can generate a degree of commitment by setting out under what conditions these tools would be employed.
- Record of meetings. Where policy decisions are made by a macroprudential committee, the framework can specify the publication of a record of the meetings of the committee that establishes transparency on issues discussed and clarity as regards the votes cast by members on policy decisions.
- Periodic reports. A basic mechanism is a requirement to publish periodic reports on the activities of the macroprudential policymaker, including an assessment of risks and policy actions taken to mitigate the risks.

C. Assignment of the Mandate

80. To strengthen 'willingness to act,' it is important that the macroprudential mandate is assigned to *someone*, a body or a committee (IMF, 2011a). Where a clear assignment is lacking, collective action problems lead to underinvestment in systemic risk identification and mitigation across agencies and reduce accountability, since in the end *no one* is fully responsible for the crisis outcome.

81. It is desirable for the central bank to play an important role in macroprudential policy (IMF, 2011a; Nier and others, 2011; IMF, 2013a; Viñals, 2011). This can harness the expertise of the central bank in systemic risk identification and its incentives to ensure macroprudential policy is

pursued effectively. It can also help shield macroprudential policymaking from political interference that can slow the deployment of tools or bias their use toward other objectives.

82. In practice, these two basic principles lead to the increasing prevalence of three models for macroprudential policymaking:

- **Model 1:** The macroprudential mandate is assigned to the central bank, with macroprudential decisions ultimately made by its Board (as in the Czech Republic).
- **Model 2:** The macroprudential mandate is assigned to a dedicated committee within the central bank structure (as in the U.K.).
- **Model 3:** The macroprudential mandate is assigned to a committee outside the central bank, with the central bank participating on the macroprudential committee (as in Australia, France and the U.S.).

83. The choice of model in any given country will often be driven strongly by traditions as well as political economy considerations. This includes importantly the perceived need for checks and balances in the conduct of macroprudential policy. In addition, the existing arrangements for monetary and supervisory policy as well as legal (constitutional) constraints are likely to play a strong role in shaping the arrangements. The pros and cons of each model, and mechanisms to address the drawbacks of each model are examined in more detail in Nier and others (2011).

84. Model 1 is a natural choice in highly integrated arrangements where the central bank already concentrates the relevant regulatory and supervisory powers. Where supervisory and regulatory agencies are established outside the central bank the assignment of the mandate to the central bank is usefully complemented by coordination mechanisms, such as a coordination committee chaired by the central bank.

85. Model 2 can help counter the risk of dual mandates for the central bank, by creating dedicated decision-making structures for monetary and macroprudential policy even as both functions are under the roof of the central bank. It also allows for participation of separate supervisory agencies and external experts on the decision-making committee. This can foster an open discussion of trade-offs that brings to bear a range of perspectives and helps disciplining the powers being assigned to the central bank.

86. Model 3 can more easily accommodate a desire for a strong role of the Ministry of Finance (MoF). Participation of the MoF can be useful when changes in legislation are needed to expand the macroprudential toolkit or the regulatory perimeter. However, a dominant role of the MoF risks delaying macroprudential action and can compromise the independence of participating agencies, including the central bank and separate supervisory agencies (Nier and others, 2011). Some of these risks can be countered by assigning the central bank the chairmanship (as in Australia), a strong voice (as in Mexico) or a veto over policy decisions (as in Germany). They can also be countered by establishing only soft powers for the decision-making committee.

87. More generally 'willingness to act' can be driven by the governance of the decision-making committee, including its voting arrangements. In principle, it is desirable for a

macroprudential committee to seek a consensus. However, a formal requirement for unanimity assigns a veto to each of the members of the committee and risks paralyzing macroprudential policy. Simple or qualified majority arrangements can strike a better balance between the need to avoid delay and the need to ensure that the committee has taken full account of trade-offs and different perspectives.

MULTILATERAL ISSUES

This section offers a discussion of multilateral issues arising in the application of macroprudential policies. It provides a conceptual analysis of the range of these issues and considers potential solutions, drawing on initial considerations set out in IMF (2011a), IMF (2012d), FSB, IMF, and World Bank (2011) and the work of international standards setters to date.

88. In a financially integrated world, effective macroprudential policy requires a multilateral perspective. Collective action problems occur not just at the national but also at the international level. And even when each country's macroprudential policy is optimal at the national level, the overall combination of macroprudential policies may be suboptimal when financial cycles are not synchronized across countries, or systemic intermediaries can evade policy actions taken by national authorities.

89. Financial integration poses a range of specific challenges for the effectiveness of national macroprudential policies.

- First, lack of forceful macroprudential action in one country can increase the likelihood of crises, imposing negative externalities on other countries.
- Second, national policies to contain risks from a rapid build-up of domestic credit can lead to an increase in the provision of cross-border credit.
- Third, policies to strengthen the resilience of systemic institutions in one country can cause their activities to migrate to other countries.
- Fourth, where financial institutions have affiliates in multiple jurisdictions, this complicates the assessment of systemic risk and can lead to conflicts between home and host authorities.

A. Lack of Action

90. Lack of forceful macroprudential action in one country can increase the likelihood of crisis and imposes negative externalities on other countries. There has been a rapid increase in trade and financial linkages across countries over the past few decades (Annex VII). This means that when a financial crisis erupts in one country, negative trade and particularly financial spillovers are felt across regions or even globally. A lack of preventive macroprudential action to contain the build-up of systemic risk can then impose substantial costs on other countries.

91. Strong institutional frameworks at the national level are essential to address biases in favor of inaction. Macroprudential policy is subject to a strong bias in favor of inaction or

insufficiently timely and forceful action as risks are building up (IMF 2011a). These can be countered by establishing appropriate powers, strong accountability and the appropriate assignment of the macroprudential mandate. Since strong national mandates can contribute to both domestic and global stability, the IMF is promoting the establishment of such mandates across its membership, and is providing advice through FSAPs and technical assistance (e.g., IMF, 2012a).

92. National frameworks can be buttressed by international guidance and surveillance (IMF 2011a). 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. The Fund is in a unique position, through its existing programs of surveillance, FSAPs, and technical assistance, to help countries conduct an in-depth assessment of systemic risks, and to advise on preventive macroprudential action in the light of this assessment. Such surveillance can strengthen the hands of national macroprudential authorities in the face of opposition and increase their resolve to take potentially unpopular risk mitigating action.

B. Need for Coordination—Action in the Time Dimension

93. National policies in the time-dimension that are designed to contain risks from a rapid build-up of domestic credit can lead to an increase in the share of credit provided across borders. Cross-border arbitrage can occur through direct cross-border lending and lending by foreign branches, and through a "rebooking" of loans, whereby credit is originated by subsidiaries, but then booked on the balance sheet of the parent institution. These "leakage" effects are well documented empirically (Aiyar and others, 2012) and have complicated macroprudential policies in a number of countries ahead of the crisis (e.g., Bulgaria and Croatia).

94. Addressing cross-border arbitrage calls for "reciprocity" in the imposition of macroprudential action. This ensures that the same constraint is imposed on all relevant credit exposures to borrowers in a given country, whether credit is provided by domestic or foreign entities. Reciprocity is enshrined in the Basel III agreement on the CCB and calls for full cooperation by the home authorities, such that when the CCB is activated in any given country, all countries are meant to apply the buffer to exposures into that country (Annex VIII explains this in more detail).

95. While reciprocity for the countercyclical capital buffer is an important advance, further work may be necessary to expand the scope of reciprocity. In particular, where countries are concerned about the build-up of risks in particular segments of the credit market, such as mortgages or corporate credit, they may want to impose more targeted sectoral measures, such as increases in capital requirements (risk weights) for lending to such segments. However, there is currently no international agreement that would call for reciprocity with regard to sectoral measures, or risks taken in securities markets, while the strength of implementation of reciprocity for the CCB remains untested.

