

Interactions between Monetary and Macroprudential Policies in an Interconnected World

by

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Abstract

The newly emerging macroeconomic management paradigm is one in which monetary policy is primarily aimed at price stability and macroprudential policies are primarily aimed at financial stability. The two policies can interact though. This paper first examines the conduct of both policies in the presence of such interactions. While interactions can enhance or reduce the effectiveness of each policy in achieving its objectives, there is no great need for coordination in most cases. There are exceptions though, notably when monetary or macroprudential policies are constrained. And the presence of interactions imposes some demands on institutional designs. The paper next reviews specific coordination issues for small open economies, also in light of how monetary policy in major advanced countries affects the global financial cycle, and in turn local financial conditions, with associated risks to financial and economic stability. Given the limited prospect for international coordination of monetary policy and the practical problems with coordinating macroprudential policies, small open economies may need to, besides rethinking their monetary and exchange rate policies, use specific macroprudential policies to deal risk coming from international factors. And countries may want to use capital flow management tools, considering carefully how various macroprudential and capital flow management tools interact and considering the longer-term benefits from financial integration.

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1. Introduction

The interactions between monetary and macroprudential policies is a relatively recent topic. While many countries had used before the global financial crisis a number of tools now being labeled as macroprudential policies (e.g., reserve requirements, limits on credit growth, capital requirements, limits on loan to value ratios), their use was often motivated by monetary policy or microprudential objectives. Only more recently has there been a formal recognition, in part due to progress in analytical modeling, that such tools can (also) help address concerns arising from the procyclicality of finance. (There is also a cross-sectional, financial stability dimension that can motivate macroprudential policies (e.g., to deal with the systemic risks arising from “too big to fail” financial institutions); I do not discuss this). Macroprudential policies have gained more interest with the pursuit of unconventional monetary policy (UMP) in a number of advanced countries as it raises some specific domestic concerns, including about excessive risk-taking. And the effects of monetary policy in major advanced countries, and UMP (and exit thereof) especially, on global asset prices and capital flows raise questions about how small open economies best respond.

Within a domestic context, the newly emerging paradigm is one in which both monetary and macroprudential policies could be used for countercyclical management: monetary policy primarily aimed at price stability; and macroprudential policies primarily aimed at financial stability. The use of both policies for reducing economic and financial cycles raises the issue of the interactions between monetary and macroprudential policies. If both policies are used, how do they interact? And if policies interact with each other, does each enhance or diminish the effectiveness of the other? What are the adaptations needed to each policy given these interactions? Does it matter for the adaptations and coordination if either policy operates imperfectly? And what are the best institutional settings for conducting both set of policies?

Monetary policy in advanced countries, and the use of UMP notably, raises some further questions because it affects the global financial cycle, and in that way local conditions in small open economies. What are the channels by which monetary policy in major advanced countries, and UMP especially, affect other countries? Do these effects mean negative externalities? Do they call for adjustments to macroeconomic management in small open economies, including regarding their exchange rate and monetary policies? And does this make macroprudential policies, including capital flows management tools, more attractive in these economies? More generally, what are the policy options available for these economies to mitigate any adverse impacts of international factors on economic and financial stability?

This paper, which draws on recent IMF Board and other papers, provides a summary of recent thinking on these issues and tries to answer these questions. The paper first focuses on an ideal benchmark in a domestic context, in which both monetary and macroprudential policies work perfectly in achieving their own objectives. It acknowledges though that monetary policy can affect financial stability and macroprudential policies can influence

price and economic outcomes. It concludes that monetary and macroprudential policies can each be adjusted to account for any interactions, as has been found for fiscal and monetary policies (which also can interact). It then addresses two additional questions: if macroprudential policies work imperfectly, what are the implications for monetary policy? And if monetary policy is constrained, what is the role for macroprudential policies? For these two questions it concludes that the other policy will have to take up some of the role of the imperfectly operating other policy. Considering next institutional and political economy constraints, it concludes that both macroprudential and monetary policies need to be backed up by clear accountability and transparency frameworks. Even then, coordination may remain difficult, and having the central bank in charge of both policies could be useful.

In terms of international dimensions, the paper reviews evidence showing that, for a variety of reasons, monetary policy in major advanced countries, notably in the US, affects global asset prices and capital flows, with possible adverse effects on financial stability in other countries. While identifying and measuring the transmission channels remains difficult, including how they vary by global, source and destination country circumstances, the cross border effects of conventional and unconventional monetary policies appear clearly in prices and quantities. It is also obvious that (lack of) macroprudential policies can give rise to cross border spillovers and possible negative externalities, again varying by source and destination country circumstances. Negative externalities argue in principle for policy coordination, but in practice the scope for international coordination is limited. Only for some types of macroprudential policies are coordination instruments and mechanisms being defined. And coordination in the monetary policy domain among major countries is even harder. While some progress on coordination can be envisioned, spillovers are therefore likely to remain, implying that countries have less control over their own monetary and financial stability. Within the set of unilateral responses, capital flow management tools in combination with macroprudential policies can then sometimes be part of a useful policy response.

The outline of the paper is as follows. Section 2 covers domestic interactions. It reviews the newly emerging paradigm of monetary and macroprudential policies and introduces the “side effects” that one policy can have on the objectives of the other. It shows how interactions can enhance or reduce the effectiveness of each policy in achieving its objectives and suggests some need for coordination and clear institutional designs. In section 3, the paper reviews specific issues for small open economies. It reviews first the latest thinking on monetary and exchange rate policies for such economies. It then reviews the channels, and evidence thereof, by which monetary policy in major advanced countries, and global financial conditions more generally, can affect other economies. It confirms the limited scope for international coordination of monetary policy and acknowledges the practical problems with coordinating macroprudential policies. The paper therefore reviews how countries can use, besides macroprudential policies, capital flow management tools to deal with risks to their financial and economic stability and assesses on how various macroprudential and capital flow management tools available may interact and be coordinated. Section 4 concludes.

