The Implications of Macroprudential Policies for
International Policy Coordination

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Abstract

Macroprudential policies are designed to safeguard systemic financial stability, in coordination with macroeconomic policies and micro-prudential supervision. The relative importance of macroprudential instruments differs under floating and fixed exchange rate regimes, with the latter placing a greater burden on such instruments, in the absence of an independent monetary policy. Benefits from international coordination of macroprudential policies arise from addressing the externalities involved, reflecting cross-border interconnectedness of financial institutions and markets. Such externalities suggest that gains would be greater for macroprudential policies than the gains from macroeconomic policy coordination, where the literature has traditionally found gains to be modest. In particular, macroprudential measures applied solely to domestic financial institutions may be undermined by cross-border flows in the absence of coordination. Countries of similar financial size are more likely to coordinate because the gains are similarly sized compared with those between large and small economies. A monetary union, with a very high degree of financial integration, poses unique challenges to the pursuit of national macroprudential policies in the absence of coordination amongst its members; tension can exist between macroprudential measures designed to inhibit cross-border flows, which intentionally fragment the currency union’s financial market, and the broader long-term objective of promoting a single financial market.

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Key Words: Systemic financial crisis, financial externalities, macroprudential policies, capital controls, international policy coordination

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I. Introduction

This paper explores the relevance of international coordination in the field of macroprudential policy.\(^2\) It thus draws together two sets of issues that have received increased attention since the onset of the global and euro area crises. Macroprudential policies, aimed at externalities that can threaten systemic stability, can complement macroeconomic frameworks, such as inflation targeting and fiscal rules. International policy coordination, meanwhile, has gained a new lease of life—with coordinated fiscal and monetary actions to counter the global crisis, and initiatives underway in Europe to integrate more closely cross-country policy structures. An \textit{a priori} case for extending policy coordination to the macroprudential domain rests on financial sector externalities. The cross-border interconnectedness of financial institutions and markets suggests that major gains from cooperation might exist compared with the relatively modest gains from macroeconomic cooperation typically reported in the literature.

The goal of the paper is challenging for several reasons. One, no consensus has emerged as yet on the \textit{domestic} role of macroprudential policies, or their coordination with macroeconomic and microprudential policies—let alone the international dimensions of these issues. Two, macroprudential policies are envisaged as safeguarding financial stability, but this concept is not well-defined by comparison with, say, price stability. Three, under fixed exchange rate regimes, macroprudential instruments may not be directed solely towards financial stability, but can be directed towards macroeconomic objectives as well, in the absence of an independent monetary policy (although benefits to financial stability may also result). Four, the distinction between macroprudential policies and capital flow measures is blurry. Finally, a well-developed literature does not presently exist on the calibration of the impact of macroprudential instruments, or indeed their effectiveness in different contexts.

This paper starts by seeking to place the domestic role of macroprudential policies on a firmer footing — noting that this role may vary according to the exchange regime. The relevance of international policy coordination is then discussed. To keep the topic tractable, the empirical effectiveness of these policies is not explored: the reader is referred to a number of sources on that issue. The \textit{de facto} overlap with capital flow measures is treated pragmatically, and again the relevant literature is referenced. Our main focus is thus on issues of policy assignment and coordination, both domestically and internationally. These issues go to the heart of the current debate about macroprudential policies. It is not the instruments themselves that are new. Rather, it is the political economy of pre-emptive macroprudential action that has been brought to the fore by the global and euro area crises. How can such actions be insulated from political pressures or bureaucratic inertia, when their benefits are not immediate and are diffuse, while their costs fall quickly on vocal interest groups? How should macroprudential action be situated relative to policy frameworks such as inflation targeting and fiscal rules, which have achieved a degree of insulation from political myopia? Should financial stability be the responsibility of one agency, enjoying independence in this role, or coordinated amongst several agencies? And

\(^2\) Following Wallich (1984) and Fischer (1987) coordination “implies a signification modification of national policies in recognition of international economic interdependence.” More recently, James (2013) distinguishes coordination from cooperation; the latter involves information sharing without policy modification.
how realistic is macroprudential action that “bites” only within the borders of one country, without international coordination?

Any attempt to clarify such questions needs to be placed in a model of the way the economy works, and how instabilities emerge. It can then be determined whether disagreements result from the economic model or the proposed policy approaches. The remainder of this paper is organized as follows. Section II examines factors relevant to the use of macro-prudential measures in a small open economy with a floating exchange rate, and the coordination challenges that arise in this connection. Section III is concerned with the same issues under a fixed exchange rate regime. Section IV takes up questions of international coordination, as well as the special case of the euro area. Section V offers some concluding observations.