96. In the absence of reciprocity, there is a risk that countries resort to unilateral imposition of capital controls to increase effectiveness of macroprudential actions. However, these measures come with their own distortions. Moreover, since the riskiness of cross-border

banking flows increases in the absence of reciprocity, it is in the interests of the home authorities to reciprocate the macroprudential action. International agreements are therefore usefully supplemented by bilateral and regional arrangements. This can help ensure that reciprocity applies with full force and across the range of tools that are needed to contain the build-up of risks in the time dimension.[42]

C. Need for Coordination—Action in the Structural Dimension

97. Policies to strengthen the resilience of systemic institutions in one country can cause their activities to migrate to other countries. Authorities in each country may want to impose measures to increase the resilience of systemically important institutions, such as capital surcharges for such institutions. However, each jurisdiction may fear that these institutions relocate or that they move their activities to other countries, reducing jobs and tax revenue. This can lead to a race to the bottom in the application of such measures and greater concentration of risky activities in less strictly regulated jurisdictions.[43]

98. In principle, this issue can be addressed by international agreements and guidance. An important advance is the determination of capital surcharges for global systemically important financial institutions (G-SIFIs) by the FSB. In addition, 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.

99. However, such guidance leaves considerable room for national discretion in the application of a framework for dealing with risks from systemically important institutions. Guidance issued by standard setters is usefully complemented by surveillance that can help the authorities assess risks and the need for mitigating action. Such surveillance can also help internalize the costs of failure that are borne in other countries, such as when financial institutions have cross-border subsidiaries and branches that are systemic in the host country.

D. Need for Coordination—Home-Host Issues

100. Where financial institutions have affiliates in multiple jurisdictions, this can lead to conflicts between home and host authorities (FSB, IMF, and WB, 2011).

- Macroprudential actions taken by the *home country* to improve resilience, such as the imposition of strict liquidity requirements or loan-to deposit ratios, can lead to undesirable deleveraging in the host country.

[42] For instance, the European Systemic Risk Board (ESRB) has recommended reciprocity for measure to address risks from lending in foreign currencies in the European Union (EU). The home supervisor of financial institutions are recommended to impose measures addressing foreign currency lending at least as stringent as the measures in force in the host jurisdiction where they operate through provision of cross-border services or through branches.

[43] This issue is well-recognized in the literature. See, for example, Acharya and others (2009), Houston and others (2012), and Karolyi and Taboada (2013).

- *Lack* of action by *home authorities* can lead to spillovers when affiliates are systemic in the host country but this is not taken into account in the supervisory approach taken by the home authority.
- Macroprudential actions taken by the *host country* to constrain systemic risk of foreign branches or subsidiaries can impose costs and a loss of efficiency at the level of the banking group, such as when capital and liquidity are required to be held in and "ring-fenced" by the host country.[44]

101. Where financial institutions operate across multiple borders this complicates the assessment of systemic risk for the home and the host authorities, as well as globally. In countries with a high share of foreign banks and in the absence of information on parent institutions and their exposures, it is difficult to assess domestic systemic risk. Foreign branches, in particular, can become "shadow banks" for the host supervisor.

102. These issues require bilateral and multilateral coordination and consultation. Supervisory colleges can facilitate information exchange among regulatory authorities. They can also foster recognition and understanding of home-host interdependencies. However, they may not overcome the present impediment that national authorities often do not have incentives or even a legal mandate to take full account of the effects of their actions on financial stability in other countries. [45]

E. Multilateral, Regional and Bilateral Solutions

103. Although the case for a cross-border perspective in the application of macroprudential policies appears clear, major challenges still lie ahead. The way forward may be a combination of multilateral, regional and bilateral approaches.

- **Multilateral approaches** can be based on international agreements or standards, such as the Basel framework. However, the development of international standards is a slow process, and it cannot take full account of local conditions. It therefore needs to be supplemented by surveillance that promotes a faster response to the evolving nature of systemic risk.
- **Regional coordination** is essential for countries belonging to highly integrated regional financial systems. Where cross-border financial activity is promoted, as part of a single market, or required, as in a currency union, this requires dedicated institutional mechanisms to deal with the associated cross-border challenges.[46] Examples of such regional coordination mechanisms

[44] These considerations extend to "structural measures" that may be taken by one country but impose costs also for the home country of the local affiliates. See further Viñals and others (2013).

[45] Ex ante agreed cooperation in the application of national resolution powers is a key mechanism to reduce systemic spillovers from the failure of systemically important institutions. The recent agreement between the Federal Deposit Insurance Corporation (FDIC) and the BoE provides an example. See FDIC and BoE (2012).

[46] In currency unions, in particular, it is important that macroprudential policy is differentiated across countries belonging to the union. This is turn requires strong mechanisms for regional coordination to avoid effectiveness being undermined by cross-border arbitrage (IMF, 2013a).

are the ESRB[47] and the Nordic-Baltic Macroprudential Forum.[48] There can also be more ad-hoc structures organized to deal with specific problems, such as the "Vienna initiative."[49]

- **Bilateral approaches** require strengthening home-host cooperation in the macroprudential field. Forms of this cooperation may differ, ranging from the cooperation in relation of individual institutions (as in supervisory colleges), to bilateral agreements that coordinate macroprudential measures of the countries involved.

CHALLENGES AND THE ROAD AHEAD

104. This paper has charted the progress made over the past few years in establishing macroprudential policy frameworks. The analysis has drawn on a number of country experiences, as well as the analytical advances that are being made to help policymakers decide whether and when to act and how to use macroprudential tools effectively.

105. The paper has also pointed to a number of important challenges and limitations of macroprudential policy.

- Detecting systemic risk will remain inherently difficult, even as progress is being made in developing quantitative approaches.
- Calibrating macroprudential tools is challenging in the face of uncertainty over the transmission of macroprudential tools.
- Achieving strong governance is difficult when success is not easily measurable, but costs are more immediate.
- Biases in favor of inaction over action are compounded by financial lobbying, political interference and public opposition.[50]
- Communication challenges arise even as some elements (e.g., periodic reports, etc.) can be borrowed from monetary policy frameworks.
- Macroprudential policies are prone to being be circumvented, both at the national level (boundary problem) and through cross-border arbitrage (leakage problem).

[47] IMF (2013c) provides a description of the ESRB framework.

[48]The Nordic-Baltic Macroprudential Forum was set up in 2011. It meets twice a year at the level of the central bank governors and heads of supervision of the participating countries, to discuss macroprudential issues relevant to the Nordic-Baltic region.

[49] See http://vienna-initiative.com.

[50] These issues are a greater concern than for monetary policy, since the costs of targeted macroprudential action will fall predominantly on the financial industry, or on specific groups of households and corporations (Nier and others 2011, Blanchard and others 2013).

- Flexible use of tools is required to keep pace with developments in the financial sector, but this can conflict with political and legal traditions.
- Closing information and regulatory gaps is necessary, but challenging, and will often require legislative change.
- In a financially integrated world, multilateral coordination of policies is desirable, but is not easily achieved where the incentives of home and host authorities are not aligned.

106. As experience with the use of macroprudential tools accumulates over the next few years, further research can guide policy. As experience accumulates this can form the basis of further research, including on the mapping of risk indicators to policy responses, the strength of transmission of specific macroprudential tools, and the effects of combining tools for the ultimate objective of reducing the probability and depth of crises.

107. Policymakers need to engage with challenges and avoid pitfalls in the design and application of macroprudential policy.

- **Policymakers should not be lulled by apparent macroeconomic stability.** Financial imbalances often grow in the background and under the surface of apparent economic tranquility, and need not translate into inflationary pressures.
- **Policymakers should not be led to believe that any one quantitative approach is sufficient for systemic risk assessments.** They should be aware of the limitations of present techniques used for stress testing and network analysis in capturing the full dimension of systemic risks. A range of methods and indicators need to be combined and complemented with qualitative information, based on market intelligence, and sound analysis of real imbalances.
- **Policymakers should not over-rely on a single tool.** The countercyclical buffer will be established by way of implementing Basel III in many countries. However, effective mitigation of systemic risk requires use of interlocking tools in both the time and structural dimension.
- **The policy framework should not overburden macroprudential policy.** Macroprudential policy cannot cure all ills. For it to make a contribution to macroeconomic stability, its objectives need to be defined clearly and in a manner that can form the basis of a strong accountability framework.
- **Macroprudential policy needs to be complemented by strong macroeconomic policies.** Prudential policies alone are unlikely to be effective in containing systemic risk driven by real imbalances. Macroeconomic policies including monetary, fiscal and structural policies are needed to correct these.
- **Macroprudential policy should not be expected to prevent all future crises.** Policymakers need to accept that crises will continue to occur and be prepared to manage these crises through appropriate policies.

