



THE INTERACTION OF MONETARY AND MACROPRUDENTIAL POLICIES

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EXECUTIVE SUMMARY

The recent crisis showed that price stability does not guarantee macroeconomic stability. In several countries, dangerous financial imbalances developed under low inflation and small output gaps. To ensure macroeconomic stability, policy has to include financial stability as an additional objective. But a new objective demands new tools: macroprudential tools that can target specific sources of financial imbalances (something monetary policy is not well suited to do). Effective macroprudential policies (which include a range of constraints on leverage and the composition of balance sheets) could then contain risks *ex ante* and help build buffers to absorb shocks *ex post*.

Experience and knowledge on the effectiveness of macroprudential policies, their calibrations, interactions among financial distortions and macroprudential tools, and interactions of those tools with monetary policy ones are still limited at this juncture. With this caveat in mind, the analysis in this paper provides the following findings:

Ideally, with macroprudential policies perfectly targeting the sources of threats to financial stability, monetary policy should remain primarily focused on price and output stability. That said, even in this ideal world, the conduct of both policies will need to take into account the effects they have on each other's main objectives.

In practice, however, policies face constraints. As knowledge is still limited, macroprudential policies cannot be targeted perfectly and do not fully offset financial shocks or distortions; institutions are imperfect; and time inconsistency and political economy constraints can arise. Should these weaknesses prove important, monetary policy may have to take a greater role in preserving financial stability and accept the associated trade-off. Similarly, where monetary policy is constrained, as within currency unions and in many small open economies, there will be greater demands on macroprudential policies. Nonetheless, using macroprudential policies to offset shortcomings in weakly conducted monetary policy is rarely optimal.

The interaction between monetary and macroprudential policies has implications for institutional design. Policy coordination can improve outcomes, making it advantageous to assign both policies to the central bank. But concentrating multiple (and sometimes conflicting) objectives in one institution can muddy its mandate, complicate accountability, and reduce credibility. Safeguards are then needed, with institutional frameworks to distinguish between the two policy functions through separate decision-making, accountability, and communication structures.

Approved By
Olivier Blanchard and
José Viñals

Prepared by a staff team coordinated by Stijn Claessens (RES) and Karl Habermeier (MCM) and comprising Erlend Nier, Heedon Kang, Tommaso Mancini-Griffoli (MCM), and Fabian Valencia (RES).

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I. INTRODUCTION

1. **In the decades prior to the crisis, macroeconomic management evolved to assign a strong role to monetary policy, with a primary focus on price stability.** The framework of monetary policy was broadly converging toward one with an inflation target (explicit or implicit) and a short term interest rate as a tool (Blanchard, Dell’Ariccia and Mauro, 2010). Fiscal policy played a limited role in macroeconomic management. Academic and policy thinking supported this strategy, reinforced by decreased macroeconomic volatility during the Great Moderation (Annex I provides some empirical evidence for selected crisis countries) as the best way to stabilize both the macroeconomy and the financial system.
2. **While boom-bust cycles in asset prices and credit were observed prior to the recent crisis, these did not seriously challenge the prevailing paradigm.** Several proponents argued in favor of more “leaning against the wind” (Blanchard, 2000, Borio and White, 2003). But the opposing view argued that by keeping monetary policy focused on price and output stability, it would deliver the best feasible outcome (Bernanke and Gertler, 1999, 2001). Meanwhile, at least in most economies, prudential policies were focused narrowly on the soundness of individual firms.
3. **Price stability, however, did not ensure macroeconomic stability and the crisis has strengthened calls for the use of financial regulation focused on macro-financial risks: macroprudential policies.** Financial instability has undermined macroeconomic stability, despite low and stable inflation. This means that additional tools will be helpful in complementing monetary policy in countercyclical management. Macroprudential tools emerge as candidates. Because there is no single tool that influences all financial behavior consistently, a variety of tools is needed, from procyclical capital adequacy requirements to loan-to-value caps (LTV’s), taxes/levies, and constraints on the composition of assets and liabilities of financial institutions. Several of these tools have a long history, but were mostly used for microprudential or monetary objectives (Federico et al., 2012; Tovar and others, 2012). Emerging market economies have been pioneers in refocusing those instruments on macroprudential uses.
4. **As macroprudential policy frameworks are being developed, policymakers are increasingly turning their attention to the relationship between macroprudential and monetary policies.** The newly emerging paradigm is one in which both monetary policy and macroprudential policies are used for countercyclical management: monetary policy primarily aimed at price stability; and macroprudential policies primarily aimed at financial stability. The relationship between monetary and macroprudential policies hinges on the “side effects” that one policy has on the objectives of the other and how perfectly each operates in the pursuit of its own primary goal (Gerlach and others, 2009). These interactions can enhance or reduce the effectiveness of each policy in achieving its objectives and therefore suggest the need for coordination.

5. This paper examines the conduct of both monetary and macroprudential policies in the presence of interactions. The paper starts with a conceptual review of how both policies would be conducted optimally considering their interactions. While structural models now available offer clear insights, they do not take into account important frictions that affect policy interactions in the real world. The paper therefore addresses three additional questions: if macroprudential policies work imperfectly, what are the implications for monetary policy? If monetary policy is constrained, what is the role for macroprudential policies? And if there are institutional and political economy constraints, how can macroprudential and monetary policies be adjusted?

6. In addressing these issues, the paper builds on other work, a review of the growing literature, and is part of a larger effort. Previous work includes Board papers on macroprudential policies, notably on the organizing framework (IMF 2011a), the effectiveness of macroprudential instruments (Lim and others, 2011), and institutional models for macroprudential policies (Nier and others, 2011). The paper is also informed by a range of new country case studies and empirical evidence collected in an accompanying background paper. It is part of a larger effort, including forthcoming staff papers on unconventional monetary policy, the costs of macroprudential policies, and the relationship between macro- and microprudential policies. And, in accordance with the 2011 Triennial Surveillance Review, and the 2012 Financial Surveillance Strategy, it contributes to the Fund's work on financial stability.

7. The paper does not seek to cover all aspects of macroprudential policy and comes with caveats. It is important to clarify that, while this paper draws out the institutional implications of the interactions between monetary and macroprudential policies, there are broader institutional considerations that are left for future work by MCM and LEG (including the upcoming Board paper on "Key Aspects of Macroprudential Policy"). Similarly, macroprudential policies may generate costs and face constraints, which may undermine their effectiveness. While the paper touches upon those issues, it does so only to the extent that they also affect the interaction with monetary policy since a comprehensive coverage is outside the scope of the paper. The paper also reflects the tentativeness of the state of knowledge and experience on macroprudential policies. Its main contributions are rather an analytical framework for the interactions of macroprudential policies with monetary policy, and operational insights given these interactions in light of various constraints.

II. CONCEPTUAL FRAMEWORK

8. Perfectly functioning macroprudential and monetary policies imply no major changes in the conduct of each policy. This section describes an ideal benchmark in which both policies operate perfectly, in the sense that they effectively target the distortion of concern, do not generate additional distortions, and do not face other institutional or political economy constraints. While this

benchmark is most likely unattainable, it is a necessary first step to anchor the analysis. Departures from this ideal world, which are considerable, are discussed in the next section.¹

A. Policy Goals and Assignment of Tools

9. When price rigidities are the only distortion, stabilizing inflation is generally equivalent to maximizing welfare. The ultimate goal of policy is to ensure the best attainable level of welfare, which implies achieving an efficient level and composition of output. To this end, policy has intermediate goals related to mitigating distortions that reduce welfare. When price rigidities are the only distortion, standard monetary economics arrives at a fairly clear cut conclusion: monetary policy should aim at stabilizing inflation as a means to eliminate the distortions in the dispersion of output generated by price rigidities (Woodford, 2003). By keeping monetary policy focused on price stability, output stability is guaranteed and the best feasible outcome is obtained. When other rigidities in the non-financial economy are present, this result needs to be qualified, leading to a tradeoff between stabilizing output and inflation (Blanchard and Gali, 2007). But even then, inflation stabilization receives a large weight.