II. Macroprudential policy under a floating exchange rate

Our analytical journey begins in a proto-typical small open economy with a floating exchange rate. In this set-up, international coordination has no meaningful role because this economy is too small to affect economic conditions in the rest of the world; and as price-taker in the goods, factor, and financial markets, it is too small to matter from a global perspective. This restrictive assumption focuses attention first upon domestic policy coordination issues and will be relaxed later to examine international coordination.

a. An economy with frictions and financial cycles

In a friction-free world with perfect foresight and complete markets, our journey would be a short one; but this would leave us far distant from the world in which financial crises emerge. The model of the economy presented here is based on New Keynesian macroeconomics. It embodies market frictions that affect short-run dynamics and impose long-run social costs. Behavior is based on forward-looking expectations, not just inertia or historical developments. For example, expectations of higher income or wealth raise current consumption, and a risk premium can be added to reflect default risk. It is on these New Keynesian and real business cycle foundations that economists have constructed Dynamic Stochastic General Equilibrium (DSGE) models that are the workhorse of policy-makers and academics. (For a fuller discussion, see Annex I.) Such models can explore the effects of policy coordination.

The generation of DSGE models in use before the global crisis, however, did not feature a substantial role for the financial sector. To explore financial stability issues and the role of macroprudential policy the micro-foundations of the financial sector had to be developed. These foundations introduced financial frictions into the New Keynesian framework, including: the financial accelerator, amplifying shocks to investment via net worth changes; adjustment costs; changing financing costs for firms, reflecting levels of leverage; contract verification; asymmetric information; principal-agent problems; and collateral constraints. Housing activity has received particular attention given its influence on aggregate demand, net wealth, and the financial sector. Anticipated fluctuations in income result in consumption smoothing, through saving and dissaving; and uncertain income fluctuations – owing to incomplete financial markets – produce a demand for precautionary savings because agents cannot borrow quickly or fully. Movements in precautionary savings amplify fluctuations in aggregate demand. Most
DSGE models utilize log-linear dynamic systems to study adverse shocks around a steady state. However, with larger shocks the system’s behavior away from the steady state can be very different—with non-linear and asymmetric dynamics—possessing strong adverse amplification effects, higher correlation of asset prices, fire sales/liquidity shortages, and spending significant time in a crisis state once moved there (Brunnermeier and Sannikov (2013)). Moreover, periods of lower risk and financial innovation can leave the system more vulnerable owing to endogenous risk taking, resulting from higher leveraging.

Major take-aways are the pro-cyclicality induced by financial frictions; that even small shocks can have big consequences, owing to contagion; and that government oversight of the financial sector can pay dividends. This modified new Keynesian framework is the context in which this paper will examine policy assignments and explore the impact of coordination.

b. Macroeconomic policy assignments and financial stability

Our framework for discussing instrument assignments is based on the traditional instruments/targets analysis of Tinbergen and Mundell. Tinbergen focused on the need to have at least as many independent instruments as policy goals, while accepting that specific situations may require coordination. Mundell developed the “effective market” classification principle: an instrument should be assigned to the target over which it has the relatively greater impact. Again, however, Mundell’s principle did not remove all need for policy coordination.

With a floating exchange rate and long-run wage-price flexibility, monetary policy is accepted to hold a comparative advantage in providing a nominal anchor for the economy, embedding price stability. In the short run, given nominal rigidities, monetary policy can influence aggregate demand—the output gap—via changes to the nominal and therefore real interest rate. On this basis, the central bank in normal times uses the nominal interest rate to minimize deviations in actual inflation from the target rate, while avoiding excessive sacrifices of, or volatility in, output (a “Taylor Rule” approach).

Assigning inflation (or the trade-off between growth and inflation) to an instrument-independent central bank has helped to insulate monetary policy from political myopia, although this approach has been tested mainly in the benign global context of the “great moderation.” Moreover, the willingness of politicians to “delegate” monetary policy may in part reflect the limited and widely-accepted scope of the delegation; monetary policy does not explicitly involve distributional decisions, and inflation control usually does not require ongoing coordination with other domestic policies. The political-economy attractions of independence/delegation have come under strain as advanced economies have entered a period of high public debt, slower growth, and incipient financial repression.

This approach, however, meant that monetary policy was destined, by and large, to ignore trends in credit growth and private sector deficits, fluctuations in the real exchange rate, developments in asset prices, and swings in the current account—except as they affected inflation and the output gap. In the run-up to the financial crisis, when inflation was well contained, economic and financial stability became increasingly compromised, by paradoxically a low-risk environment that induced increased risk taking. In principle, some financial variables
could be incorporated into monetary policy framework. For example, asset price inflation could be included in the inflation target; and the output gap could be adjusted when, for example, credit deviates from its long-term trend, which may indicate unsustainability in the output level (as suggested by Borio (2012)).

But proceeding far in this direction could complicate the transparency, accountability and autonomy of monetary policy—key elements for the political viability of inflation targeting. If concerns about credit growth relate to potential instability in one sector of the economy (and are by definition difficult to pin point), it may be hard to justify interest rate action that will depress output and employment across the whole economy. The political economy of policy tightening may founder, if the alleged benefits are not immediately apparent and are diffused over the population; are hard to calibrate; and have costs that fall on interest groups such as the financial and construction sectors, or indeed curtail a government revenue boom. Moreover, containing credit growth or the current account deficit may require coordinating several policy branches, perhaps jeopardizing autonomy.