2. **Monetary Policy and Macroprudential Policies: Interactions**

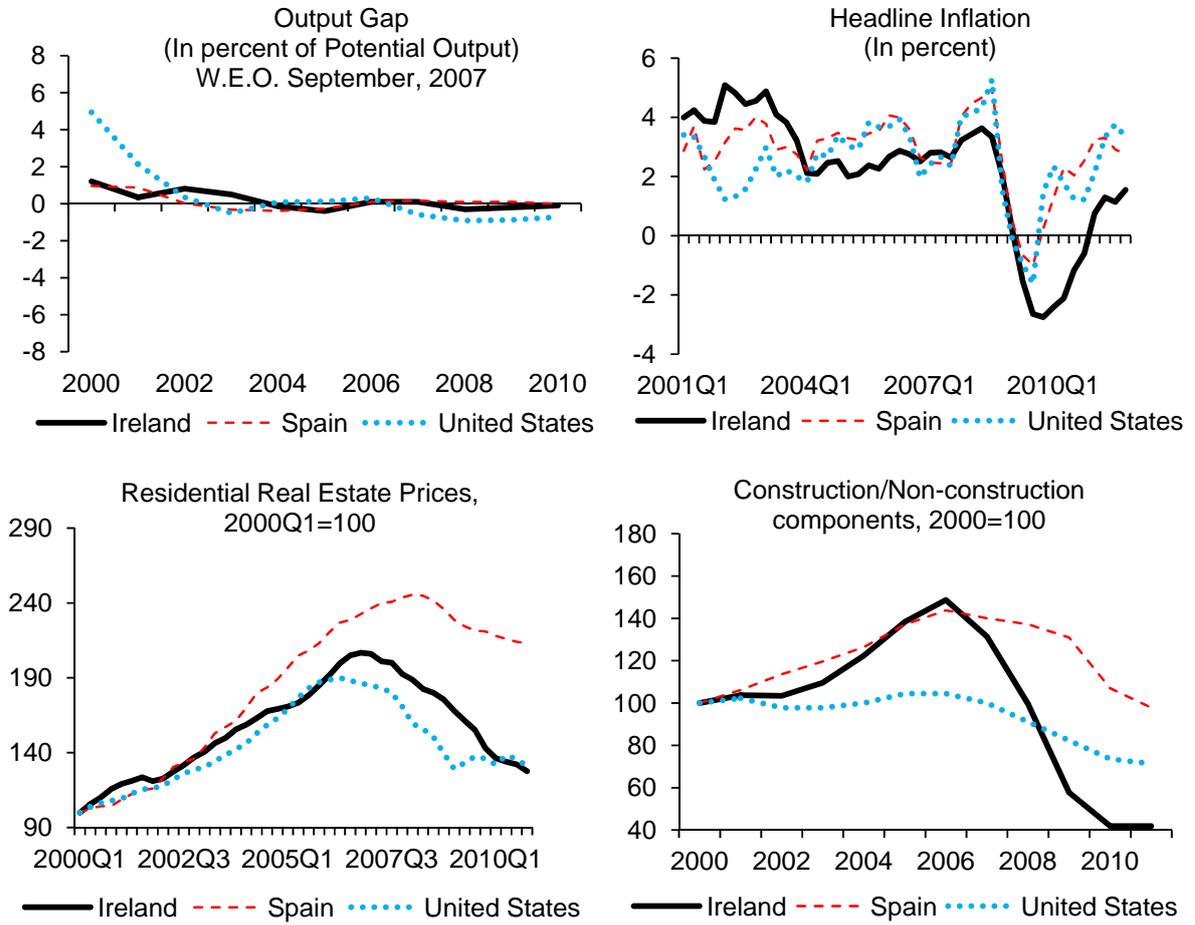
In the decades prior to the crisis, macroeconomic management evolved to assign a strong role to monetary policy, with a primary focus on price stability. The framework of monetary policy was broadly converging toward one with an inflation target (explicit or implicit) and a short term interest rate as a tool (Blanchard, Dell’Ariccia and Mauro, 2010, 2013). While boom-bust cycles in asset prices and credit were observed prior to the recent crisis, these did not seriously challenge the prevailing paradigm. Meanwhile, in most economies, prudential policies were focused narrowly on the soundness of individual firms.

This paradigm was successful in achieving price stability and moderation in business cycles until the recent financial crisis. Pre-crisis estimates of the output gap for key countries that subsequently experienced a crisis (Ireland, Spain, and the United States) were relatively flat (Figure 1). Meanwhile, inflation was stable or only moderately rising. The prevailing monetary policy paradigm thus delivered output and price stability. Price stability, however, did not ensure full macroeconomic stability. Credit and asset prices were rapidly increasing. Distortions led to an inefficient composition of output, with excessive real estate investment, excessive consumption, and widening external imbalances (Figure 1 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, with the financial crisis leading to a large drop in output and large-scale financial distress.

The lessons from this and other experiences and from recent advances in research are that additional tools will be helpful in complementing monetary policy in countercyclical management. The use of financial regulations focused on macro-financial risks, that is, macroprudential policies, emerge as candidates. These primarily prudential tools 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).

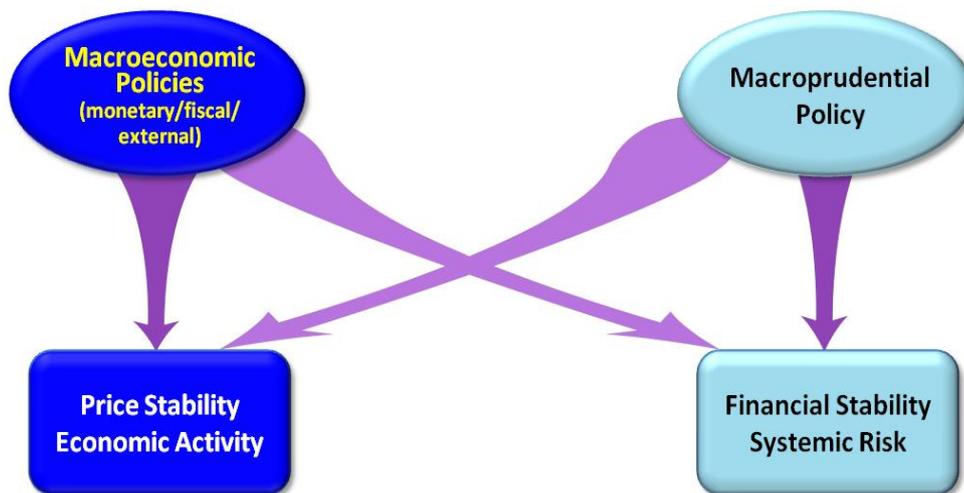
The newly emerging paradigm is then one in which both monetary and macroprudential policies are used for countercyclical management: monetary policy primarily aimed at price stability; and macroprudential policies primarily aimed at financial stability. But these policies interact with each other and thus each may enhance or diminish the effectiveness of the other (Figure 2).