10. When financial distortions are present, price stability is not sufficient for welfare maximization and financial stability becomes an additional intermediate policy goal. In the presence of financial market imperfections, individual behavior is distorted, giving rise to excessive risk-taking ex ante—in the form of excessive leverage, large exposure to risky assets, and fragile liability compositions—and negative asset-price or exchange-rate externalities ex post (Box 1). In short, boom-bust cycles are amplified.² When these distortions vary over time, or respond to economic conditions, and affect one sector of the economy more than others, as generally is the case, there will also be a distortion in the composition of output (Curdia and Woodford, 2009; Carlstrom and Fuerst, 2010). Welfare maximization then requires adding financial stability as an intermediate goal for policy, because financial instability signals distortions in the level and/or composition of output (Figure 1).

11. Operationalizing financial stability is made difficult by the large range of financial distortions and their changes over time. Policy and academic thinking have converged on what is considered price stability: low and stable inflation. Knowledge on financial stability, however, is incomplete in many respects, such as the interactions across financial distortions and the changing nature of financial distortions. Factors such as the degree of financial development and the exchange rate regime can greatly affect the types of risks that arise (see the background paper for case studies on Emerging Europe, Brazil, Korea, Turkey, and the United States). Excessive leverage in the corporate

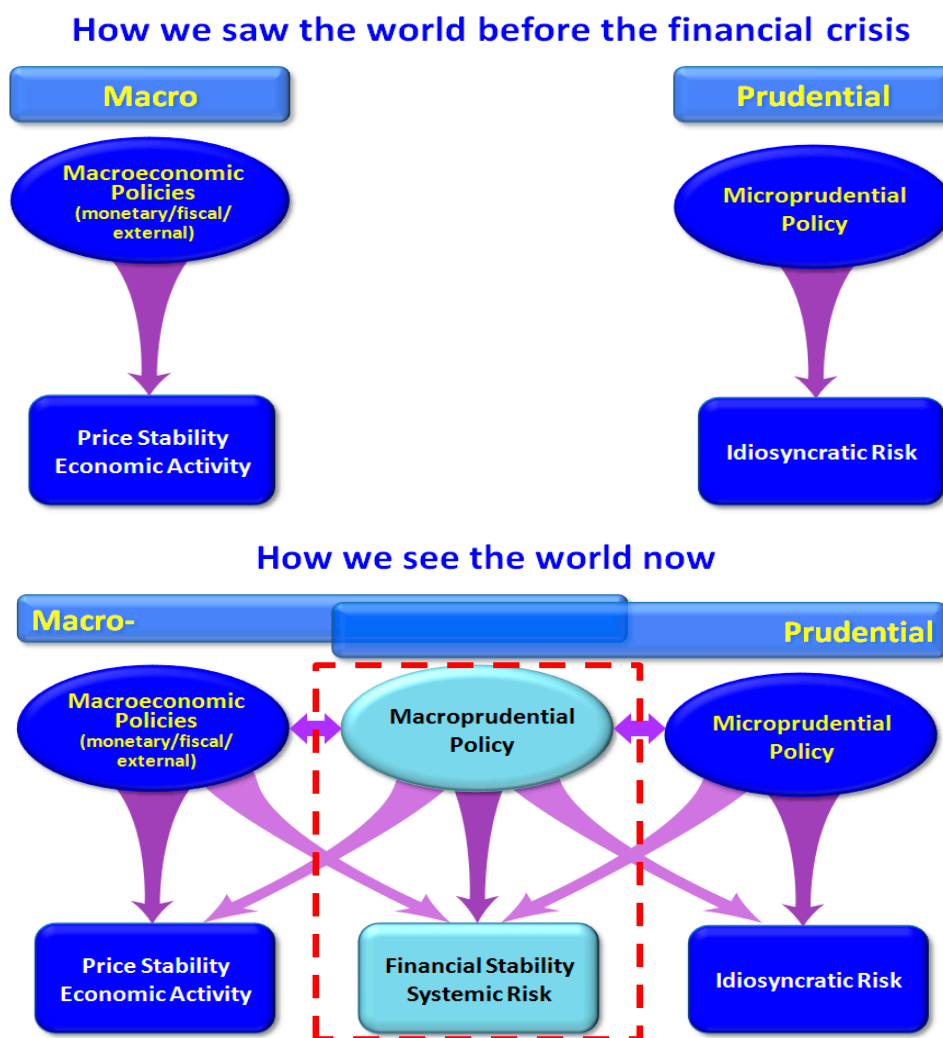
¹ More generally, both monetary and macroprudential policies have to be set in consideration of the broader macroeconomic context. These include, besides financial stability conditions, the stance of other policies, notably fiscal policy. These other considerations are acknowledged, but not analyzed in this paper.

² Bianchi (2011), Caballero and Krishnamurthy (2003, 2004), Lorenzoni (2008), Mendoza (2010), and Korinek (2010). De Nicolò and others (2012) provide a review of the financial distortions that give rise to systemic risk.

sector may give way, for example, to excessive leverage in the household sector, and vice versa. Liquidity conditions in domestic and international financial markets can change rapidly. It is therefore not yet possible to operationalize financial stability to the same degree as price stability.³

12. The task of preserving financial stability nonetheless remains clear: mitigating financial distortions and the risks associated with them, with intermediate targets linked to the aggregate implications of these distortions (for example, leverage in the banking or household sectors, capital and liquidity positions of financial intermediaries, foreign exchange composition of assets and liabilities).

Figure 1. Policies and Objectives



Source: IMF

³ Numerical thresholds, for example, are at this stage of knowledge premature to consider, among others as they depend on country circumstances.

13. Monetary policy is not best suited to maintaining financial stability, and price and output stability should thus remain its primary objective. Monetary policy alone cannot achieve financial stability because the causes of financial instability are not always related to the degree of liquidity in the system (which monetary policy can fix). While monetary policy can affect risk-taking incentives and financial market conditions, mitigating the effects of financial distortions or pricking an asset price bubble can require large changes in the policy rate (Bean and others, 2010). Moreover, when financial distortions are more acute in some sectors of the economy than in others, as is often the case, monetary policy is too blunt a tool. In these circumstances, price and output stability conflict with financial stability and having additional tools for the financial stability goal can increase welfare. Relying too much on monetary policy to deal with financial stability ex ante can also create potential confusion of the public with regard to its objectives. In sum, keeping monetary policy focused on its primary objective can create stronger commitment and reduce public fears the central bank will be co-opted for other purposes.

Box 1. Aggregate Consequences of Financial Market Imperfections

Asymmetric information in financial markets, combined with limited liability or limits on enforcement, leads to financial distortions. When there are information asymmetries, banks and borrowers can shirk (limit efforts) or engage in moral hazard (“strategic defaults”). When there is limited enforcement, whether due to legal or judicial limits, borrowing is constrained by how much lenders can recover in case of default (Hart and Moore, 1994), leading to collateral constraints. When there is limited liability combined with asymmetric information, intermediaries do not internalize the cost that their bankruptcy imposes on lenders and take too much risk (Townsend, 1979).

These distortions create externalities beyond the parties involved in a financial contract. Agents (borrowers and banks) make financial decisions not internalizing their impact on the aggregate economy or financial system. When agents individually undervalue the benefits of being financially prudent, this collectively means too much risk. Because agents do not internalize their contribution to systemic risk, they take excessive leverage, liquidity risk, exposure to a risky asset, or exposure to exchange rate risk. Excessive leverage figures prominently in all these examples because agents increase borrowing in short-term debt or foreign currency debt to expand assets. When times are bad, collateral constraints bind and trigger fire sales, further collateral tightening, and asset price spirals (Lorenzoni, 2008; Mendoza, 2010; Bianchi, 2011; Adrian and Shin, 2012).

Strategic complementarities (it pays off to take more risk if others do it) can exacerbate this behavior. Certain kinds of competition or expectations of bailouts will tend to reinforce strategic complementarities. Expectations of aggressive monetary expansion (“Greenspan put”), or expectations of a fiscal bailout when a crisis erupts, create incentives to correlate risks, because the more widespread the behavior, the more likely that a bailout will take place (Farhi and Tirole, 2012).

Existing regulatory and tax regimes can also lead to excessive risk-taking. The existence of a differential tax treatment between equity and debt, the tax deductibility of mortgage interest, and the use of non-recourse mortgage loans distort incentives and can lead to excessive leverage or other forms of excessive risk-taking.