THE ROLE OF THE FUND

108. The Fund is in a unique position, in cooperation with international partners and national authorities, to help its members establish effective macroprudential policies. With its mandate to promote the effective operation of the international monetary system; its near universal membership; a breadth of expertise that spans macroeconomic and financial stability analysis; and a focus on analyzing members' domestic policy mix and policy coordination across countries, the Fund has a key role to play. In partnership with the FSB and country authorities, the Fund can help its member meet the range of practical challenges arising in establishing well-functioning macroprudential policy, thereby ensuring that macroprudential policy can contribute effectively to domestic macroeconomic stability, and that national macroprudential policies 'add up' to contribute to global financial stability.

109. The Fund can help national authorities assess macro-financial risks and advise on the appropriate policy tools to address these risks. The Fund has stepped up its analysis of macro-financial risks and uses its existing surveillance and technical assistance instruments, including Article IV consultations, mandatory financial stability assessments and the FSAP, to advise on the policy response. In line with the Integrated Surveillance Decision (ISD), surveillance focuses on the impact of individual countries' economic and financial policies on countries' own stability and the actual or potential spillover effects of individual countries' policies on global stability. In particular, the macroeconomic and macroeconomically relevant structural aspects of monetary, fiscal and financial sector policies of individual countries are always the subject of bilateral surveillance. As part of its multilateral surveillance the Fund would also focus on and discuss with member countries actual or potential spillovers that may significantly impact global stability, including alternative policy options that would minimize the adverse impact of spillovers on global stability. More generally, the goals are to enhance the complementarity between monetary, macroprudential and microprudential policies; to identify policy tools to minimize negative side effects, and to consider the cross-border effects of policies in different jurisdictions.

110. The Fund can help ensure appropriate institutional underpinnings for national macroprudential frameworks. Through its financial sector surveillance, FSAP and other technical assistance work, the Fund can help national authorities build strong institutional foundations and governance arrangements for macroprudential policies, as well the institutional capacity to operationalize macroprudential policies, in a manner that ensures effectiveness of these frameworks within the legal, political and resource constraints faced by the authorities.

111. The Fund can help close data gaps that impede the analysis of macro-financial linkages and interconnectedness both at the national and global level. Through the IMF/FSB/G-20 Data Gap initiative, SDSS and SDDS Plus, increased prominence is being given to data for monitoring the build-up of sectoral risks and cross-border financial linkages. Work has begun on mapping global flows of funds and better capturing data on shadow banking. Important progress is also being made in capturing data on G-SIFIs that will, with time, enhance the ability of macroprudential authorities

to analyze systemic risks. Staff is also being encouraged, in the context of Article IV consultations, to highlight data gaps that inhibit assessments of financial stability.

112. The Fund can become a global macroprudential facilitator. This involves continued and increased efforts in the following areas.

- Acting as a global risk advisor, through the Fund's risk assessment work and its multilateral surveillance (including Global Financial Stability Report (GFSR), World Economic Outlook (WEO), Early Warning Exercise (EWE) and spillover work) which can demonstrate how global systemic risks transmit to individual countries.
- Ensuring that the stability and spillover implications of macroprudential policies are discussed in the context of Fund surveillance.
- Conducting further rigorous research into macro-financial linkages and the transmission and effectiveness of macroprudential policies, drawing on the research expertise available at the Fund and growing data on the use of such measures around the world.
- Helping national authorities to develop the capacity to monitor and assess systemic financial risks and to operationalize macroprudential policy.
- Promoting the effort to close data and information gaps, notably through the IMF/FSB/G20 data gaps initiative, in order to improve the ability of macroprudential authorities to detect the emergence of systemic risk and ensure effective bilateral and multilateral surveillance.
- Providing a range of international fora for dialogue and exchange of experiences with macroprudential policies, given the novelty of national frameworks and diversity of approaches taken. Examples include the annual Financial Stability and Systemic Risk Forum (launched this year) and the High-level Policy Roundtables (organized around the Spring and Annual Meetings).
- Promoting regional cooperation and understanding, including through co-sponsoring of regional conferences on macroprudential policies, and engaging with regional macroprudential bodies and groups, such as the ESRB.
- Collecting, consolidating and disseminating information on policies, including by establishing a new database on macroprudential instruments.

ISSUES FOR DISCUSSION

113. Do Directors agree with the analysis and conclusions of the paper, and that they can provide a basis for the Fund's advice on macroprudential policy? Do Directors agree that the Fund should play a key role, through its bilateral and multilateral surveillance and in collaboration with standard setters and country authorities, to help ensure the effective use of macroprudential policy for domestic and global stability?

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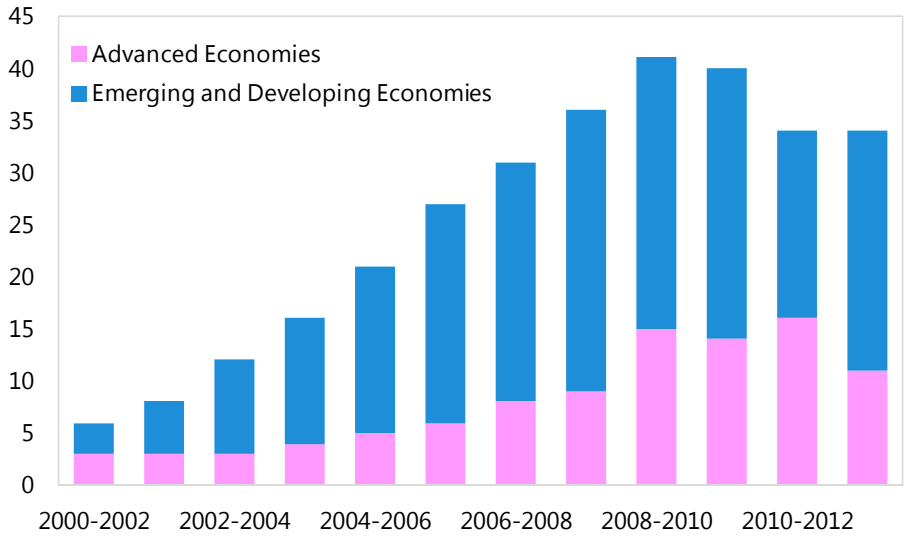
Annex I. Macroprudential Tools and Institutional Arrangements[51]

114. Both emerging and advanced economies use macroprudential tools to reduce various sources of systemic risks (see Annex III for further details). A dataset on macroprudential polices compiled by Lim and other (2013) suggests that over the last ten years there was an increasing use of macroprudential tools (Figure 6). EMEs have been using a broad range of tools to target risks from housing market, credit growth foreign indexed loans and foreign currency mismatches. An increasing number of advanced economies have also implemented macroprudential tools, often to target systemic risk in mortgage and housing markets (examples include Canada, Hong Kong, Israel, Netherlands, Norway, Singapore, Switzerland and Sweden).

Figure 6. Introduction/Changes of Macroprudential Tools

(Number of countries)



Source: IMF staff based on Lim and others (2013).
Note: Each column represents number of countries that implemented or changed a macroprudential instrument over a rolling three-year period.

115. Since the 2008 crisis, a number of countries have also made changes to the institutional arrangements for macroprudential policy. Some of the most recent examples include:

- **U.K.:** An independent FPC at the BoE was established on April 1, 2013. The committee is charged with a primary objective of identifying, monitoring and taking action to remove or

[51] Prepared by Ivo Krznar (MCM).

reduce systemic risks.[52] The FPC has a secondary objective to support the economic policy of the government.