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



Source: World Economic Outlook and Haver Analytics

Figure 2. Monetary and Macroprudential Policy Interactions



IMF (2012b and 2012c) examines the conduct of both monetary and macroprudential policies in the presence of these interactions. The analysis first focuses on an ideal benchmark, in which both policies work perfectly in achieving their objectives and then 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?

A. Benchmark world, when policies work perfectly

When price rigidities are the only distortion, stabilizing inflation is equivalent to maximizing welfare (Woodford, 2003). By keeping monetary policy focused on price stability, output stability is guaranteed and the best feasible outcome is obtained. 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*. In short, boom-bust cycles are amplified (Bianchi (2011), Caballero and Krishnamurthy (2003, 2004), Lorenzoni (2008), Mendoza (2010), and Korinek (2010); Claessens and Kose, 2013 review this literature). 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 (Curdia and Woodford, 2009; Carlstrom and Fuerst, 2010) (Figure 1). While operationalizing financial stability is not easy—because of the large range of financial distortions and their changes over time, the task of preserving financial stability is nonetheless clear: mitigating financial distortions and the risks associated with them.¹

Monetary policy alone cannot achieve financial stability because the causes of financial instability are not always related to the interest rate level or degree of liquidity in the system (which monetary policy can affect). Mitigating the effects of financial distortions or pricking an asset price bubble for example can require large changes in the policy rate (Bean and others, 2010) and when financial distortions are more acute in some sectors of the economy than in others, monetary policy is too blunt a tool. Similarly, the use of macroprudential policies primarily for managing aggregate demand may in fact create additional distortions by imposing constraints on behavior beyond those areas where financial distortions originate. For example, to use limits on general credit growth for financial stability purposes may be too blunt an instrument from an aggregate economic perspective. It is thus desirable, when both policies are available, to keep monetary policy primarily focused on price stability and macroprudential policies on financial stability.

Monetary policy, however, can affect financial stability when it pursues its primary objective: (i) by shaping *ex-ante* risk-taking incentives of individual agents, through leverage, short-term

¹ De Nicolò et al (2012) present a taxonomy of the externalities that can justify macroprudential tools and provide a mapping between various externalities and possible tools.

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. Similarly, by constraining borrowing and hence expenditure in one or more sectors of the economy, macroprudential policies affect overall output. These side effects imply that the new paradigm needs to take into account how the conduct of both policies is affected in the presence of their interactions.

If macroprudential policies have strong effects on output, more accommodative monetary policy can offset these effects as necessary. Conversely if changes in the monetary stance affect incentives to take too much risk, the relevant macroprudential policies would need to be tightened. A number of papers surveyed in IMF (2012b and 2012c) and replicated in Box 1 support this conclusion. In particular, these largely DSGE 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. In other words, the sole presence of side effects has no major implications for the conduct of both policies, however, when policies operate perfectly.

B. World when macroprudential policies work imperfectly

These conclusions rely 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 political economy reasons. This is of course not the real world. 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 such a second best world, the conducts of both policies need to be adjusted to consider the weaknesses in the other. This is conceptually and empirically a hard problem, as with many second best problems.

There are a number of reasons why macroprudential policies may not operate perfectly. Financial stability concerns are hard to capture in theory and practice, making it difficult to determine when macroprudential policies need to be loosened, or tightened. Most DSGE models that include financial stability considerations and allow for macroprudential concerns for example have tools that largely act like an interest rate. As such, macroprudential policies are not so different from how monetary policy helps in stabilizing the economic cycle. More general, models are still poor at capturing financial stability considerations as these often arise from nonlinear effects that are hard to model. The limits of models make for limited scope to know how to adjust either policy optimally.

Importantly, actual experiences with many policies used for macroprudential objectives are still limited, and evidence is only slowly accumulating on the effectiveness of specific tools. While there have been some studies looking at the aggregate effects of macroprudential policies, for example, few analyses have yet used micro economic data, which can provide the detailed insights needed on the channels through which risk taking may occur that macroprudential policies can mitigate (see IMF, 2013b, 2013c for reviews and new evidence).

Box 1. 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.² 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.³ Limiting credit is misguided and runs counter to the stimulus provided by monetary policy. Models with endogenous financial distortions reach the opposite conclusions.⁴ 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.

² 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.

³ 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).

⁴ Christensen and others (2011) or models as in Brunnermeier and Sannikov (2011), or Lambertini and others (2011).

Limited knowledge on the quantitative impact of macroprudential policies makes calibration difficult. Furthermore, it may be the case that addressing one distortion improves other manifestations of financial instability, but it can also be the other way around, i.e., it worsens overall financial stability. These limitations in knowledge may lead to imperfectly targeted or excessively tight macroprudential policies, implying a binding constraint in the wrong place or at the wrong time with negative consequences on welfare (Caballero and Krishnamurthy, 2004).⁵ Tighter regulations can also create stronger incentives for circumvention, with the risk of vulnerabilities building up outside of the regulatory perimeter and policymakers' sight. All these limits on knowledge should make one proceed with some modesty.

Moreover, institutional constraints may impede the optimal deployment of macroprudential instruments. For instance, macroprudential tools may *not* be able to reach some financial activities that lead to systemic risks. Also, macroprudential policies can require, among others, cooperation and coordination with microprudential supervisory agencies, which may be legally or institutionally difficult (see further Osiński, Seal, and Hoogduin, 2013). A “Bayesian” updating approach, where one uses those tools which impacts are well known and implement other tools as one learns more, may then be attractive.

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 (Curdia and Woodford (2009), Carlstrom and Fuerst (2010), and others). 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). See further Stein (2013) for reasons why monetary policy may need to react to financial stability concerns, even in the presence of some macroprudential tools, with one of the main reasons being its more general reach (“it gets in all of the cracks”).

C. Constraints on monetary policy

Just like macroprudential policies may work imperfectly or be constrained, so can monetary policy be limited in its effectiveness. In small open economies with exchange rate pegs or countries in currency unions, for example, the demands on macroprudential policy will be greater. The effective monetary stance can give rise to macroeconomic imbalances, which may need to be contained for macroeconomic and financial stability reasons. Just as it is optimal for monetary policy to respond directly to financial conditions when macroprudential policies are absent and when financial distortions have an effect on the composition of output, it can be

⁵ In an analysis of the evolution of banking system vulnerabilities in relation to the use of macroprudential policies, Claessens, Ghosh and Mihet (2013) find that some macroprudential policies can impose constraints that lead banks to adjust perversely in times of financial downturns.

optimal for macroprudential policy to respond to aggregate demand when monetary (and fiscal) policy are constrained.