At the aggregate level, these imperfections imply amplification and persistence. In addition to implying an inefficient steady state, any shock will generate a larger and longer-lasting response in aggregate variables than in the absence of financial imperfections. The reason is that in their presence, capital does not flow frictionlessly to where it is most productive (Kiyotaki and Moore, 1997).

14. Macprudential policies should focus on financial stability and are relatively less well suited to managing aggregate demand.

The use of macroprudential policies for managing aggregate demand may in fact create additional distortions by imposing constraints on behavior beyond those areas where financial distortions originate.⁴ When other countercyclical tools (notably monetary and fiscal policies) are available and effective, it is desirable to keep macroprudential policies focused on financial stability. Moreover, while financial distortions can lead to economic imbalances, such as an inefficient level or composition of output, this does not imply that these imbalances, regardless of their source, are best addressed through macroprudential policies. Assigning macroprudential policies a primary role in managing these imbalances is likely to overburden them, with the key risk that policymakers overestimate what they can achieve.

15. The foremost role of macroprudential policies is to constrain (ex ante) the incentives for excessive risk-taking.

By constraining financial market participants' behavior, macroprudential policies force them to internalize their contributions to systemic risk and can reduce this risk, mainly over the cycle but also across institutions.⁵ Reflecting the variety of distortions, systemic risk can manifest itself in different forms, including excessive leverage, weak lending standards and liquidity positions, and balance sheet mismatches of financial institutions and borrowers. This variety explains the need for multiple macroprudential tools, which will typically need to be adjusted in response to how macro-financial conditions, including systemic risk, evolve.⁶ Many of these tools are microprudential in nature—and thus well-known—but are now being considered with financial stability objectives in mind.

16. There is a range of macroprudential tools, reflecting a variety of potential sources of risk.

Constraints on leverage are key as increases in leverage are a common manifestation of excessive risk-seeking in theoretical work and a predictor of crises.⁷ In the banking sector, tools include countercyclical capital buffers (as used in Bulgaria and proposed internationally), dynamic provisioning (as used in Spain and several countries in Latin America), reserve requirements (as used in Brazil, Peru, and Turkey), and levies on short-term borrowing (as recently introduced in Korea). In the household sector, LTV caps for mortgage loans and debt-to-income (DTI) limits can be used and have already met with some success in a number of economies (including Hong Kong SAR, Korea, and Poland). Excessive maturity mismatches or exposures to foreign exchange risk can justify tools such as liquidity requirements and net open position limits. If borrowing is external, tools may include capital flow management measures—including residency based measures—in certain circumstances.

⁴ Costs, side-effects, and incentives for circumvention of macroprudential policies will be discussed in greater detail in a forthcoming paper (Mitra and others, 2012).

⁵ Bank of England (2009), IMF (2011a), and De Nicolò and others (2012).

⁶ Our analysis focuses on macroprudential tools whose benefit is seen as containing "time series" risks, or the "procyclical" increases in the risk of financial instability, it being understood that those macroprudential tools that are expected to have benefits in containing the risk of failure of individually systemic institutions, or increase the resilience of markets, are less likely to affect the regular conduct of monetary policy.

⁷ Dell'Ariccia and others (2012), Laeven and Valencia (2012), Kaminsky and Reinhart (1999), and Reinhart and Rogoff (2009).

17. The alternative is to preserve financial stability through reactive policies, but this entails distortions and costs, which need to be mitigated through (further) ex-ante regulations. Dealing with financial instability once it materializes allows policymakers to conduct targeted bailouts instead of attempting to identify ex-ante excessive risk-taking or bubbles. But ex-post interventions can be inefficient: they can overburden a (fiscally weak) sovereign, impose costs on taxpayers, and are not always well-targeted. Most importantly, expectations of ex-post intervention can increase incentives to take risks. Even if ruled out ex-ante by policymakers, private agents may expect ex-post public sector interventions because they know it is too economically costly not to intervene. This implies that even if some degree of ex-post interventions is used, macroprudential policies are needed to mitigate some of their costs: they can reduce incentives for risk-taking created by expected bailouts and decrease the intensity of any needed ex-post intervention.

B. Interactions

18. The use of each policy tool needs to take into account the side effects that they have on the targets of the other. If financial distortions vary exogenously, each policy can pursue its goals without being affected by side effects. The more realistic and typical case, however, is one in which distortions respond to economic conditions and in particular to policy (for instance, when changes in the policy rate affect incentives to take excessive leverage, and leverage is an intermediate target for macroprudential policies). Side effects from monetary policy on macroprudential targets, and from macroprudential policies on output and inflation, thus need to be considered.

19. It has long been recognized that monetary policy rates can affect agents' decisions on leverage and on the composition of assets and/or liabilities, by affecting the cost of borrowing, domestic asset prices, and exchange rates. The literature on financial market imperfections has identified a number of channels by which policy rates can affect financial decisions: (i) by shaping ex-ante risk-taking incentives of individual agents, through leverage, short-term borrowing, or foreign-currency borrowing; or (ii) by affecting ex-post the tightness of borrowing constraints and possibly exacerbating asset price and exchange rate externalities and leverage cycles. (Box 2 discusses the various channels in more detail. Annex II reviews, for each channel, the predictions from theoretical models and summarizes related empirical evidence).

20. First principles suggest that macroprudential policies well-targeted at the sources of distortions have the potential to contain the undesirable effects of monetary policy. Appropriate macroprudential policies can attenuate these side effects, thereby reducing policy dilemmas and creating additional "room for maneuver" for monetary policy. For most of the channels discussed above, a range of specific macroprudential instruments may reduce these effects when brought in ex-ante. For example, the impact on defaults from a tightening of monetary policy can be contained by having in place conservative limits on DTI ratios (Igan and Kang, 2011). When accommodative monetary policy drives up asset prices, measures such as limits on LTV ratios can reduce vulnerabilities.

Higher capital requirements, or tighter leverage or liquidity ratios can help contain increases in bank risks in response to expected lax monetary policy (Farhi and Tirole, 2012).^{8, 9}

Box 2. Channels Through Which Monetary Policy can Affect Financial Stability

Changes in the monetary stance can affect the risk-taking behavior of financial intermediaries. With asymmetric information, low monetary policy rates can create incentives for banks to over leverage or reduce efforts in screening borrowers. Low rates can also lead other economic agents to seek more risks in order to achieve higher returns. These effects are likely to be worse if monetary policy is too accommodative for too long during expansions. Moreover, if monetary policy is expected to be eased during recessions to support not only the real economy but also the financial system, the effect may be stronger because this may give rise to additional incentives to correlate risks.

Changes in the monetary stance can affect the tightness of borrowing constraints and the likelihood of default. Monetary easing relaxes collateral constraints, as asset prices rise and borrowers' net worth increases, and lowers the costs of external financing, thereby easing overall credit conditions. Conversely, a tightening of rates can adversely affect borrowers' capacity to repay, possibly leading to higher default rates and financial instability.

Monetary policy can give rise to asset-price and exchange-rate externalities. By affecting asset prices and exchange rates, monetary policy affects the value of collateral, which influences the tightness of borrowing constraints. Low interest rate can increase *asset prices*, which can trigger excessive increases in leverage and lead to asset price booms, exacerbating the financial cycle. Conversely, a tighter monetary stance can cause collateral constraints to bind, fire sales to follow, with resulting adverse asset price externalities. In open economies, interest rate increases can attract excessive capital flows, appreciating the *exchange rate*, and leading to excessive borrowing in foreign currency and exchange-rate externalities in a subsequent depreciation.

These channels may be operating simultaneously, with their strengths varying with the stage of the cycle, financial structure, and other country characteristics. For example, incentives to correlate risks due to the expectation of future monetary easing can be stronger in upswings. Effects can also depend on financial structure and capital account openness. For example, structural changes modified the monetary policy transmission channels prior to the crisis in the United States and Europe (Gambacorta and Marqués-Ibáñez, 2011). Securitization generally reduces the strength of the effects of monetary policy on credit extension by banks (Altunbas, and others 2012). In open and financially-integrated economies, domestic monetary policy has a weaker influence on domestic long-term rates and asset prices, but exchange rate externalities become more important.

21. Moreover, well-calibrated and clearly communicated macroprudential policies can contain risks ex-ante, thereby easing the burden on monetary policy. Macroprudential policies can help control unsustainable increases in credit and asset prices and mitigate procyclical feedback

⁸ English and others (2012) find empirically that a flatter yield curve is associated with lower net interest margins, with the size of the effect increasing in the maturity mismatch between bank assets and bank liabilities.