- **European Union:** The ESRB, created at the end of 2011 as a macroprudential authority of the EU, has played a key role in providing guidance on national macroprudential frameworks, to ensure that macroprudential policy is operational in all member states. A number of EU countries have started to develop their macroprudential institutional arrangements in line with ESRB recommendations.[53] For example, in Germany, a Financial Stability Committee was established in March 2013, consisting of the ministry of finance, the central bank, the federal financial supervisory authority and the financial market stabilization agency, with the central bank playing the leading role.[54]

- **South Africa:** The 2011 proposal that would introduce a "twin peaks" model of financial regulation includes the granting of an explicit mandate to the central bank to oversee and maintain financial stability. Moreover, the Financial Stability Oversight Committee, chaired by the central bank, would facilitate information sharing between agencies and would have a power to make recommendations to relevant agencies on a comply or explain basis.

- **Korea:** A formal Macroeconomy and Finance Meeting was newly set up in July 2012, with four agencies as members–the Ministry of Strategy and Finance (head), the Bank of Korea, the Financial Services Commission, and the Financial Supervisory Service. While each agency conducts its primary policy independently, the committee assesses external and domestic systemic risks and coordinates the use of macroprudential instruments.

- **New Zealand:** In May 2013, a memorandum of understanding (MOU) was signed between the ministry of finance and the central bank to provide governance arrangements for the use of four new macroprudential tools (LTVs on mortgage credit loans, CFR, a CCB, sectoral capital requirements). Under the MOU, the central bank should consult the Minister of Finance ahead of the any macro-prudential policy decision. However, final policy decisions would be made independently by the Reserve Bank.

[52] The FPC can make recommendations to any institution including to the Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA) on a comply or explain basis. It also has a power to direct those regulators to adjust specific macroprudential tools.

[53] The guidance recommends that central bank should play a key role in macroprudential policy.

[54] The central bank is tasked with systemic risk monitoring. It also suggests respective warnings or recommendations for corrective measures, and submits such warnings or recommendations to the Financial Stability Committee.

Annex II. Identification and Measurement of Systemic Risk

Table 1. Identification and Measurement of Systemic Risk[1, 2, 3]

Tools	Coverage			Data Requirements		Applicability across Countries			Applicability across Questions						Additional Characteristics					Form of Publication	Main Reference
	Institutions	Markets	Sectors	Frequency	Type of Data	Low Income	Emerging	Advanced	A	B	C	D	E	F	Thresholds	Early Warning	Impact of crisis	Amplification	Spillovers/Interconnectedness		
1. Conditional Value at Risk (CoVaR)	Y		Financial	High	Asset prices and balance sheet data	Limited	Y	Y	Y			Y			Y	Y	Y			Y	W	Adrian & Brunnermeier, 2010
2. Joint Distress Indicators	Y		Financial	High	Asset prices		Limited	Y	Y			Y	Y			Y	Y			Y	W	Segoviano and Goodhart, 2009
3. Returns Spillovers	Y		Financial	High	Asset prices	Limited	Y	Y	Y			Y			Y	Y	Y			Y	P	Diebold and Yilmaz, 2009
4. Distress Spillovers	Y	Y	Financial	High	Asset prices	Limited	Y	Y	Y		Y		Y			Y	Y			Y	P	Chan-Lau, Mitra and Ong, 2009
5. Market-Based Probability of Default	Y		Financial and corporate	High	Asset prices and balance sheet data	Limited	Y	Y	Y							Y					O	Kealhofer, 2003
6. Debt Sustainablity Analysis			External and public	Low	BoP and fiscal data	Y	Y	Y			Y	Y			Y		Y				F	IMF, 2002 and 2003
7. Indicators of Fiscal Stress			Fiscal	Low	Fiscal	Y	Y	Y		Y					Y	Y						Baldacci, McHugh and Petrova , 2011
8. Sovereign Funding Shock Scenarios		Y	Financial and public	Medium	Investor base and bank asset		Y	Y	Y		Y				Y		Y				W	Arslanalp and Tsuda, 2012
9. Asset Price Models		Y		Medium	Asset prices and cash flow data	Limited	Limited	Y	Y	Y		Y			Y	Y		Y			F	IMF-FSB, 2010
10. Balance Sheet Approach			All main sectors	Low	Sectoral balance sheet data	Y	Y	Y			Y	Y				Y		Y	Y		W	Allen, Rosenberg, Keller et al, 2002
11. Systemic Contingent Claims Analysis	Y		Financial	High	Asset prices and balance sheet data	Limited	Y	Y	Y		Y	Y	Y	Y		Y	Y			Y	P	Gray and Jobst, 2011

Table 1. Identification and Measurement of Systemic Risk (concluded)

Tools	Coverage			Data Requirements		Applicability across Countries			Applicability across Questions						Additional Characteristics					Form of Publication	Main Reference
	Institutions	Markets	Sectors	Frequency	Type of Data	Low Income	Emerging	Advanced	A	B	C	D	E	F	Thresholds	Early Warning	Impact of crisis	Amplification	Spillovers/Interconnectedness		
12. Cross-Border Interconectedness	Y		Banking	Low	Cross-border banking exposure and balance sheet data	Limited	Y	Y	Y				Y		Y	Y	Y			Y	W	Cihak, Munoz and Scuzzarella, 2011
13. Cross-Border Network Contagion	Y		Banking	Low	Cross-border banking exposure and balance sheet data	Limited	Y	Y	Y				Y				Y			Y	W	Espinosa-Vega and Sole, 2010
14. Systemic Liquidity Risk Indicator	Y		Financial	High	Asset prices and balance sheet data		Limited	Y		Y				Y			Y				W	Severo, 2012
15. Regime switching		Y	Financial	high	Asset prices	Y	Y	Y	Y					Y	Y	Y	Y				W	González-Hermosillo and Hesse, 2009
16. Financial Soundness Indicators	Y	Y	Financial, corporate and household	Low	Cash flow and balance sheet data	Y	Y	Y	Y			Y	Y			Y					F	IMF, 2006
17. Bank HEalth Assessment Tool (HEAT)	Y		Financial	Low	Balance sheet	Y	Y	Y	Y							Y					W	Ong, Jeasakul and Kwoh, 2012
18. Thresholds Model			Financial	Low	Macroeconomic data	Y	Y	Y	Y	Y			Y	Y	Y	Y			Y		F	Borio and Drehmann, 2009
19. Macro Stress Tests	Y		Financial		Asset prices and balance sheet data	Limited	Y	Y	Y		Y	Y	Y				Y	Y			F	Moretti, Stolz and Swinburne, 2008
20. GDP at Risk			Real, financial	Low	Asset prices and macroeconomic data	Y	Y	Y	Y			Y			Y	Y	Y	Y			P	De Nicolo and Lucchetta, 2010
21. Credit to GDP-Based Crisis Prediction Model			Financial	Low	Macroeconomic data	Limited	Y	Y	Y	Y	Y			Y	Y	Y					W	Lund-Jensen, 2012
22. Crisis Prediction Model			Financial and public	Low	Macroeconomic data	Limited	Y	Y	Y	Y	Y			Y	Y	Y					F	IMF-FSB, 2010
23. DSGE Model			Corporate and household	Low	Macroeconomic data	Y	Y	Y		Y		Y		Y			Y	Y			F	Benes and others, 2010

Source: Blancher and others (2013).

Note: 1. (Questions) **A.** Financial institutions: Is excessive risk building up in financial institutions? **B.** Asset prices: Are asset prices growing too fast? **C.** Sovereign risk: How much is sovereign risk a source of systemic risk? **D.** Broader economy: What are the amplification channels among sectors and through the domestic economy? **E.** Cross-border linkages: What are the amplification channels through cross-border spillovers? **F.** Crisis risks: What is the probability of a systemic crisis?

2. ("Y" or blank) "Y" implies that the indicator can be used for the categories; a blank implies the indicator cannot, as yet, be used for the categories unless otherwise noted.