Where monetary policy is constrained, it can also be that excessively strong incentives for risk-taking arise. In such cases, macroprudential policies will need to address the adverse side-effects of the effective monetary policy stance on financial and economic stability. For instance, in the case of a currency union, macroprudential tools such as loan-to-value ratios and capital buffers may need to respond to asset bubbles and credit booms that may arise at the national level, rather than at the level of the region, due monetary policy conducted at the central level. This is independent of whether the calibration powers sit at the national level or at the center. The case of the euro area shows the systemic and economic risks that can arise when booms at the national level are not mitigated. Nonetheless, where monetary arrangements are not adequate, there is likely more to be gained from strengthening monetary policy's effectiveness than from using macroprudential policies as imperfect substitutes.⁶

D. Institutional and political economy considerations

Given their interactions, macroprudential and monetary policies may need some coordination. In the well-studied monetary-fiscal interactions, it has been shown that distortions introduced by fiscal policy (Dixit and Lambertini, 2003) or time-inconsistency problems stemming from political factors (Barro and Gordon, 1983) also generate coordination issues. Similar problems can arise in the conduct of monetary and macroprudential policies. A regulator in charge of macroprudential policies may tighten regulation in a recession as the financial system is facing adverse shocks. Or coordination problems may arise when macroprudential policies do not work perfectly, for reasons given earlier. In addition, different institutions can have different views of the economy and the financial system, which can lead to ineffective policy coordination. Some of the solutions adopted for fiscal and monetary policy coordination have lessons on how to address macroprudential and monetary policy coordination problems.

To enhance coordination, the central bank can adopt a leading role in macroprudential policy. This has some key advantages. This way any interactions between macroprudential policies and monetary policy are more easily internalized. It can also ensure macroprudential policy draws on the central bank's expertise in financial and macroeconomic analyses, make sure 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, using the generally greater degree of (granted and de-facto) independence of central banks, it can help shield the macroprudential policy function

⁶ The need to conduct macroprudential policies at the country level in currency unions arises not just due to financial frictions, but is in part also due to an "incomplete" overall design. It is, for example, generally not thought to be necessary to conduct macroprudential policies at a regional level in the United States, even though booms and busts can (and have been) regional. This is, among others, as the financial safety net is nationally organized and funded, as fiscal stabilizers exists across regions, and as labor and other factors markets are flexible enough to allow for reallocation of resources.

more from political influence than when it is assigned to a separate regulatory body.

Leaving macroprudential policies to the central bank also has risks though. A central bank formally responsible for both price and financial stability could for example 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.⁷

These considerations suggest that when both monetary and macroprudential functions are housed within the central bank, coordination is improved, but safeguards are needed to counter the risks from dual objectives. These should include separate decision-making structures for the two policies. 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. The need for clear accountability structures of course also exists when macroprudential functions remain separate from monetary policy.

3. Monetary, Macroprudential and Capital Flow Management Policies in an Interconnected World

The discussion so far has highlighted the need to consider the interactions between macroprudential and monetary policy, with some specific concerns laid out when monetary or macroprudential policies are constrained. Here we broaden the analysis to consider issues more generally for open economies, therefore including coordination between macroprudential and capital flow management tools as well. We first review the latest thinking on the conduct of monetary policy in small open economies, which in practice appears to deviate in some ways from “standard” open economy models. We then review analyses on the effects of monetary policy in major advanced countries across borders and on global financial conditions, which standard models also do not fully capture. As these international factors can lead to negative spillovers, we next review the scope and feasibility of international coordination in the areas of monetary and macroprudential policies. We end by reviewing the latest thinking about capital flow management (CFM) tools and how they may relate to macroprudential policies, all to reduce risks to financial and economic stability.

⁷ 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 some communication challenges.

A. Monetary and exchange rate policy in small open economies

The standard open economy models give us the basic insight of the impossible trinity (or trilemma): with an open capital account, a country cannot conduct independent monetary policy with a fixed exchange rate, or it can only have an independent monetary policy if it does not target the exchange rate. This means that the central bank can only have one target: the inflation rate or the exchange rate. While inflation targeting central banks may care about the exchange rate, they only need to do so to the extent that it affects inflation. Adopting as well the exchange rate as a target will only risk undermining the credibility of the inflation targeting regime. But, in practice it appears that central banks of small open economies with non-fixed exchange rate regimes, including those that use inflation targeting, care quite a bit about the exchange rate (and not just because of political pressures of exporters or importers). Indeed, because of a “fear of floating,” many countries engage in some forms of sterilized exchange rate interventions, which in most basic open economy models would have no impact on the exchange rate.

Ostry, Ghosh and Chamon (2012) therefore ask for what reasons central banks ought to consider the exchange rate and what this means for economic policies. Specifically, they ask whether the central bank of small open economies should have two targets, the inflation rate and the exchange rate, and two instruments, the policy rate and foreign exchange intervention. They reject the two targets approach for economies with highly integrated financial markets. For these economies, sterilized intervention is unlikely to be effective because capital flows react immediately to interest rate differentials. But for economies with greater financial frictions and more highly segmented markets, including possibly due to CFM tools, the scope is clearly larger, as evidence also suggests. And, importantly, there may be benefits from targeting the exchange rate, especially when the country has significant currency mismatches in domestic balance sheets, a high pass-through of the exchange rate to inflation, and limited inter-sectoral factor mobility, possibly leading to Dutch diseases. Under those circumstances, ignoring exchange rate volatility can itself prove costly.

For some countries, one could thus consider an “extended” inflation targeting framework, with the policy rate aimed at inflation, and foreign exchange intervention aimed at the exchange rate. This thus takes a more nuanced view on the trilemma in light of various financial frictions and forms of market segmentation. While establishing that there can be a case for two targets and two instruments, Ostry, Ghosh and Chamon (2012) caution that any interventions should only be so as to move the exchange rate closer to its multilaterally-consistent, equilibrium value. And resorting to exchange rate interventions does put a greater importance on communications to avoid some loss of central bank credibility and prevent market participants from taking unwarranted foreign exchange exposures on the basis of expected interventions. As such, the two-target model is still to be fully refined, at least conceptually (as noted, in practice countries have used this approach).