⁹ To control increases in leverage outside the banking system associated with changes in policy rates, margin in securities lending can be regulated (Kashyap and others, 2010; background paper, United States case study). Measures, such as the Basel Net Stable Funding ratio, which encourage banks to seek stable and longer-term funding, can reduce the incentive for intermediaries to seek risk in response to looser monetary policy conditions.

between financial and real variables. While macroprudential policies should not be primarily used for macroeconomic management, they can therefore facilitate it. Moreover, when macroprudential policies constrain ex-ante risk-taking, they reduce the risk of financial distress.

22. Macroprudential tools can also provide buffers against unexpected shocks, lessening the risk that monetary policy will run into the lower bound on interest rates. Releasing these buffers in periods of tight financial conditions may cushion the effect of shocks on the provision of credit and the economy. For instance, capital buffers can serve to complement monetary policy in times of stress, by supporting the transmission of monetary policy and allowing for a smoother path of monetary policy through the whole cycle (see the background paper). There is some evidence from Spain, for example, suggesting that dynamic provisions do provide some relief in downturns (Jimenez and others, 2012). Similarly, a tight LTV ratio can help contain the fall-out from a property bust and keep open monetary transmission (background paper).

23. In principle, it can be appropriate to relax macroprudential tools in times of financial stress. However, any such relaxation needs at the same time be consistent with ensuring the resilience of the system to future shocks (CGFS, 2012). Moreover, evidence on the effectiveness of a relaxation of macroprudential policies is still mixed at this time. One possible reason is because markets have thus far tended to take an adverse view of reductions in prudential ratios during a downturn.¹⁰ It is not yet clear whether this will change in the future as markets' understanding of macroprudential policies becomes more settled.

24. Finally, macroprudential policies can affect the level of output and prices. By constraining borrowing and hence expenditure in one or more sectors of the economy, macroprudential policies affect overall output. In principle, these effects may differ with the macroprudential tool being used, as well as the stage of the financial and economic cycle (as further examined in the background paper).¹¹ The actual quantitative effects, however, are not well understood because there is simply not enough data yet.

25. The sole presence of side effects has no major implications for the conduct of both policies, however, when policies operate perfectly. If macroprudential policies have strong effects on output, more accommodative monetary policy can offset these effects as necessary, as

¹⁰ Experiences after crises are that market discipline forces banks to keep higher capital buffers. Even though the trade-off with risk to financial stability is not well-known, there is some evidence that relaxations of LTV and DTI limits can help support house prices during downturns (Igan and Kang, 2012).

¹¹ The background paper contains conceptual analysis of the transmission of a range of macroprudential tools, including capital requirements, reserve requirements, and loan-to value ratios, to financial and real variables. It also offers some (necessarily preliminary) empirical analysis of the relative strength of the effects across tools. See also CGFS (2012) and ECB (2012).

long as monetary policy is effective.¹² Conversely if changes in the monetary stance affect incentives to take too much risk, certain macroprudential policies would need to be tightened.

Box 3. Interactions Between Monetary and Macroprudential Policies

A recent theoretical literature suggests that monetary and macroprudential policies are mainly complements, not substitutes, although results vary by type of shock. Theoretical (mostly Dynamic Stochastic General Equilibrium, DSGE) models with borrower collateral constraints and a banking sector generally assume monetary policy controls the risk free interest rate and macroprudential policy the risk premium, or the spread between lending rates and the risk free rate.¹³ The objectives are output and price stability, and also credit growth. Using different policy rules and shocks—financial, productivity or demand—the literature typically finds that it is optimal to use monetary policy together with macroprudential policy. Moreover, using macroprudential policy to achieve the same outcomes as monetary policy is inefficient, as it severely constrains the financial sector and output.

These models imply that in the wake of a financial shock leading to financial stability concerns, it is optimal to mainly use macroprudential policies. The macroprudential instrument is more targeted at the specific financial sector distortion and monetary policy is too blunt (in the sense of also affecting all other macro variables) to fight alone against a financial shock. This finding appears robust to open economy extensions. In open economies, financial shocks can originate abroad and, more importantly, lead to an appreciation of the domestic currency. While this limits inflation, when banks have foreign liabilities, it leads to financial amplification by strengthening banks' balance sheets, causing credit to expand. As a result, macroprudential policy needs to react more and monetary policy less, but the interplay between the two does not change markedly (Agenor and others 2012; Unsal, 2011).

Following a productivity shock, conclusions depend on the nature of the financial distortions. Models with only borrower collateral constraints suggest that just monetary policy should be used.¹⁴ Limiting credit is misguided and runs counter to the stimulus provided by monetary policy. Models with endogenous financial distortions reach the opposite conclusions.¹⁵ As lending by individual banks affects overall riskiness, it is optimal to tighten macroprudential policy to rein in credit. But, the monetary policy response to inflation remains unchanged from what is traditionally found. In practice, the appropriate policy mix will vary depending on both the strength and expected persistence of the productivity shock, and the riskiness of balance sheets, including capital buffers and leverage.

Similar considerations apply for an aggregate demand shock. A monetary policy response alone is optimal if it durably stabilizes both inflation and output. When stabilizing inflation comes at the cost of lost output, and when lending imposes a systemic risk externality, there is some scope for using macroprudential policy alongside monetary policy so as to limit systemic risk stemming from the expansion in leverage.

¹² Complications can arise when macroprudential policy is tightened in stressed conditions and monetary policy is already constrained by its lower bound.

¹³ Some papers differentiate between capital requirements and LTV ratios (such as Angelini and others, 2011), but most models remain too simple to properly distinguish among instruments.

¹⁴ As in Bailliu and others (2012), Beau and others (2012), Kannan and others (2009), Unsal (2011), Angelini and others (2011), Bean and others (2010), and Cecchetti and Kohler (2012).

¹⁵ Christensen and others (2011) or modeling approaches as in Brunnermeier and Sannikov (2011), or Lambertini and others (2011).

26. Existing analytical methods support the conjecture that the conduct of both policies does not change markedly compared to a world without side effects (Box 3). In particular, these models suggest that the optimal calibration of the reaction of monetary policy to output and inflation does not change markedly when macroprudential policy is also used, even when different types of shocks are considered.

27. More generally, effective macroprudential and monetary policies can enhance each other. Where a country has a credible monetary policy regime and inflationary expectations are well-anchored, monetary policy responses to shocks need not be as aggressive, reducing the burden on macroprudential policy to contain their side-effects (the background paper provides a case study on emerging Europe).¹⁶ Conversely, since there are now extra tools to deal with financial stability, macroprudential policies can make the commitment of monetary policy to price stability more credible. Moreover, effective macroprudential policies can help avoid financial stress, where accommodative and unconventional monetary policy may be needed, and thereby reduce moral hazard.

28. The precise interaction between monetary and macroprudential policy will depend on country-specific circumstances. For instance, where positive supply shocks reduce goods market inflation but drive up asset prices and credit, macroprudential policy can deal with the latter, allowing for a more accommodative monetary policy stance. In open economies, when capital inflows lead to increased leverage and exposures to exchange rates, and macroprudential policies contain these developments, monetary policy can afford to be tighter in response to inflationary shocks. In both cases, macroprudential policies will tend to reduce trade-offs and increase room for maneuver for monetary policy.

29. When other considerations are taken into account, however, the policy response may need to be different, and coordination issues can arise. The conclusions drawn from the available models relies on important simplifications, namely that the macroprudential instruments are perfectly targeted, fully offset the financial shock or distortion, and are immune to time inconsistency issues arising in part for reasons of political economy. While the presence of side effects by itself does not pose significant challenges for the conduct of each policy, other considerations can do so. Constraints on one policy may increase the burden on the other and additional distortions and political economy factors can give rise to coordination issues. In the next section, we analyze the implications of these additional complications.

¹⁶ The experience in emerging Europe over the previous decade underscores the benefits of credible monetary policy frameworks for financial stability. The evidence suggests that lower policy rates reduced the incentive for unhedged FX borrowing in some countries, relative to other emerging economies in the region (see background paper).