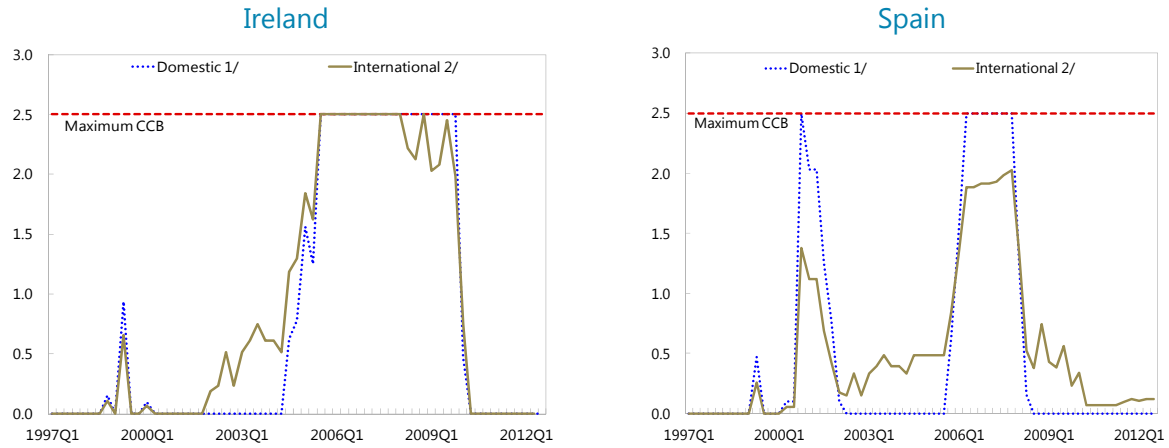
3. (Publications) P = Published in peer reviewed journal/book; W = Working paper; F = IMF policy and other multilateral surveillance papers; O = Other publications available online.

Annex III. Effectiveness of Tools in Time Dimension[55]

Countercyclical Capital Buffer

116. While the countercyclical buffer is a new tool, simulations can be used to illustrate how it would work in practice. It is considered what a small set of indicators, including the credit to GDP gap, might have signaled to the authorities in Ireland and Spain in the period before and during the crisis (Figure 7). This analysis is not a comprehensive examination of all available information that might be considered. Moreover, it is worth noting that simulation results depend on and can change substantially with different starting date of the credit gap calculation. In both cases we use 1997 as the starting date.

Figure 7. Ireland and Spain: Simulated Countercyclical Capital Buffer
(In percent of risk weighted assets)



Source: IMF staff calculation.
Note: 1/ The CCB calculated assuming Irish and Spanish bank do not have any international exposure.
2/ The CCB calculated assuming Irish and Spanish bank have international exposure.

117. Figure 7 shows the hypothetical evolution of the CCB in Ireland and Spain since 1997.[56] If the CCB had been available at the time, the additional buffer would have built up to its maximum three years ahead of the financial crisis. This suggests that the credit gap measure might be a good indicator for the activation of the CCB.

- For the case of Ireland, a simple calculation based on 2008 Tier 1 capital shows that the additional buffer would have amounted to up to a quarter of the fiscal costs of the financial crisis for the authorities. Alternatively, if raising additional capital would have been difficult for some banks, the buffer would have led to a decrease in credit growth, thereby mitigating the housing price boom.

[55] Prepared by Heedon Kang, Yitae Kim, and Ivo Krznar (MCM).

[56] For further information, see the background paper.

- In Spain, the additional capital of 2 percent prior to the crisis would have saved almost all fiscal costs of the financial crisis for the Spanish authorities (as calculated by Laeven and Valencia).[57] Moreover, the additional capital is about 70 percent larger than the estimated €24 billion in dynamic loan-loss provisioning.

Sectoral Tools

118. Table 2 and Figure 8 show that countries often make use of sectoral tools, such as sectoral capital requirements and maximum limits on loan-to-value and debt-to-income ratios. During the post financial crisis period, many advanced economies (AEs) and EMEs, such as Hungary and Norway, recently adopted these instruments as new tools.[58] Empirical analyses and country studies suggest that these measures have been found successful, by and large, in containing the risk build-up in specific sector(s).[59]

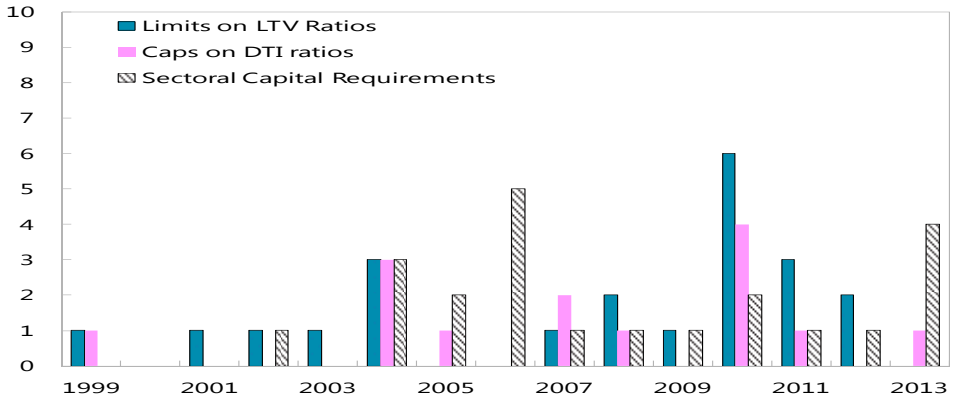
Table 2. Number of Countries with Sectoral Macroprudential Tools

	Limits on LTV Ratio	Caps on DTI Ratio	Limits on LTV and DTI ratios	Sectoral Capital Requirements	One tool	Any two tools	All three tools
Number of Countries (Total = 46)	24 (52 percent)	14 (30 percent)	14 (30 percent)	23 (50 percent)	36 (78 percent)	18 (39 percent)	7 (15 percent)

Source: IMF staff calculation.

Figure 8. Introduction of Sectoral Macroprudential Tools

(Number of countries)



Source: IMF staff calculation.

[57] This calculation assumes that losses are spread evenly across all financial institutions.

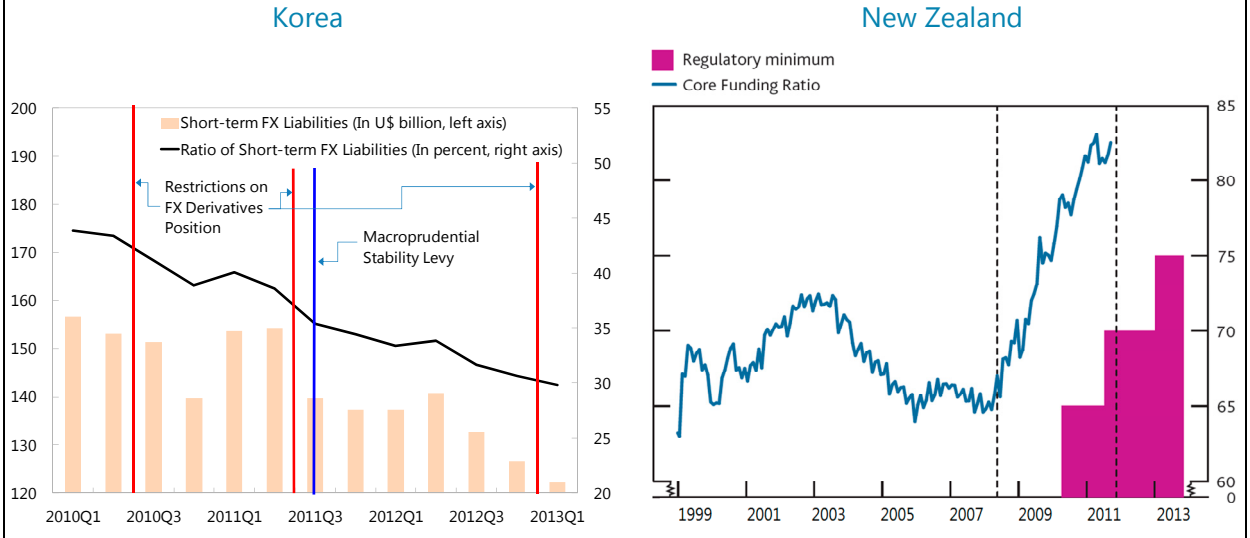
[58] Up until now, nine AEs and fourteen EMEs implemented caps on LTV ratio. Six AEs and eight EMEs adopted limits on DTI ratio, which complemented the limits on LTV ratio in all the countries except Poland.

[59] For further information, see the background paper.