B. Spillovers of monetary policy and other financial factors

A second, related question is how to adapt monetary policy for small open economies in light of international financial factors. Many models on the conduct of monetary policy aimed at price stability in open economies acknowledge the importance of international factors, but mostly as they affect the real economy through trade channels and changes in the exchange rate, including pass-through via import prices. Many models, pure inflation targeting ones in particular, imply that monetary policy does not need to be fundamentally altered for open economies. Not does monetary policy lose its potency for open economies. In the words of Woodford, 2010: “there is little reason to fear that the capacity of national central banks to stabilize domestic inflation—without having to rely upon coordinated action with other central banks—will be weakened by increasing openness of national economies.”

Models, however, often ignore some indirect effects, including on financial stability, arising from international factors, including monetary policy stances in major other countries. In practice therefore, central banks in many small open economies do give considerable importance to changes in major advanced countries’ monetary policy and related international financial conditions. Monetary policy reaction functions in many emerging markets for example appear to give considerable weight to US interest rates (see BIS, 2012, Taylor, 2013).⁸ And, as noted earlier, exchange rate interventions in emerging markets and other small open economies are often motivated by international factors. What are the exact reasons these central banks do so? What are the channels for spillovers? What are the financial frictions that give rise to them? What are the (implicit) weights placed on price, economic or financial stability reasons?

It is clear that monetary policy in major advanced countries affects financial conditions globally and in other, small open economies. The manifestations of this include effects on local interest rates, asset prices and credit growth, with effects arising in large part through international capital flows (see Caruana, 2013, and Landau, 2013, for a list of channels). Depending in part on the flexibility of their exchange rate, it is to be expected that central banks have to adjust to some degree their policy rates in response to changes in international rates. Furthermore, and especially with large local foreign bank presence, monetary policy actions in advanced countries affect local liquidity conditions (Cetorelli and Goldberg, 2012a), making loan supply less responsive to domestic monetary policy conditions. Spillover effects include, however, not just co-movements in the short-term, policy rates, but also co-movements in longer-term bond yields and the slope of yield curves. These effects also affect major advanced countries, as in the context of UMP (see further, IMF 2013i for evidence of spillovers of monetary policy in advanced countries).

⁸ This statement is based on an evaluation of domestic policy rates relative to some Taylor rule which includes only domestic factors. Obviously, it is not clear from this exercise alone if this behavior is suboptimal from a price, economic or financial stability point of view.

It is to be expected, and well documented, that equity, bond, real estate, and other asset prices are affected by global financial conditions (Lewis, 2011 reviews global asset pricing; see also Rey, 2013), including for East Asian countries (He and McCauley, 2013). Also, the effects of monetary policy changes in advanced countries show up in the ease of financing for corporations around the world.⁹ Effects on asset prices also arise through changes in risk premiums (Bekaert et al 2012). Many of these effects are larger than “fundamentals” only would indicate.¹⁰ As such, it suggests the presence of financial frictions, including those related to the behavior of internationally active institutional and other investors.

The co-movement in asset prices relates of course to the behavior of capital flows, with (co-movements in) gross flows being important.¹¹ Flows into and out of bond and equity markets of emerging economies especially respond quite elastic to changes in interest rates in advanced countries and other global financial conditions (the push factor, first documented by Calvo, Kaminsky and Reinhart, 1996). UMP in advanced countries, and effects thereof on changes in global risk appetite and other financial conditions, for example, has driven much of bond and equity flows lately (see further IMF 2013e-2013h). These effects are observed not just for emerging markets, but also for other small open economies.

The co-movement in gross flows is importantly due to the behavior of debt flows as international credit is the one flow that more or less easily extended. Large, international active banks expand and contract their balance sheets in part in response to monetary policy in advanced countries and the (related) behavior of global asset prices (Shin, 2012; Bruno and Shin, 2012a and 2012b). As the global supply of credit in foreign exchange expands, it tends to fuel local credit and asset price booms (or adds to busts as credit contracts), especially in small open economies. Close relationships can then arise between gross credit flows, current account deficits, and local credit growth.

More generally, there appears to be a global financial cycle that is importantly influenced by the monetary policy stance in advanced countries (e.g., Rey, 2013). This cycle is turn closely linked to the state of global liquidity, especially in US dollars, as well as measures of risk aversion (e.g., the VIX), with various interactions (Gourinchas, 2011). Consistent with the role of global banks in leading to some of these spillovers, economies with more internationalization and a larger foreign (bank) presence are more affected. In turn, these

⁹ Evidence (Laeven and Tong, 2012) shows for example that US monetary policy affects global stock prices, with sectors more dependent on external financing and countries whose domestic monetary policy is more aligned with that of the US more affected.

¹⁰ Whether asset prices are out of line with fundamentals is forbearance course not easily confirmable, since one does not know whether mispricing truly represents deviations from a model or the use of a misspecified model, including not knowing or using the “right” fundamentals.

¹¹ Net flows, typically the only concept captured in macroeconomic models, imply net resource transfer. Gross flows are not necessarily associated with net resource transfers, yet they can lead to risks through balance sheets effects. See further Shin (2012) for a review of gross vs. net flows.

global financial cycles can have adverse real consequences when they turn down.¹²

Importantly, independent monetary policy may not be feasible even with a purely floating exchange rate. Rey (2013) goes as far to say that only if the capital account is also managed to some degree, can a country still regain monetary policy independence. Note that Klein and Shambaugh (2013) dispute this strong view and find that free floating exchange rates do in fact allow monetary policy autonomy, and that partially floating ones allow partial autonomy. Nevertheless, the conduct of monetary policy in small open economies is surely affected more by global conditions than standard models would suggest.

This issue has taken on greater importance with UMP. A growing number of studies, using both high-frequency event studies and full-fledged empirical models, have identified spillovers of UMP to non-UMP countries (Fratzscher and others, 2013; Glick and Leduc, 2013; Chen and others, 2012; Chinn, 2013; Neely, 2012; Bauer and Neely, 2013; Moore and others, 2013; as well as IMF 2013h). Studies find that UMP in the U.S boosted a broad range of asset prices globally: especially equities, but also government and corporate bonds, and credit default swap (CDS) spreads. IMF (2013a) for example showed that external factors accounted for two-thirds of the local currency yield compression in emerging markets since 2008 with domestic improvements explaining the remainder. The capital flows out of advanced countries and into emerging markets in the latter period of UMP can also be largely explained by push factors, such as monetary policy conditions and global risk appetite in advanced countries. See further IMF (2013g) for evidence of the spillovers of UMP.¹³

C. Responses to spillovers: coordination and macroprudential policies

These cross-border spillovers not only complicate the conduct of monetary policy, but can create risks to financial stability if they lead to credit and asset prices booms. The close relationship between financial booms and subsequent crises with high costs, for example, is well documented (Dell’Ariccia et al, 2012). The question thus arises what the scope is for international coordination and cooperation on monetary policy and macroprudential policies

¹² Helbling et. al. (2011) find disturbances in global credit markets to have significant impact on output and other macroeconomic variables in G-7 countries, with shocks to credit markets accounting for some 11 percent of the variance in global GDP, about as large as standard productivity shocks. Credit shocks explain almost 10 percent of the variance of global productivity and 11 percent of the variations in inflation and interest rates, shares close to those obtained for productivity shocks.