III. EXPERIENCES AND LIMITATIONS

30. Imperfectly functioning macroprudential and monetary policies, and institutional and political economy constraints imply a departure from the benchmark world described thus far. Limited quantitative knowledge on the effects of macroprudential policies and of monetary policy on financial stability makes it hard to design well-targeted macroprudential policies. Constraints on monetary (and fiscal) policies may increase the role of macroprudential policies in countercyclical management. Lastly, political economy and institutional constraints can generate coordination issues.¹⁷ This section reviews these complications, drawing on experiences, limited as they are.

A. Imperfect Macroprudential Policies

31. Financial stability concerns are hard to capture in practice. For one, it is hard to differentiate efficient market responses from those inefficient ones arising from market failures or externalities. As such, it can be hard to determine when macroprudential policies need to be employed, loosened, or tightened. Lower interest rates, for example, can lead to some increased risk taking, but to a large degree this is desirable when monetary policy tries to support the real economy. Related, measuring (increased) chances of financial instability has proven to be very difficult, as reflected in the long-ongoing debate on whether policy makers can identify, let alone prick, asset bubbles. Balancing Type I (too little emphasis on financial stability) with Type II errors (too much control or too often “crying wolf”) is consequently also a challenge for macroprudential policy applications.

32. Limited knowledge on the quantitative impact of macroprudential policies makes calibration difficult. Designing macroprudential policies requires determining how large a buffer should be built up during boom periods and when and how much it can be released safely during periods of financial stress. However, experience still needs to be gained on how to best calibrate and adjust macroprudential policy tools in the face of changing economic conditions, and quantitative research faces a range of obstacles.¹⁸ Some suggested macroprudential tools have never been tried in practice. Another unknown is how different financial distortions and tools to address them interact with each other. It may be the case that addressing one improves others, reducing the need for multiple tools. It can also be the opposite, by mitigating one distortion, others are worsened, increasing the need for multiple tools. Greater clarity is consequently needed on the exact

¹⁷ Other constraints naturally arise, such as the identification of permanent versus transitory shocks or the nature of the shocks. These complications, however, are not different than those faced in other policy areas.

¹⁸ Many analyses suffer from endogeneity problems well-known to studies of effects of policy changes on aggregate financial and real variables. This issue is shared by most existing studies on the effects of macroprudential policies (Lim and others, 2011). However, when investigating real aggregate effects—which are the focus of work presented in the background paper—this bias should be less since macroprudential policies ought to respond to credit and asset prices, rather than to output. Moreover, if endogeneity does not differ across tools, it does not affect the comparisons of relative effects.

transmission and effectiveness of many macroprudential instruments, including on their interactions among themselves (see also CGFS, 2012). Much of this work will be country specific in nature, and is the subject of ongoing efforts by country authorities and Fund staff, in the context of surveillance and technical assistance.

33. Existing models of monetary and macroprudential policy interactions not only lack a description of the causes and onset of financial crises, but also assume that macroprudential tools work perfectly. In reality, financial crises often arise from what appear to be small shocks, which yet trigger large-scale financial turmoil. These phenomena, which involve many interacting non-linearities, are not well captured in the current generation of monetary models, most of which have essentially linear structures.¹⁹ Moreover, in the available models, macroprudential instruments are usually assumed to be fully effective in containing systemic risk. In reality, macroprudential policies are not perfectly targeted and do not fully offset financial distortions and shocks.

34. Practical experience with the use of both monetary and macroprudential policies for price and financial stability is still limited. While some countries have used both policies in conjunction, few countries have done so with clearly articulated and communicated objectives. Experiences from countries as diverse as Brazil, Israel, Korea, Poland, Sweden, Turkey and the United States illustrate the challenges, but also suggest that well-targeted macroprudential policies can complement monetary policy in achieving both price and financial stability (see the background paper). In Brazil, for instance, monetary policy and macroprudential tools (such as capital and reserve requirements) worked in tandem in the post crisis period (2010-11) to contain an overheating of the economy and to rein in risks from rapid credit growth. Alternatively, in Korea during the 2000s, house price swings were only weakly correlated with inflation, and risks were addressed through sector- and region specific variation in LTV and DTI ratios, while the central bank used its policy rate to achieve stability of overall output and inflation.

35. As experience is still to be gained, policymakers may misjudge the effect of macroprudential policies on output, which may give rise to policy errors. For example, policymakers may overestimate the extent to which reserve requirements dampen aggregate demand and inflation, and may thus choose too small an interest rate response.²⁰ While policy errors also arise in other areas (monetary policy, for example, is conducted under uncertainty about the output gap), the limited experience thus far with macroprudential tools may imply a larger probability of errors, at least initially.

¹⁹ Linear structures with some inertia are also common in monetary policy models, explaining in part why policy rates are often adjusted in gradual fashions. Despite their limitations, these models provide a useful benchmark for the introduction of less effective policies and of institutional and political economy constraints. Goodhart and others (2012) is a good example of ongoing work to overcome some of these limitations.

²⁰ Arguably, this may have happened in Turkey, where reserves requirements were increased, but the policy rate was not raised in response to inflationary pressures (see background paper, Turkey case study).

36. Institutional constraints may impede the optimal deployment of macroprudential instruments. Effectiveness of macroprudential policy requires access to an appropriately broad range of prudential tools. Institutional arrangements may, however, limit the ability to use some tools (background paper, Turkey case study). Macroprudential policies can require, among others, cooperation and coordination with microprudential supervisory agencies, which may be legally or institutionally difficult. Accounting issues may arise and prevent full use of provisioning requirements.²¹ Participation of the fiscal authority may be needed (for example, for time-varying levies or proper tax treatment of dynamic provisioning), also as it can facilitate changes in legislation to expand the set of tools available to the macroprudential policymaker (IMF, 2011a). This may again be easier said than done. Importantly, the macroprudential authority may not have the expertise and information to identify the build-up of financial risks and thus not be able to adopt and calibrate appropriately macroprudential tools.

37. Imperfect macroprudential policies may give rise to costs. Imperfectly targeted or excessively tight macroprudential policies imply a binding constraint in the wrong place or at the wrong time which may worsen distortions (Caballero and Krishnamurthy, 2004).²² Tighter regulations can also create stronger incentives for circumvention, with the risk of vulnerabilities building up outside of the regulatory perimeter and policymakers' sight.

38. Weaknesses in the application of macroprudential policies make it more likely that monetary policy may need to respond to financial conditions. Indeed, in models where macroprudential policy is absent or time invariant, but in the presence of financial sector distortions, it is optimal for monetary policy to respond to financial conditions, in addition to the output gap and deviations of inflation from target.²³ By extension, to reduce the effects of imperfectly targeted or less effective macroprudential policy, it can be desirable for monetary policy to respond to financial conditions and "lend a hand" in achieving financial stability (e.g., by "leaning" against the credit cycle).²⁴ This means monitoring a broader range of financial indicators such as buoyant credit growth, increasing leverage, and other financial indicators, and adapting policy horizons.

²¹ In Spain, for instance, there was a tension between the requirements of international financial reporting standards and the use of dynamic provisioning.

²² In an analysis of the evolution of banking system vulnerabilities in relation to the use of macroprudential policies, Claessens et al. (2012) find that some macroprudential policies can impose constraints that lead banks to adjust perversely in times of financial downturns. This can also happen with microprudential policies, such as minimum capital and liquidity requirements, which can exacerbate procyclicality of credit in undesirable ways. This can justify a macroprudential overlay to microprudential policies. A forthcoming MCM paper will explore further the relationship between microprudential and macroprudential policies (Osinski and others, 2012).

²³ See, for example, Curdia and Woodford (2009), Carlstrom and Fuerst (2010), Christiano and others (2010), Woodford (2011). Kannan and others (2009) as well as Christensen and others (2011) also find that optimal monetary policy responds to credit when macroprudential policy is not available while Ciccarelli and others (2012) discuss the use of unconventional and conventional monetary policy together.

²⁴ Many central banks (and especially in countries that still lack effective macroprudential policies) seem to consider financial market conditions in setting monetary policy (Munoz and Schmidt-Hebbel, 2012).