Liquidity Tools

119. A few small open economies moved ahead of others to implement new macroprudential liquidity tools. These developments arise since the Basel committee is still negotiating international liquidity standards, such as the NSFR, and since these will not come into effect before 2018. For example, Korea in August 2011 introduced a price-based Pigovian tax on banks' non-core foreign currency liabilities, so called the Macroprudential Stability Levy (MSL), and New Zealand implemented from April 2010 a quantity-based minimum requirement of 65 percent core funding, the so called CFR (Figure 9).

Figure 9. Korea and New Zealand: Effectiveness of Liquidity Tools
(In percent)



Sources: Bank of Korea and IMF staff calculation.

Source: Bank of England (2011).

120. While the experience is limited, preliminary evidence suggest that liquidity tools can limit overexposure to funding shocks and also put a brake on procyclical lending.

- Korea adopted the MSL as a macroprudential tool as of August 1, 2011.[60] The measure appears to have been effective in curbing banks' reliance on short-term FX funding and in reducing vulnerabilities from FX mismatches and their links to exchange rate volatility.[61]

[60] Korea also implemented caps on the loan-to-deposits ratio (2012) to shift banks' funding structure away from wholesale funding and ceilings on banks' FX derivative positions (2010, 2011 and 2012). FX derivative positions were limited to 50 percent of capital for domestic banks and 250 percent for foreign banks' branches in June 2010, and the limits were lowered to 40 percent and 200 percent in June 2011 and were cut again to 30 percent and 150 percent in December 2012. Combining them with the levy, the authorities target both the source and the costs of the excessive dependence on short-term non-core FX borrowings, and to encourage long-term and stable sources of funding.

[61] Since these measures were brought in only recently, firm conclusions on their effectiveness would need more thorough analysis as more data become available.

Banks' short-term FX liability dropped by 9.3 percent (US$14.4 billion) in the third quarter of 2012 relative to the previous quarter.

- The introduction of a minimum CFR in New Zealand has contributed to a sharp shift away from short-term funding with maturity less than a year. By forcing banks to compete for more retail funding, or borrow in wholesale markets for terms longer than one year, it may also have had an impact on credit growth.

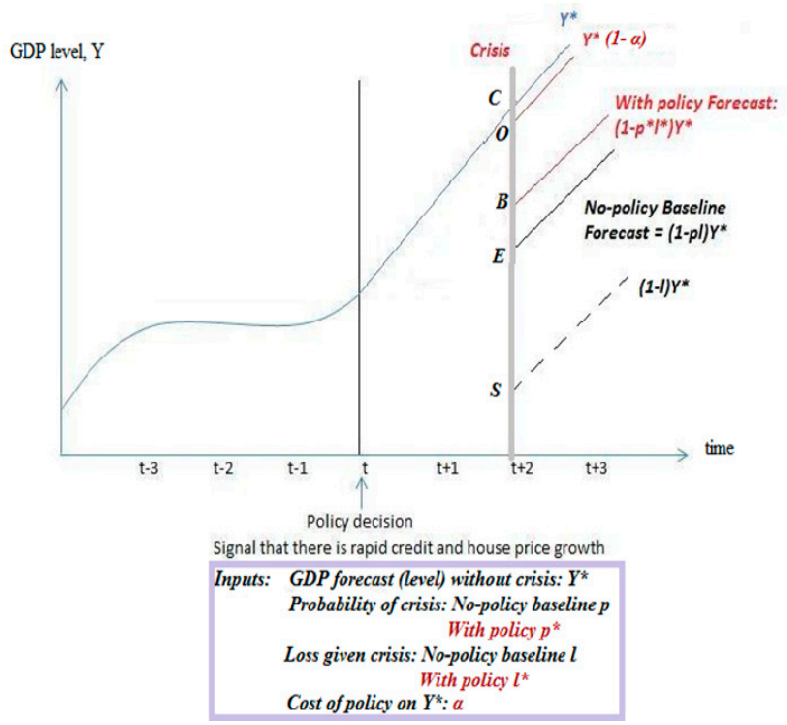
Annex IV. Evaluating the Net Benefits of Policy—Some Simple Rules of Thumb[62]

A simple, new, analytical framework for assessing the cost and benefits of macroprudential policies is laid out in Arregui and others (2013). The methodology casts net benefits in terms of parameters that can be estimated: the probability of crisis, the loss given crisis, and the cost of a policy decision. It offers some measurements and simple rules-of-thumb on each of these parameters. The Annex also shows how policy could affect these parameters.

Concepts

121. The benefits of tightening policy are in lowering the probability of crisis, *p*, and the loss in real GDP level, *l*, during crisis. In the figure, policy decision is taken at time, t, with the 2-year ahead forecast of output without crisis at *Y**. Policy is expected to bring down the probability of crisis from *p* to *p** and the loss given crisis from *l* to *l**, recognizing that it may not eliminate crisis fully.

Figure 10. Benefits of Tightening Policy



Source: Arregui and others (2013).

122. The cost arises from mis-measurement of systemic risk. If the probability of crisis was largely overestimated, then tightening policy increases intermediation costs and therefore results in lower output in the scenario that a crisis does not materialize. If there is no crisis, output will be lower than Y* by a factor α—reflecting the dampening of activity from harnessing intermediation. The no-policy baseline expected output is at E (taking into account the probability and depth of crisis) and the forecast *with* policy is at B if the probability and depth of crisis are both reduced; thus, BE is the benefit from policy. The cost of policy is the reduction in the trend from C to O in Figure 10. Thus, a policy has positive net benefits if expected output after policy, $(1-p^*l^*)(1-\alpha)Y^*$, is higher than expected output without policy: $(1-pl)Y^*$. That is, $\frac{1-p^*l^*}{1-pl}-\frac{1}{1-\alpha}>0$.

[62] Prepared by Srobona Mitra (MCM).

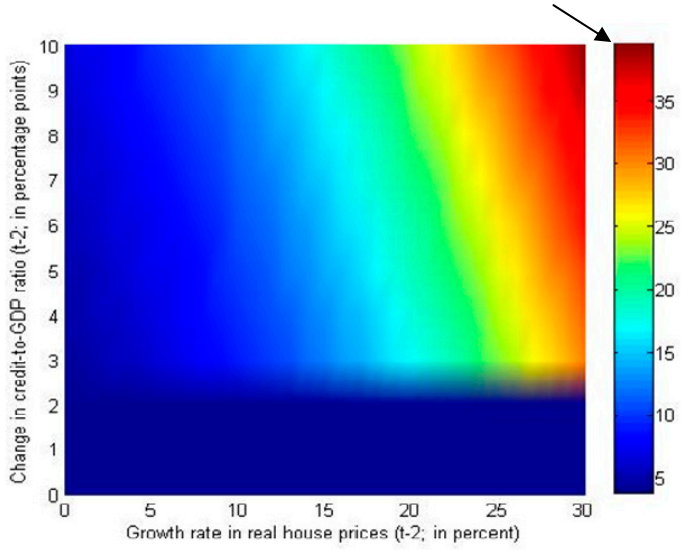
Measurements: Probability of Crisis (*p*), Output Loss in the Event of a Banking Crisis (*l*), and Cost of Policy (*α*)

123. Empirical analysis with different types of models provide rules-of-thumb estimates for *p, l* and *α*. A survey of macroprudential policy instruments in use by countries is also used to estimate the effectiveness of five different policy instruments in harnessing credit growth and other indicators.

124. A panel logit model using annual data 1970–2010 relates credit growth and house price growth to the probability of a banking crisis (Laeven and Valencia, 2010). The model allows for a non-linear effect of house price growth conditional on credit-to-GDP growth higher than 3 percentage points (see IMF, 2011b for thresholds based on noise-to-signal analysis). The rationale is that it is difficult to disentangle healthy asset price growth (one driven by productivity growth) from non-healthy ones, but policymakers should be very cautious if both house prices and (mortgage) credit are growing rapidly. In addition, all sources of credit should be included, not just the ones from banks (see Arregui and others, 2013, on how probabilities of crisis differed greatly between estimates based on bank credit growth versus all consumer credit growth from all sources).