¹³ This is not to say that UMP has caused major problems for non-UMP countries so far. Evidence, including from various case studies (IMF, 2012h), suggests that both advanced and emerging countries have generally managed well the implications from UMP, with positive effects similar to what one would expect with conventional policy. In general, countries have undertaken sound macroeconomic management, with actions to make their financial systems more secure—including macroprudential and CFM measures. The present calculus of UMP for both MUP and non-UMP countries is thus, on balance, still positive. Other views do differ, however, on the domestic and international costs and benefits from UMP (e.g., Rajan, 2013).

to reduce these spillovers and their impact.

On monetary policy, which obviously needs not be in tandem across countries as economic cycles are not necessarily synchronized, the scope for international coordination seems very limited in theory, at least in models without financial frictions. If monetary policies are conducted independently, many multi-country models imply no or small aggregate welfare losses. As a corollary, in these “simple” models the gains from cooperation tend to be absent or small.¹⁴ Even if gains are larger than these models suggest, due to some financial frictions or other distortions not modeled, cooperation on monetary policy will be hard to attain in practice. Central bank independence and accountability to national bodies make internalization hard in principle. Furthermore, there is no natural cooperation forum.¹⁵

It is more obvious that international coordination and cooperation is needed for macroprudential policies to be effective given that the financial cycle can be in an upswing in one country but in a downswing in another and the de-facto international financial integration of most countries. There can be inward spillovers, e.g., when foreign institutions lend cross-border and thereby circumvent local macroprudential rules.¹⁶ Outward effects can be when institutions adjust to local restrictions by increasing or decreasing their cross-border activities.¹⁷ And a lack of national actions in applying macroprudential policies can negatively affect other countries. Countries may not want to or be able to cover some cross-border financial transactions with macroprudential policies (similar to limits on where to draw the regulatory perimeter in the domestic context), yet these can give rise to systemic financial or macroeconomic risks in other countries.

For these reasons, one would ideally want to coordinate macroprudential tools across jurisdictions.¹⁸ In principle, one could coordinate policies solely on the supply side, i.e., source countries. To date, only one such coordination mechanism has been established and it

¹⁴ Indeed, in benchmark open economy models, with no distortions other than nominal rigidities, and when the interest rate is the only policy instrument, there are no gains from cooperation: the Nash equilibrium is the same as the cooperative equilibrium. In the DSGE model of Obstfeld-Rogoff (2002), the welfare gains from coordination are only a few tenths of a percent of GDP. Some models have larger gains, but rarely above 1% of GDP.

¹⁵ See further Eichengreen et al (2012) for a discussion and a proposal for an International Monetary Policy Committee to debate such coordination.

¹⁶ For the case of the UK, for example, Aiyar, Calomiris, and Wieladek (2013a and 2013b) show that foreign bank branches in the UK increased their share of lending in the UK in response to these measures, a sign of cross-border competition and regulatory arbitrage.

¹⁷ Aiyar, Calomiris, Hooley, Korniyenko and Wieladek (2013) show that local banks lend less abroad during the 2000s as supervisors required UK banks and UK-based subsidiaries to meet higher capital requirements, which may or not have been optimal given demand for financing in other countries.

¹⁸ The welfare gains from coordinating macroprudential policies have not yet been analyzed, but analysis (Ostry, Ghosh, and Korinek, 2012) on multilateral aspects of CFM tools relates.

only partially addresses problems. Specifically, the countercyclical buffer of Basel III, where banks are required to have more capital during an upswing and thereby expected to reduce lending, also need to consider the financial cycle in other countries to which the bank lends. It will be difficult though to calibrate countercyclical capital buffers this way and to assure that the moderating influences are not negated by internationally active banks and other financial institutions in jurisdictions not subject to such rules. Macroprudential tools limiting the supply of other forms of external financing to specific countries in response to their specific risks are not yet being considered and many are unlikely to become available. For example, policies that require portfolio managers to limit their debt or equity exposures to specific markets because of asset price booms there are very unlikely to be forthcoming.

Restrictions on the demand side are less subject to international evasion, but many issues can still arise. It can, for example, be easy for a recipient country to limit flows coming through its banking system, but difficult to limit flows into its stock market or borrowing internationally by non-financial corporations. And while restrictions on some final borrowers may be harder to evade, issues can still arise (e.g., how to apply limits on LTVs for real estate when the title of the house and the mortgage are held outside the country).

In practice, even with a combination of supply and demand methods, coordination will remain complex, and many difficult issues remain to be assessed and resolved. International active intermediaries can easily evade actions taken by national authorities. And especially in times of stress, given that the international financial architecture is also incomplete in other aspects (e.g., the lack of an agreed framework for cross-border banking resolution, including principles for burden sharing), there are likely to be conflicts between home and host supervisory authorities (as when authorities seek to retain capital and liquidity locally, creating adverse spillovers; see Cetorelli and Goldberg, 2012b, for bank liquidity management in the crisis). Spillovers and negative externalities are therefore likely to remain.

D. Capital flow management tools as an option

As the scope for spillovers with adverse consequences arising from monetary policy in major advanced countries, international financial conditions, and otherwise remains, countries, especially small open economies, will likely consider unilateral measures. Since “demand-side” macroprudential policies can have coverage “deficiencies,” these may not suffice to address fully financial stability concerns. In principle, countries may then want to use CFM tools. To prevent inefficient choices and to reduce negative externalities from unilateral actions, however, such use should be guided by a clear framework.