39. The relative weight monetary policy should assign to financial stability is not well-known. Although conflicts between price and financial stability are unlikely to emerge (Issing, 2003), the economic (output) costs of using monetary policy for financial stability objectives can be large.²⁵ For example, cross-country evidence suggest that at a five-year horizon, a 100 basis point hike in the policy rate would reduce annual house price appreciation by only 1 percentage point, compared to a historical average annual increase of 5 percent (see Crowe and others, 2011, for details). But it would also lead to a decline in GDP growth of 0.3 percentage points. The experience in Japan in the late 1980's and the United States in the late 1920s are often cited as examples of the economic costs of using monetary policy to prick asset bubbles. More generally, the transmission of monetary policy to financial stability outcomes is uncertain (Annex II). Nevertheless, monetary policy will have to be used at times to some degree to compensate for the limitations of macroprudential policy.

40. In particular, monetary policy will often need to respond to financial turmoil.

Monetary policy may need to be loosened to counter deflationary pressures and at the same time stabilize the financial system. In fact, because both ex-ante regulation and ex-post interventions can carry costs, it can be desirable to have a combination of both (Jeanne and Korinek, 2012). Such ex-post monetary policies need to be complemented by proper crisis management tools, including lender of last resort, and resolution and restructuring policies.

B. Constraints on Monetary Policy

41. Where monetary policy is constrained, the demands on macroprudential policy will be greater. Financial distortions can manifest themselves in the form of an inefficient composition of output, including across member countries of a currency union. Similarly, in small open economies with exchange rate pegs, the required monetary stance can give rise to excessively strong incentives for risk-taking (see Box 4).²⁶ In such cases, macroprudential policies will need to address the adverse side-effects of monetary policy on financial stability.²⁷ However, macroprudential policy should not be overburdened and will need to be complemented by strong fiscal and structural policies.²⁸ And,

²⁵ One example of a conflict could be when a country faces low goods price inflation and high asset price inflation, a situation in several advanced economies before the 2008 crisis (see the background paper for a case study of the United States).

²⁶ See, among others, Cetorelli and Goldberg (2012) and Bruno and Shin (2012) on how global monetary conditions can be transmitted through cross-border banking operations and affect risk-taking in small open economies.

²⁷ For instance, loan-to-value ratios and capital buffers need to respond to asset bubbles and credit booms that may arise at the national level, rather than at the level of the region. This is independent of whether the calibration powers sit at the national level or at the center. The converse case, when tight international monetary policy conditions lead to inefficiently low levels of risk-taking, could call for some relaxation of national macroprudential policies.

²⁸ Credit booms and asset bubbles can be spurred by cross-border capital flows. The underlying external imbalances need to be addressed by appropriate macroeconomic and structural policies, complemented by macroprudential policies. National fiscal policy in a currency union has an important role to play in offsetting a monetary policy stance at the union level that is not appropriate for a given country; and a union level fiscal policy will also in general be needed. The euro area is a case in point (Jaumotte and others, forthcoming).

especially in a currency union, macroprudential policies would ideally be coordinated, albeit not necessarily harmonized, so as to recognize differences in financial conditions, across countries, as recognized by members in the European Union in establishing the European Systemic Risk Board (see also IMF, 2012b).

42. Where monetary policy lacks credibility or effectiveness, macroprudential policy should not be used as a substitute. Where monetary arrangements are not adequate, there is more to gain from strengthening monetary policy's effectiveness, including the policy framework for monetary policy, than from using macroprudential policies as imperfect substitutes. Adverse financial developments can occur when monetary policy is lacking in effectiveness. While these developments may be controlled by macroprudential policies, this will in turn create costly distortions and greater incentives for circumvention. For instance, where a small open economy has a peg that is very credible but not perfectly assured, this can create incentives for foreign currency borrowing (Dell'Ariccia and others, 2012), and yet the macroprudential measures to effectively contain this may be too costly.

Box 4. Monetary and Macroprudential Policies in Small Open Economies

In small open economies, capital flows are driven in part by differentials between domestic and global policy rates (Hahm and others, 2012, background paper). Where high domestic rates fuel capital inflows, this can drive credit growth, contribute to excessive leverage, and increase maturity and currency mismatches. Many small open economies, such as Iceland and some Central, Eastern and South-Eastern European (CESEE) economies, faced this dilemma before the crisis. And given low policy rates in advanced economies since the crisis, a number of emerging economies (for example Brazil, Peru, and Turkey) are facing it today. For countries with fixed exchange rates, low advanced country policy rates have created challenges, both ahead of the crisis (for example, in the GCC countries, including Dubai), as well as more recently.

The dilemma arising from interactions between monetary policy and capital flows can be alleviated by macroprudential measures. Targeted measures, such as the levy on non-core foreign exchange liabilities in Korea (case study, background paper), may help change the composition of flows, thereby reducing the financial stability risk associated with capital inflows. Where policy rate differentials encourage corporations or households to borrow in foreign exchange, macroprudential measures, including higher risk weights, tighter LTV ratios, and limits on foreign exchange lending, as applied in some CESEE economies (case study, background paper), can limit increases in default risks. And a combination of increases in capital and reserves requirements can help control surges in credit growth associated with capital flows, as in Brazil (case study, background paper), complementing changes in policy rates and providing greater policy autonomy.

Such use of macroprudential measures can be consistent with the IMF's institutional view on managing capital flows (IMF 2012b). This view specifically encourages targeted macroprudential measures to contain the systemic risk associated with capital inflow surges. Indeed, a strong macroprudential policy framework can help countries reap the benefits of capital mobility while mitigating the potential costs.

C. Institutional and Political Economy Considerations

43. Institutional constraints can lead to complex coordination issues. A parallel with monetary-fiscal interactions is useful. In those well-studied interactions, distortions introduced by

44. fiscal policy (Dixit and Lambertini, 2003) or time-inconsistency problems stemming from political factors (Barro and Gordon, 1983) generate coordination issues. Similar problems can arise here. A microprudential regulator in charge of macroprudential policies may tighten regulation in a recession. Or problems may arise when macroprudential policies do not work perfectly, for reasons given in the previous section. In addition, different institutions can have different views of the economy and the financial system (and sometimes fundamentally different views), which can lead to ineffective policy coordination. As these coordination issues arise, they may imply different outcomes under joint decision-making than under separation.

45. Political economy and other considerations may introduce further complications. Political economy constraints are well understood in the case of monetary policy, leading to the need for an independent central bank. They also arise for macroprudential policies. A macroprudential regulator without sufficient political independence may be reluctant to constrain credit (for example, since this may be politically unpopular and also reduces tax revenues in the short run) even if that is the socially optimal policy.²⁹ And the frequency with which macroprudential policy may be used can be less than ideal owing to political and other constraints, as when broad approval is required to reset an instrument, or when use of the instrument has strong distributional implications.³⁰ In light of these and other constraints, monetary policy will again retain a residual role in assuring financial stability.

46. There is thus a need for a strong legal mandate and appropriate powers, dedicated decision-making, accountability, and communication tools. As is recognized in other areas of policymaking, the legal framework needs to allow the policymaker to set out a policy strategy, establish transparency on the deliberations leading to decisions, and provide for ultimate accountability to legislators and the public at large (IMF 2012a). These conditions are important to achieving effective policy implementation.

47. There is also a need for strong coordination between monetary and macroprudential policies. To maximize synergies, mechanisms that facilitate policy coordination are desirable, such as decision-making supported by shared information and analysis, but these should not undermine the credibility of each policy field in achieving its primary objective, and need importantly to preserve the independence of monetary policy decisions (see further Nier and others, 2011).³¹

²⁹ These risks may be greater when the fiscal authority assumes a leading role in the macroprudential framework. However participation of the fiscal authorities is in general desirable, since it can facilitate discussion of legislative changes that may be needed to adapt the regulatory perimeter and to establish new macroprudential policy tools and powers in the face of changing circumstances (Nier and others, 2011).

³⁰ In the United Kingdom, the Financial Policy Committee did not ask for control over loan-to-value ratios, since this tool was viewed as having strong distributional effects.

³¹ The experience in Turkey in early 2011 highlights the need for coordination between the central bank and the supervisory authority (background paper). There is also a need for a communications policy that provides clarity for market participants and the public at large on the objectives and actions of policymakers.