125. The related 'heatmap' can be used to estimate the probability of a banking crisis for various combinations of credit and house price growth (Figure 11). For instance, a combination of 5 percentage point credit-to-GDP growth and 15 percent real house price growth leads to *p*=14 percent; a 6 percentage points credit growth and 20 percent house price growth pushes *p* up to 20 percent. By lowering credit growth, policies would reduce p to *p**.

Figure 11. Assessing the Probability of Crisis



Source: Arregui and others (2013).

126. Data for 10 countries and 12 crisis events show that GDP, on average falls about 8 percent per year (*l*=0.08) from the trend-level, for five years. This loss is also related to the growth in credit prior to the crisis. A cross-section model of 67 banking crises shows that a 1 percentage point higher credit-to-GDP growth is associated with a higher average yearly cost of a financial crisis of 0.6 percent in terms of trend level of GDP. By lowering credit growth, policy instruments could lower crisis costs, *l**. The paper has estimates of *l** for four policy instruments.

127. A bivariate model of the GDP level and credit-to-GDP gap for the U.S. produces medium-term forecasts of output conditional on two states of the banking sector—distress

and normal times. The cost of policies is directly related to the macro-financial linkages in the model. It shows that a 1 percent lowering of the credit-to-GDP gap lowers the GDP forecast by about 0.2 percent (α=*0.002)* if there is no banking distress. Policies that reduce credit growth would thus incur a cost on the GDP forecast if systemic risks were mis-measured. The paper also has estimates of α for four different policy instruments.

Policy Effectiveness: p* and l*

128. Actual experience with macroprudential policy instruments show that policies have been effective in reducing imbalances. Dynamic panel regressions show that LTV limits, reserve requirements and sectoral risk weights on capital can slow down credit growth; and both DTI limits and reserve requirements work towards reducing loan/deposit ratio. Moreover, the policies have prolonged impacts. The probability of crisis can be reduced from p to *p** by reducing credit growth and deducing the new *p** from the probability heatmap above. Reducing credit growth would also reduce the depth of crisis from *l* to *l**. For instance, starting with a credit-to-GDP growth of 5 percentage points and real house price growth of 15 percent, p = 14 percent (from the heatmap) and l=0.092 (9.2 percent). Capital risk weights reduce credit growth, on average across time and countries, by about 5 percentage points accompanied by lowering of real house price growth. Together, these would lower p to p*=3.8 percent, and l to l* = 0.05 percent. Gathering the p, p*, l, l* and α delivers a positive net benefits, on average, of using capital risk weights.

Annex V. Shadow Banking System and Regulatory Arbitrage[63]

129. Regulations applied to banks can be circumvented by substituting bank credit with credit from the shadow banking system which is subject to less stringent regulation. The following countries provide examples of the emergence of the shadow banking system as a response to regulatory changes.

- **Croatia:** in response to the 2003 credit growth cap implementation banks cut back on holdings of securities and on unused lines of credit (both items were included in the credit aggregate; unused lines of credit are an off-balance sheet item) and used this to offset higher growth in other categories. Moreover, banks with affiliated leasing companies encouraged clients to take leases rather than loans.

- **Korea:** circumvention of tighter limits on the LTV ratio in 2009 involved expansion of credits by non-banks (mutual credits, mutual savings banks, and credit-specialized financial institutions).

- **New Zealand:** light regulation of non-bank deposit taking finance companies (in comparison to the banking sector) was one of the factors behind their rapid growth during the first half of the 2000s.

- **U.S.:** the securitization of loans (mostly mortgages) was caused, in part, by bank capital requirements that encouraged banks to take these assets off their balance sheets. However, investment vehicles where the securitized debt was held had implicit and explicit credit and liquidity support from banks, resulting in imperfect risk transfer.

130. In response, the authorities expanded the regulatory perimeter or changed the regulation of regulated entities in order to encourage them to better manage the risks related to shadow banking activities.

- In Croatia, the 2007 credit growth cap closed the line of credit loophole by placing limits on on-balance and off-balance sheet items separately and dealt with the leasing problems by capturing funding of the leasing company within the credit limit.

- In Korea, the perimeter of LTV regulation was expanded to cover non-banks in a few months following the 2009 regulation imposed on banks.

- In New Zealand, prudential regulation of non-bank deposit taking finance companies was transferred to the Reserve Bank. Moreover, a new regulatory regime was introduced (in 2010) similar to the prudential regulation of banks covering requirements on capital, liquidity, related party exposures, credit ratings and governance and risk management.

[63] Prepared by Ivo Krznar and Heedon Kang (MCM).

- In the U.S., the FSOC was empowered to designate non-bank financial companies as systemically important, subjecting such companies to supervision and regulation by the Federal Reserve. The Dodd-Frank Act's "skin-in-the-game" credit risk retention requirement will be a major reform of the securitization market which is intended to provide sponsors with a meaningful incentive to monitor and control the quality of securitized assets and align the interests of the sponsor with those of investors. There is long experience in the United States also with regulation of margin lending in securities markets, as surveyed in Elliott and others (2013).

Annex VI. The G-20 Data Gaps Initiative[64]

131. The global financial crisis revealed key data gaps that must be addressed to facilitate financial stability analysis and smooth functioning of financial markets. To address this need, in November 2009 the G-20 economies requested the IMF and FSB to recommend data enhancements and improvements to statistical frameworks, which led to the data gaps initiative (DGI). The DGI is supported by an Inter-Agency Group (IAG) comprised of the BIS, European Central Bank, Eurostat, IMF (chair), Organization for Economic Cooperation and Development (OECD), UN, and the World Bank.

132. The G-20 endorsed the 20 recommendations of the IAG, which are designed to address and elaborate on (i) the build-up of risk in the financial sector; (ii) cross-border financial linkages; (iii) vulnerability of domestic economies to shocks; and (iv) improve communication of official statistics. The DGI has progressed on many fronts—detailed in several progress reports—and has gained traction among the G-20 countries (http://www.imf.org/external/np/g20/pdf/093012.pdf). The availability and broader dissemination of internationally comparable data have increased through the establishment of a set of Principal Global Indicators, which include data on key economic and financial statistics for the G-20 and other economies with systemic financial sectors (http://www.principalglobalindicators.org/default.aspx).

133. The DGI also supports other data initiatives. These include the FSB work on shadow banking and legal entity identifiers, and the G-20 Action Plan on Local Currency Bond Markets. The DGI underpinned the IMF's 2011 Triennial Surveillance Review and the strengthening of the Fund's Data Standards Initiatives, in particular, through the establishment of a third tier, the SDDS Plus. The SDDS Plus builds directly onto to the foundation laid by the DGI and commits "adherents" to rigorous dissemination standards for coverage, periodicity, and timeliness, of time series data.

134. In addition, there is regular engagement with G-20 member countries. STA undertakes regular bilateral visits on the DGI to G20 member countries, and organizes regional conferences and high-level events, such as the High Level Forum on Statistics and Financial Stability that will take place in November 2013.

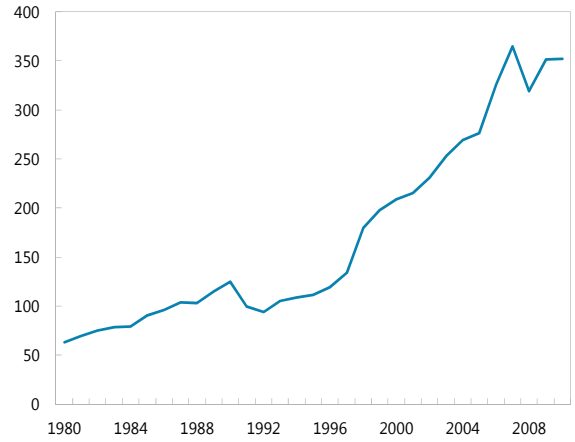
135. **The DGI is evolving, with an active work program but data challenges remain.** These challenges involve sustaining the momentum and pace of progress, ensuring the G-20 countries' continued implementation of the work program, completing the work on the new conceptual/statistical frameworks being developed by international institutions, and ensuring adequate resources to support countries' data enhancement programs.

[64] Prepared by Andrew Kitili (STA).