As a start, neither macroprudential nor CFM tools should be or become substitutes for good macroeconomic management or undertaking necessary structural reforms. To the extent that for example a large current account deficit, perhaps associated with a credit and asset price boom, is driven by the wrong mix of macroeconomic policies, macroprudential or CFM

policies should not be relied upon as a substitute. Another important aspect is the longer terms gains from international financial integration. Here tradeoffs can arise, including vis-à-vis assuring financial stability in the short-run. Much evidence suggests that, when having passed some thresholds, economies that are financially more integrated and otherwise have greater foreign financial presence, do benefit from greater risk diversification, more efficient financial intermediation domestically, even though they do import some risks (Kose et al 2009).¹⁹

A second set of questions countries will need to consider is the relationships between macroprudential and CFM tools. This is, however, complex and relative new area of policy analysis (see further Ostry et al 2011 on which this section heavily draws). To set the stage, Table 1 provides a (not exhaustive) list of possible tools classified under three types: macroprudential, foreign exchange related and CFM measures. The table already suggests many grey areas since how to classify an instrument is not always clear. For example, many foreign exchange related tools could fall under either category of macroprudential or CFM policies.

As also stated in IMF (2013b), a prime difference between macroprudential and CFM tools should be the objective. Macroprudential measures are designed to limit systemic financial vulnerabilities, including those associated with capital inflows and exposures of the financial system to exchange rate risks. CFMs are designed to influence capital flows and affect the exchange rate. While there can be overlap, notably with the foreign exchange-related measures, macroprudential measures do not seek to directly affect the strength of capital flows or the exchange rate per se. Another important distinction in principle is legal: CFM measures are by their nature aimed at non-resident transactions, whereas macroprudential policies are not necessarily so.

Other, more operational differences, relate in part to the type of capital flows. Banking flows are generally within the purview of supervisory agencies, so macroprudential policies limiting (gross or net) borrowing or open positions in foreign exchange can be relatively easy applied. The gross vs. net capital flows distinction is important here as well (as in other ways). While banking flows can present financial stability risk in large part as they are more of a gross flow type, they are for the same reason also more likely under the purview of supervisory agencies. In contrast, foreign direct investment is both less likely of financial stability concern and more a net capital flow in nature. For capital flows not directly under the purview of regulatory agencies, CFM tools might be needed. For example, borrowing by non-financial corporations internationally is hard to control for by macroprudential policies. While these flows may less likely generate systemic financial sector risks, they can still lead to overall overheating and macroeconomic risks, and thereby indirectly to financial risks. Table 2 summarizes these conceptual, legal, operational and other differences between

¹⁹ A related important distinction is between permanent or cyclical CFM tools; see Klein (2012).

macroprudential and CFM tools. While there are these differences, economically and financially, many macroprudential and CFM tools can operate similarly, especially for small open economies, therefore blurring distinctions. Even if some macroprudential tool does not explicitly restrict transactions between residents and nonresidents, and thus does not meet the strict legal definition of a capital control, it may have the same discriminatory effects. A restriction on the ability of banks to attract funds in foreign exchange for example may be a macro- (or even a micro-) prudential measure, yet it may affect non-residents more. As such, there can be considerable overlap in practice between macroprudential and CFMs measures.

More generally, measures to contain systemic risks related to being financially integrated may optimally need to involve both macroprudential and CFM measures. A conceptual way of how to view the use and choice of macroprudential and CFM tools (a “decision tree”) could be the following (this again draws on Ostry and others (2011) as well as Ostry and others (2012). Obviously, any use of policies needs to start with the specific channel by which financial sector or macroeconomic risks can arise. When flows are intermediated through the regulated banking system, prudential measures, targeted to the key concerns—the external liability structure, currency and credit risk, and broader risks from lending/asset price booms—may be the appropriate response. Capital controls may be useful if prudential measures cannot effectively deal with the targeted risks in a timely manner. And economy-wide capital controls may be useful if flows might migrate to the unregulated sector.

There could be modifications to these rules. Obviously, the institutional environment matters. Since regulatory arbitrage is both more likely in countries with either weak supervision or sophisticated financial institutions and deep capital markets, however, it is hard to tell when which tool is preferable. Macroprudential regulations may also cause flows to be intermediated (more) through unregulated parts, which would call for a customized mix of capital controls and prudential measures geared to country circumstances. It may be that macroprudential policies tilt the level playing field for access in favor of credit of large firms (as only they can access international markets) and against smaller firms and households. In such cases, capital controls on direct borrowing abroad may actually create a more level playing field than regulations that raise the cost of bank borrowing. And international obligations may prohibit or constrain the use of capital controls (e.g., the EU treaty, the GATS, the OECD code, or various bilateral investment treaties), thus favoring macroprudential tools. Altogether then, it is hard to generalize when which tools is best.

E. Use and effectiveness of macroprudential and CFM tools

Not only conceptually, but also in actual usage, macroprudential and CFM measures do tend to overlap. Figure 3 provides the various correlations for a number of countries for which macroprudential measures have been collected the use of CFM and conversely. It shows that many countries use both set of tools. Not surprisingly, most overlap is between the areas of capital controls (both economy-wide and financial sector) and FX-related prudential

regulations, and less between these measures and the domestic prudential index. This overlap suggests some complementarities as well as substitutions.

What is the evidence on the (relative) effectiveness of macroprudential policies and CFM tools? These are no easy questions, since problems of identification and causality are numerous (and have plagued for some time the research on the effectiveness of CFM measures (see Forbes, 2007, and Klein 2012 for literature reviews), and more recently, the work on macroprudential policies (see IMF 2013b and 2013c for reviews and new work). Important (additional) constraint for the joint analysis of macroprudential and CFM tools is that there is much coincidence between the buildup of domestic and external vulnerabilities. As noted, capital inflow surges are often associated with credit booms—including risky booms that end in busts—and greater reliance on foreign exchange credit in the economy. And there are large differences among countries in the use of macroprudential and CFM tools, varying from fully liberalized systems that use these tools at the margin to financially more repressed financial systems that have them most of the time in place.

With these and various other caveats nevertheless, stylized facts and regression results presented by Ostry et al (2011 and 2012) suggest that countries with capital controls tend to have less crisis-prone external liability structures; countries with capital controls and FX-related prudential regulations have a lower reliance on FX-lending (while other prudential regulations are associated with a lower incidence of domestic credit booms); and countries with capital controls and FX regulations have greater growth resilience during a sudden-stop episode. This confirms that it is best to use those macroprudential and CFM measures that are targeted at specific vulnerabilities.

More recently, Forbes, Fratzscher and Straub (2013) study CFMs and FX-related macroprudential policies (they do not cover macroprudential policies that have a pure domestic focus such as LTVs; in terms of Table 1, they thus limit themselves to category 2 and 3). Using propensity scoring techniques—to reduce selection problems—and studying higher frequency data—such as weekly portfolio flows as well as various asset prices, they find that macroprudential policies are more effective than CFM measures in reducing some measures of financial fragility, such as bank leverage, credit growth, and exposure to portfolio liabilities. Most CFMs do not appear to affect macroeconomic targets, such as capital flows, exchange rate appreciation, interest rate differentials and equity prices. Removing CFM restrictions on outflows, though, helps limit real exchange rate appreciations. They conclude that certain macroprudential policies may be useful in reducing specific financial vulnerabilities, but many others, what they call “popular” measures, are not efficient in achieving their stated aims.