48. The precise coordination mechanisms will depend on country circumstances, but will often entail a leading role in macroprudential policy for the central bank. This has some key advantages. It can ensure that macroprudential policy draws on the central bank's expertise in financial and macroeconomic analyses, that data and analyses prepared for each policy field are also available to the other, and facilitate analyses of the side effects of each policy. Furthermore, it can help shield the macroprudential policy function more from political influence than when it is assigned to a separate regulatory body. It also has risks though. A central bank formally responsible for both price and financial stability could be tempted to use inflation to repair private balance sheets following a financial shock, leading to a welfare loss (Ueda and Valencia, 2012). With such time-consistency as well as other conflicts, a dual mandate can be associated with lower credibility and create reputational risks. And it poses challenges for communication that could imply a loss in the transparency of monetary policy.³²

49. When both monetary and macroprudential functions are housed within the central bank, coordination is improved but safeguards are needed to counter the risks from assigning dual objectives to the central bank. These should include separate decision-making structures for monetary and macroprudential policies (such as separate policy committees as in the United Kingdom). Separate accountability and communications structures are also advisable (such as separate reports to the legislature). It is often the case that these issues are best addressed in legislation, by establishing in law a central bank's governance structure and clarifying the primary objectives of each policy function. These issues will be addressed in upcoming staff papers.

50. A different set of issues arises when the macroprudential policy function is outside the central bank. Where the macroprudential authority is assigned to a body or committee outside the central bank, it is still useful, and possible, for the central bank to play a leading role. For example, chairmanship of the committee can be assigned to the central bank. However, in some countries, there may be conflicts with provisions to protect the independence of the central bank, which may be enshrined in the constitution. Constitutional constraints may limit the central bank's ability to participate in a macroprudential committee, for example when this committee is chaired by the Treasury, rather than by the central bank.³³ Also, constitutional considerations may rule out any formal powers of the macroprudential body over policy tools typically assigned to the central bank, such as reserve requirements, oversight of payment and settlement systems, and regulation of foreign exchange markets (as in Poland, see IMF, 2012a). And when the central bank conducts microprudential supervision, the macroprudential body may not be able recommend use of

³² Giavazzi and Mishkin (2006) conducted interviews with participants from different sectors of Swedish society and found that statements on house prices by the Riksbank confused the public. Also, in a number of small open economies, reserve requirements are used with both monetary policy and macroprudential policies objectives (Federico and others, 2012; and Tovar and others, 2012), raising communication challenges. See also the case study on Turkey in the background paper.

³³ For instance, in Chile, the central bank has only an observer status on a financial stability committee chaired by the Treasury (Jacome and others, 2012).

supervisory tools (as under current proposals in the Netherlands). These issues could constrain coordination and limit the effectiveness of macroprudential policies.

51. Interactions with other policies may give rise to additional coordination issues that may need to be reflected in the institutional framework. Macroprudential and microprudential policies could at times conflict, and the way these conflicts are resolved may differ depending on whether microprudential supervision is housed within or outside the central bank. Similarly, the boundary between macroprudential policies and crisis management raises coordination issues. And a need for coordination with the fiscal authority can also arise. A discussion of these additional challenges is planned for future work (including the upcoming Board paper on “Key Aspects of Macroprudential Policy”).

IV. CONCLUSIONS

52. The crisis has accelerated the development of macroprudential policy, raising questions about how it interacts with monetary policy. The emerging paradigm acknowledges that monetary policy is not well suited for assuring financial stability. Instead macroprudential tools should aim to address financial distortions that may lead to a build-up of systemic risk. The new paradigm recognizes that well-calibrated and clearly communicated macroprudential policies can contain risks ex-ante and help buffer shocks, and thereby ease the conduct of monetary policy during periods of financial stress. It does acknowledge, however, that monetary policy can have effects on financial stability. However, in a world where each policy operates perfectly in attaining its objective, these side effects do not pose significant challenges to the conduct of both policies.

53. When policies do not operate perfectly, the interactions between them become important. The effectiveness of macroprudential policies and the interactions between macroprudential and monetary policies are not fully known, institutions are imperfect, and political economy and other constraints can arise. With weaknesses in the application of macroprudential policies, monetary policy may still need to respond to the buildup of financial risk, by “leaning” against the credit cycle, and, at times, be expansionary following negative financial shocks. Conversely, where monetary policy at the national level is constrained, as in currency unions, there will be greater demands on macroprudential policy, coordinated across countries. There are few cases though in which a substitution of macroprudential policies for weak monetary policy is optimal.

54. The new paradigm calls for an appropriate institutional framework, and especially for safeguards when there are dual objectives assigned to one agency. The presence of macroprudential policy can enhance monetary policy’s credibility and transparency, since there now is an additional tool to deal with financial stability. A credible monetary policy framework in turn can help macroprudential policy in achieving its objective, by reducing the need for macroprudential policy to contain adverse effects of monetary policy on financial stability. When there are synergies,

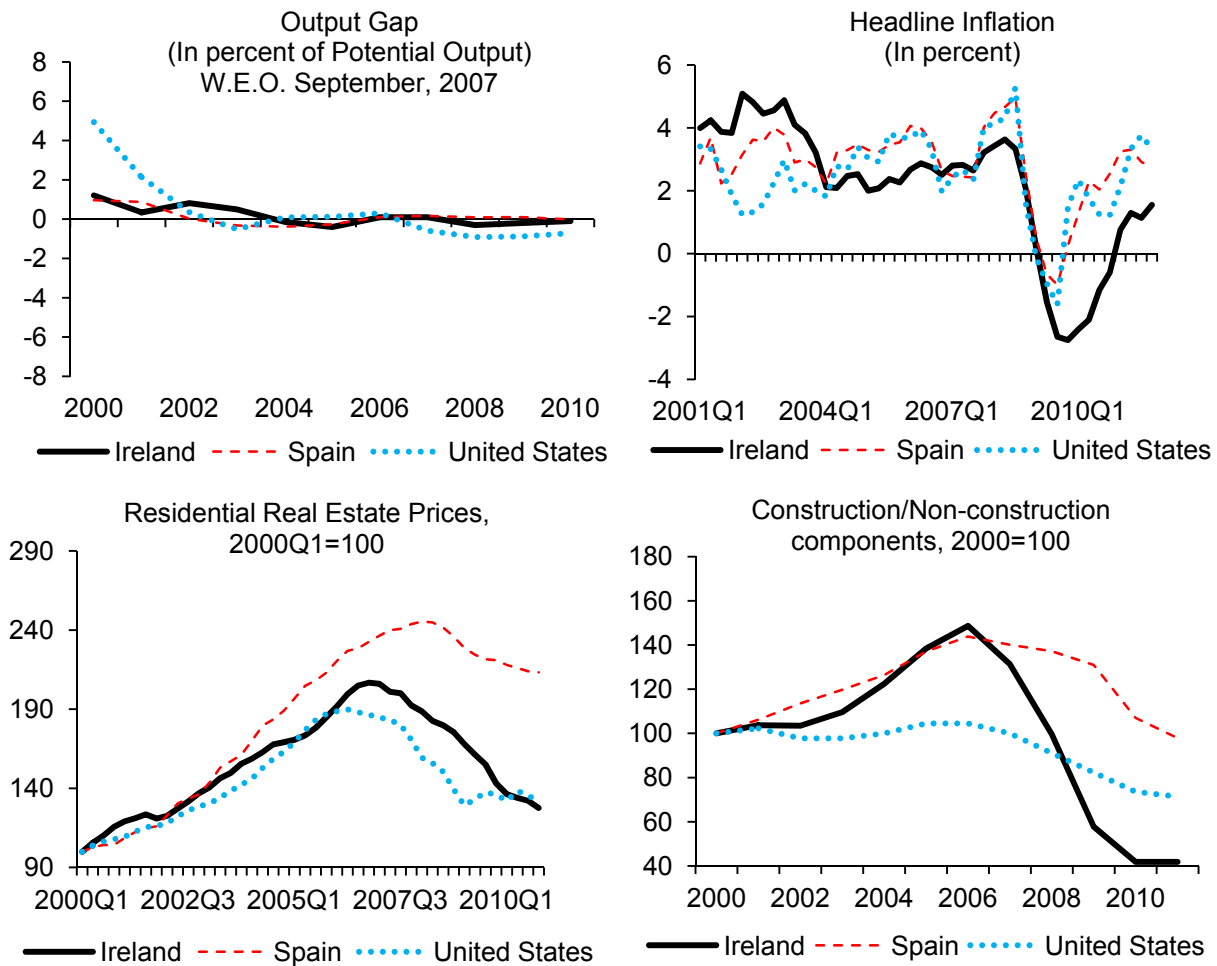
it can be advantageous to assign both policies to the same authority, namely the central bank. However, safeguards are then needed to counter the risks of dual objectives assigned to one agency, and institutional frameworks should distinguish between the two policy functions, with separate decision-making, accountability and communication structures. A different set of issues arises when the macroprudential policy function is established outside of the central bank.