Annex VII. Global Interconnectedness and Systemic Risk[65]

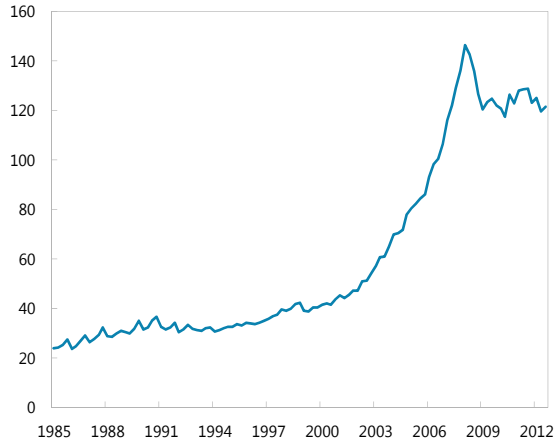
136. The rapid financial globalization of the past three decades has led to sharp increases in interconnectedness. Financial globalization has been reflected in the over six-fold increase in the external assets and liabilities of nations as a share of GDP (Figure 12). Even more striking is the sharp increase in cross-border lending and investment activities of banks, in particular since the late 1990s (Figure 13).

Figure 12. External Assets and Liabilities as a Share of GDP
(In percent of GDP)



Sources: Updated and extended version of the Lane and Milesi-Ferretti (2007) dataset.
Notes: Estimates of foreign assets and liabilities of countries using available stock positions, supplemented by cumulative capital flows with valuation adjustments.

Figure 13. Banks' External Assets
(In percent of GDP)



Sources: BIS Table 2A and Table 6A, WEO, and IMF staff's calculations.
Notes: External positions of reporting banks for all countries as a percent of total GDP for countries with reporting banks.

137. Financial globalization has brought benefits, such as more efficient intermediation of savings, and diversification of risks, but also increased vulnerabilities. The speed with which illiquidity and losses in some markets spread during the crisis is evidence of the risks associated with interconnectedness. Shocks in one part of the system can be amplified and transmitted through common intermediaries that collectively become overexposed to risk in the upswing of a credit cycle and overly risk-averse in a downswing.

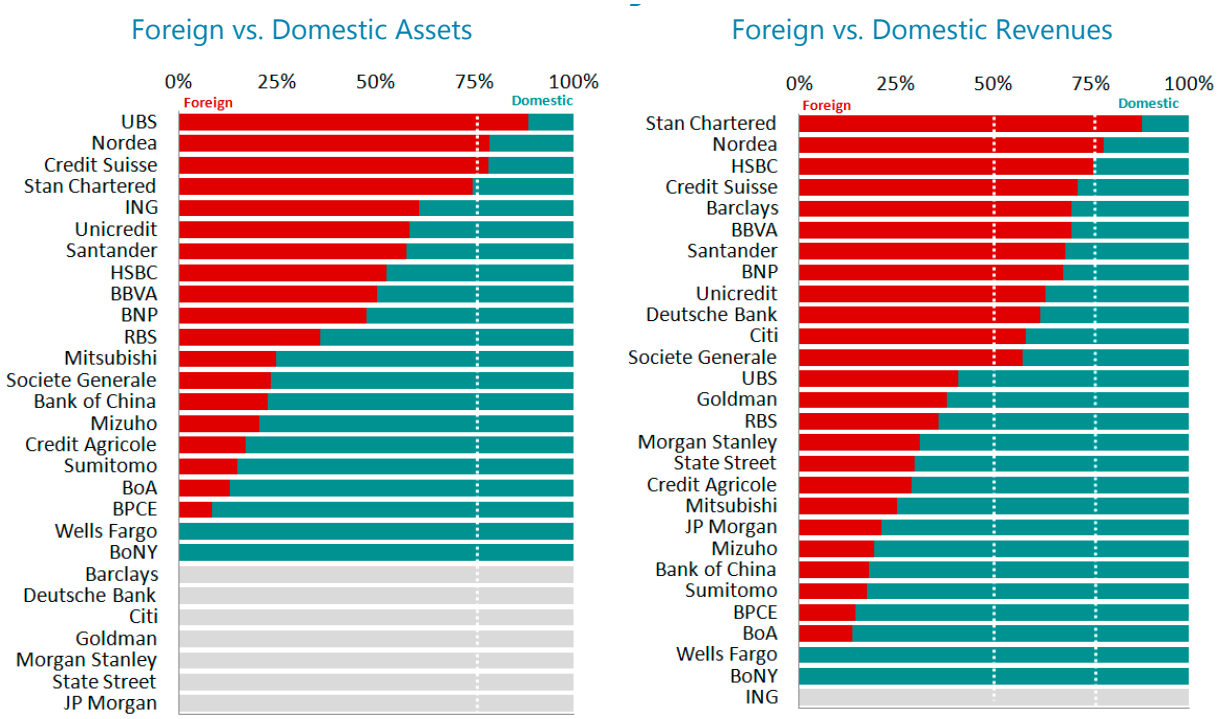
138. Cross-border financial activity also creates substantial challenges for the effective identification of systemic risks and containment of such risks. In countries with a high share of foreign banks and in the absence of information on parent institutions and their exposures, it is difficult for national authorities to assess domestic systemic risk. Cross-border activity also

[65] Prepared by Vanessa Le Lesle, Shuntaro Hara, and Manju Ismael (SPR) and Chikako Baba and Tomas Javier Mondino (MCM).

complicates the transmission of macroprudential policy action, especially where countries are home or hosts of globally systemically important institutions.

139. Closer analysis of the geographic footprint of G-SIFIs is critical. Such analysis can aid in understanding the possible unintended consequences that macroprudential policy actions taken by one country may have on other countries. However, this analysis is hampered by significant data gaps on the activities and exposures of these institutions and is complicated by their wide international diversification, with some twelve G-SIFIs deriving more than half of their revenues from outside their home country (including three G-SIFIs exceeding the 75 percent mark, as seen in Figure 14).

Figure 14. Geographic Breakdown of Twenty Nine G-SIFIs by Assets and Revenues
(In percent)



Sources: SNL, Banks' Annual Reports and IMF staff estimates.

140. For bilateral and multilateral surveillance, a deeper appreciation of systemic risk concentrations and interconnections is essential. To further develop an accurate understanding of financial interconnections and the buildup of systemic risk concentrations, data gaps need to be bridged and additional analytical tools developed. Such analysis can then guide a dialogue with policy makers on the macroprudential policies to address systemic risks as well as the potential spillovers of such policy actions.

Annex VIII. Reciprocity Principle: a Cornerstone of the Countercyclical Capital Buffer Framework[66]

141. Under the BCBS proposal, each jurisdiction determines the CCB for credit exposures to counterparties in its country. According to the reciprocity principle the home supervisor ensures that for an internationally active bank domiciled in its jurisdiction the CCB is calculated on a consolidated basis, according to the geographic location of its exposures. In other words, the CCB for internationally active banks will be a weighted average of the CCBs that are being applied in jurisdictions to which the bank have an exposure. The home supervisor is not allowed to impose a buffer requirement for credit exposures to a foreign country that is below the requirement set by the host supervisor. While the home supervisor can set a higher buffer requirement for foreign exposures, the mandatory reciprocity principle would not apply to the amount of the buffer above 2.5 percent. Reciprocity with respect to add-on buffers higher than 2.5 percent would be voluntary.

142. While bank with domestic credit exposures are subject to the full amount of the CCB determined by their respective supervisor, the CCB of internationally active banks will reflect the structure of their domestic and foreign exposure. Table 3 provides an example for four countries and two internationally active banks.

Table 3. Example of Reciprocity Principle
(In percent)

Country	Domestic Buffer rate*	Credit Exposure Bank A	Specific Buffer Rate Bank A	Credit Exposure Bank B	Specific Buffer Rate Bank B
1	2.50	60	1.50	7	0.18
2	1.70	20	0.34	13	0.22
3	1	13	0.13	20	0.20
4	0	7	0.00	60	0.00
*Reciprocity applies from 0 to 2.5 percent		100	1.97	100	0.60

Source: IMF staff calculation.

[66] Prepared by Ivo Krznar and Johannes Ehrentraud (MCM).