Overall, the evidence is supportive of the “institutional view” on CFM recently adopted by the IMF (2012a). This view entails that: “In certain circumstances, CFM measures can be useful, such as when macroeconomic policy space is limited, capital flows contribute to

systemic financial stability risks, or the appropriate macroeconomic stance is difficult to assess quickly or takes long to take effect. CFMs should not, however, substitute for warranted macroeconomic adjustment.”

4. Conclusions

The crisis has accelerated the development of macroprudential policy as a concept aimed at financial stability, yet also raising questions about how it interacts with monetary policy aimed at price and economic stability. Monetary policy can affect financial stability and macroprudential policies can affect output and inflation. 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. With weaknesses in the application of macroprudential policies, however, 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 is constrained, there will be greater demands on macroprudential policy. This need not impose great demands on coordination, with some parallels to how monetary policy and fiscal policy operate. Institutional arrangements need to be well designed, however. 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. Regardless whether assigned to one or two agencies, frameworks should distinguish between the two policy functions, with separate decision-making, accountability and communication structures.

International dimensions are crucial for both monetary and macroprudential management in light of the de-facto financial integration of most economies. International financial integration can reduce the effectiveness of domestic monetary and macroprudential policies. The scope for gains from international coordination and cooperation on monetary policy is in principle modest and in practice achievable gains are even more limited. Macroprudential policies will be hard to coordinate in practice too. For financial and economic stability reasons, countries may then have to choose the right mix of macroprudential and CFM policies unilateral, considering both the longer-run costs and benefits of international financial integration and the multilateral aspects of such policies. Regardless, countries have to monitor closely international sources of shocks (including those from monetary policy in major advanced countries) and the state of the global financial cycle for their own macroeconomic and financial stability management.

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Table 1: Classification of Macroprudential and Capital Flows Management Tools

1. Capital controls

- Discriminate between residents and non-residents in cross-border capital movements (OECD Code of Liberalization of Capital Movements, 2009)
- Economy-wide or sector specific (usually the financial sector) or industry specific
- Cover all flows, or target specific types (debt, equity, FDI; short vs. long-term)

Examples: Unremunerated reserve requirements on non-resident deposits; Tax on capital gains for NR investments, on equity and bond inflows, on settlement of derivative contracts with NRs, fees on NR purchases of central bank paper; Licensing requirements; Outright limits or bans.

2. FX-related prudential measures

- Discriminate according to the currency, not the residency, of the flow
- Applied to regulated financial institutions, primarily banks

Examples: Limits on banks' open FX (derivative) position (as a proportion of their capital), on FX lending by domestic banks, on ratio of banks FX loans and securities to FX borrowing; Reserve requirements on foreign currency deposits, capital requirements for FX loans.

3. Other macroprudential measures

- Reduce systemic risk without discriminating based on residency/currency

Examples: LTV ratios; Limits on credit growth and sectoral lending; Dynamic loan-loss provisions, and counter-cyclical capital requirements; Reserve requirements for local currency deposits; Levy on interest from consumer loans; Capital requirements for specific sectors and loans.

Source: Ostry et al 2011

Table 2. Alternative Classification of Tools

1. Residency-Based Capital Flow Measures (CFMs)

Encompassing a variety of measures affecting cross-border financial activity that discriminate on the basis of residency—often referred to as capital controls

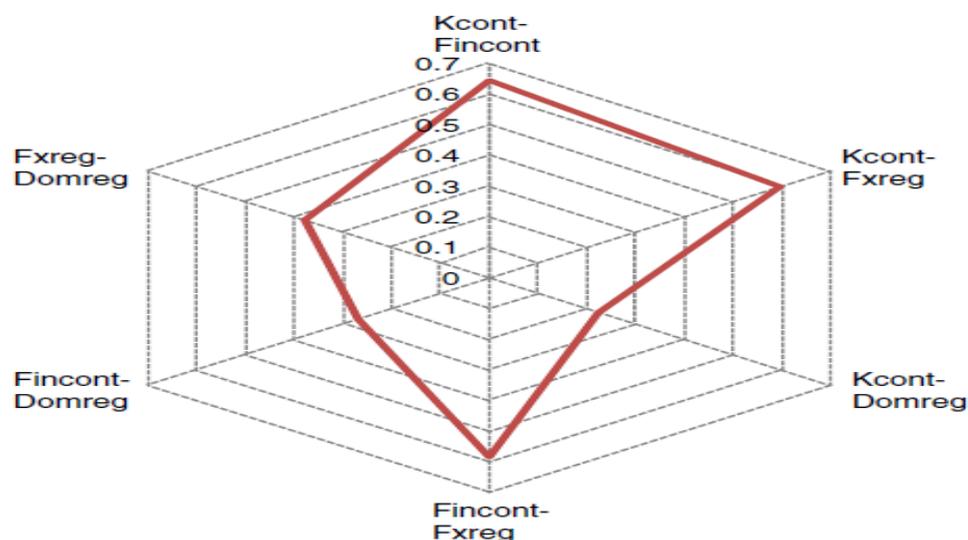
2. Other CFMs

Measures that do not discriminate on the basis of residency, but are nonetheless designed to influence capital inflows (including a subset of prudential measures that discriminate on the basis of currency)

3. Non-CFMs

Measures that do not discriminate by residency and typically, but not always, do not differentiate by currency. Include structural and prudential policies to strengthen the resilience and soundness of financial institutions

Source: Ostry et al 2011

Figure 3: Correlations between Macroprudential and CFM measures

Source: Authors' estimates.

* Kcont=Schindler's (2009) capital controls on inflow index. Fincont=mean of binary variables reflecting restrictions on financial sector's borrowing abroad, maintenance of accounts abroad, and differential treatment of accounts held by nonresidents. Fxreg=mean of binary variables reflecting restrictions on financial sector's lending locally in foreign exchange, purchase of locally issue securities denominated in foreign exchange, differential treatment of deposit accounts in foreign exchange, and limits on open forex positions. Domreg=average of binary variables reflecting LTV ratio, limit on credit concentration in specific sectors, and reserve requirements.

Source: Ostry et al 2012