55. This paper has highlighted the many issues on which more work is needed to arrive at robust policy recommendations. Knowledge on the effectiveness of macroprudential policies does not yet compare with that on monetary policy, limiting what can be known about the interactions between the two policies. Further work is needed on how macroprudential policies can be operationalized and on understanding the transmission of macroprudential policies, both in upturns and in downturns. The interaction with other policies, including microprudential, crisis management and fiscal policies also requires further work.

Annex I. Price, Output, and Financial Stability

1. With monetary policy focused primarily on price stability, systemic financial risks were largely unaddressed during the Great Moderation. Pre-crisis estimates of the output gap for key countries that subsequently experienced a crisis (Ireland, Spain, United States) were relatively flat (Figure A1). Meanwhile, inflation was stable or only moderately rising. The prevailing monetary policy paradigm thus delivered output and price stability.

Annex Figure 1. Output Gap Estimates, Headline Inflation, House Price, and Proportion of Construction Components



Source: World Economic Outlook and Haver Analytics

2. Credit and asset prices were rapidly increasing, however, and price stability was not sufficient to ensure continued macroeconomic stability. Distortions led to an inefficient composition of output, with excessive real estate investment, excessive consumption, and widening external imbalances (Figure A1 shows changes in asset prices and the composition of output). When

systemic risk materialized, the externalities arising from financial market imperfections intensified and output declined, exacerbating macroeconomic volatility.

Annex II. Literature on Channels through Which Monetary Policy Can Affect Financial Stability

- 1. Borrower balance sheet (default) channel.** Monetary policy can worsen financial stability by affecting borrowing constraints and increasing the risk of default. First, tighter policy increases debt repayment burdens for variable rate borrowers. Second, by affecting economic activity, it reduces income flows and loan repayment capacity. Third, increases in rates lower borrower net worth through a fall in asset prices, curtailing access to credit. Tighter policy then results in higher default rates, lower banking profits, and larger non-performing loans. All of these may culminate in a financial crisis (Allen and Gale, 2000; Illing, 2007; Goodhart and others, 2009). Jiménez et al (2009), using micro data from the Spanish Credit Register for 1984–2006, find that interest rate increases have strong effects on borrower default rates and the quality of banks' portfolios. When debt is securitized, increases in default rates can cause asset prices to fall, potentially leading to distress sales and amplifying the initial fall (Shin, 2005; Illing, 2007; Geanakoplos, 2010). Sengupta (2010) shows that tighter monetary policy in the United States after 2004 increased the debt service burden on adjustable rate mortgages, leading to a sharp rise in defaults of Alt-A mortgage loans in 2006.
- 2. Risk-taking channel.** Accommodative monetary policy can affect intermediaries' incentives to take risk. When interest rates are low, banks' capital and collateral values are boosted. This can lead intermediaries to expand their balance sheets, increase leverage, and reduce efforts in screening borrowers (Borio and Zhu, 2008; Valencia, 2011; Dell'Ariccia and others, 2010). Such incentives may be stronger when low interest rates reduce the likelihood of borrower defaults, leading measured risks to go down and risk-weighted capital to go up (Adrian and Shin, 2012). They may also be stronger when there are expectations for interest rates to be reduced aggressively when a crisis erupts (Farhi and Tirole, 2012). Some studies find evidence for these effects when using loan level data, e.g., Jiménez and others 2009; Ioannidou and others (2009), or survey data (Maddaloni and Peydro, 2011). At more aggregate levels, studies typically do not find strong effects of rates on risk-taking, leverage, or credit growth (Merrouche and Nier, 2010; Dell'Ariccia and others, 2012).
- 3. Risk-shifting channel.** Increases in policy rates can reduce intermediation margins and lead lenders to seek more risk. Bhattacharya (1982) shows that for highly levered institutions, the smaller the intermediation margins, the riskier the assets they choose (when the choice of riskiness is unobservable). An increase in policy rates tends to reduce the margins of intermediaries that are funded short-term at variable rates, but lend long-term at fixed rates. Lower margins can induce a move into riskier assets and toward higher leverage to maintain return on equity, thereby "shifting" value from depositors and creditors to bank shareholders. This channel may be strongest just ahead of a crisis, when intermediary leverage is high and competition limits the pass-through of policy rates to loan rates. For the United States Savings and Loans crisis, Gan (2004) shows that interest rate increases led mortgage lenders to shift into riskier securities. Landier and others (2011) also find risk-shifting ahead of the United States subprime crisis.

4. Asset price channel. When monetary policy is eased, lenders' asset value and borrowers' net worth increase. In response, the supply of and demand for loans increase. This leads to further increases in asset prices through a "financial accelerator" mechanism (Bernanke and Gertler, 1989, 1995). Evidence is mixed, however, on whether low rates cause asset price booms and the effects, if any, are often found to be quite small. Del Negro and Otrok (2007) find the impact of accommodative policy to be small relative to the overall increase in house prices in the United States. IMF (2009) finds that while in many advanced economies, rates had been low by historical standards, there was little association between measures of the monetary policy stance and house price increases. Whereas Ireland and Spain had low real short-term rates and large house price rises, Australia, New Zealand, and the United Kingdom had relatively high real rates but also large house price rises.

5. Exchange rate channel. In an open economy, monetary policy can affect the exchange rate and capital flows. There is strong evidence that policy rate differentials attract capital flows, through carry trades, in emerging markets and small open economies more generally (Hahm and others, 2012; Merrouche and Nier, 2010). In bank-based systems, capital inflows can in turn drive credit growth and, owing to the presence of exchange rate externalities, contribute to excessive increases in leverage. This poses a well-known dilemma, where raising domestic interest rates may induce excessive capital inflows and credit growth. Given low policy rates in advanced economies, a number of emerging economies (e.g., Brazil, Peru, and Turkey) have been struggling with these problems. However, this channel was also relevant ahead of the crisis. In Iceland, high interest rate differentials fueled capital inflows via the banking sector and a sharp appreciation and overheating of the economy. As the inflation targeting central bank raised policy rates in response, it attracted even more capital inflows, generating an adverse feedback loop (Jonsson, 2009). Many Central and Eastern European economies also faced this dilemma before the crisis (background paper).

6. The table overleaf shows, for each channel, what theory predicts for the effects of changes in the monetary policy stance on financial stability, and summarizes related empirical evidence.

Annex Table 1. Monetary Policy Effects on Financial Stability^{1/}

Sources of Financial Instability	Channel	Predicted Effect (↑ improves stability)		Selected Empirical Evidence	
		↓ r	↑ r		
Borrowing Constraints	Balance Sheet (default) Channel	↑	↓	Sengupta (2010)	↑ r, ↓
				Jiménez and others (2009)	↑ r, ↓
				Gertler and Gilchrist (1994)	↑ r, ↓
				Asea and Blomberg (1998)	↑ r, ↓
Risky Behavior of Financial Institutions	Risk-taking Channel	↓	↑	Jiménez and others (2009)	↓ r, ↓
	Risk-shifting Channel	↑	↓	Ioannidou and others (2009)	↓ r, ↓
				Merrouche and Nier (2010)	X
				Gan (2004)	↑ r, ↓
Externalities through Aggregate Prices	Asset price Channel	↓	↑	Landier and others (2011)	↑ r, ↓
				Altunbas and others (2012)	↓ r, ↓
				Del Negro and Otrok (2007)	↓ r, ↓
	Exchange rate Channel	↑	↓	IMF (2009)	X
Hahm and others (2012)				↑ r, ↓	
				Merrouche and Nier (2010)	↑ r, ↓
				Jonsson (2009)	↑ r, ↓

Source: IMF

Notes: ↓ r means a decrease of policy rates, ↑ r means an increase of policy rates, "↓" means a decline instability, "↑" an improvement, and "X" no statistically significant effect.

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