Of course, it would not be prudent for central bankers to pursue—however transparently, accountably, and autonomously—policies that ignore a brewing financial crisis, particularly when financial stability is often a statutory or traditional responsibility of their institutions. So, if monetary policy is not to be adapted to take account of these financial sector concerns, then preserving monetary frameworks (and independence) may depend on credibly identifying complementary policies to address financial stability risks more directly. Here, macroprudential policies have been seen as offering promise.

The discussion above concerned the conduct of monetary policy under “normal” economic conditions. More extreme conditions include times when interest rates are at the lower bound (zero or close to zero); when there is fiscal dominance; and when balance sheets adjustments are underway after a crisis. Recent experience has shown that these elements can occur in a mutually reinforcing fashion. A major break-through of the past few years has been the scope to pursue an active monetary policy even under these conditions. Nonetheless, unconventional monetary policy may not be effective unaided and the central bank may depend on others—especially on the fiscal authority—to achieve its goals. Macroprudential policy (as defined below) may be needed to restore the economy to health. The specific roles of macroprudential policies in exiting and resolving a crisis are very important, but it is not the subject of this paper.

Returning to “normal times”, the period since 2007 has seen a shift in opinion amongst economists on the macroeconomic role of fiscal policy—from government debt as a shock absorber that stabilizes both government spending and taxes. It is now widely accepted that discretionary fiscal actions can have a role in stabilizing the economy, although the application remains hotly disputed. A discussion of the role of fiscal policy in a New Keynesian framework will be found in Annex II. For present purposes, the key assumption is that fiscal policy is effective because in many circumstances private saving does not offset fully spending financed by borrowing (i.e., full Ricardian equivalence does not hold). For example, some households are liquidity-constrained, while others are myopic; firms have finite planning horizons; taxes are distortionary; and government investment can enhance private sector productivity.
This said, no consensus exists on the size of fiscal multipliers, which differ widely across countries and economic contexts, tending to be smaller in more open economies and in countries with larger automatic stabilizers. The size of multipliers depends in part on the response of monetary policy to fiscal deficit changes (Woodford (2011), Anderson (2013)). Recent evidence suggests that fiscal multipliers are larger in recessions than in booms (Baum et al (2012)), while at the zero bound of interest rates the effect of fiscal contraction is typically estimated to be more than double—i.e., above 2—its effect in normal circumstances (Christiano (2011), Anderson (2013)). For our purposes, the precise size of multipliers is not central; what counts is that they are sufficiently large—and vary with monetary policy—to make policy coordination a meaningful exercise.

The use of discretionary fiscal policy for stabilization presupposes an ability to assess correctly the output gap and the associated stance of fiscal policy. However, experience during the financial crisis underscored earlier research findings at the IMF and EC, indicating that revenue elasticity is much higher than normal during asset price booms; and the more general finding that estimates of potential GDP are often pro-cyclical. Strikingly, contemporaneous IMF estimates for Ireland in 2006 signaled a structural fiscal surplus of 2¾ percent of GDP; but with hindsight a structural deficit of 4.0 percent of GDP for 2006 has been estimated more recently. Indeed, it seems that Ireland inadvertently administered a stimulus of 2 percentage points of GDP on average in the four years before its crisis, when output is now estimated to have averaged some 2 percentage points above potential GDP. There has been a similar, though more modest reassessment of the output gap and fiscal stance in Spain (by 3.0 percentage points of GDP); interestingly EC staff calculated in 2007 that standard statistical techniques over stated structural revenues for Spain by about 3.0 percentage of GDP in 2006 (see Martinez-Mongay (2007)). In both cases, significant fiscal surplus were being run at the time, making it also difficult politically to increase the size of the fiscal surpluses.

These developments revealed several interrelated issues. One, the level and growth rate of potential GDP was over stated, providing a false sense of fundamentals. To “lean against” the wind, one needs to know how strong the wind is blowing and from which direction! Two, the composition of government revenues was more cyclically dependent than assumed, overstating the strength of the structural fiscal position and understating inadvertent stimulation of the boom. Finally, the political challenge remains of proposing and implementing budgets with larger surpluses. Rainy days funds typically lack strong political ownership, particularly when faced with competing constituent needs.

The decades before the crisis saw a strong current of opinion against discretionary fiscal actions for economic and political economy reasons. The economic reasons pertained to small fiscal multipliers associated with Ricardian equivalence and the desire to protect social welfare by smoothening government spending. Political economy concerns focused on the difficulties in implementing timely fiscal measures and the desire to insulate fiscal policy from political/deficit bias. Fiscal rules and fiscal councils have been instituted in some countries as commitment devices (see IMF (2013c)). Quantitative limits on expenditure, deficits, and debt are among the prevalent types of fiscal rules. While some evidence exists that fiscal rules can improve discipline, such rules also have weaknesses including: possible pro-cyclicality,
undesirable impact on spending composition, and recourse to creative accounting and off-budget operations. Fiscal rules may also create a presumption against the active use of policy.

Difficulties with fiscal rules have led some to propose the formation of fiscal councils. Fiscal councils can help limit political influences by providing independent macroeconomic projections, objective assessments of revenue and spending plans, and analysis of the long-run implications of policy choices (Calmfors and Wren-Lewis (2011)). The transparency and analysis associated with appears to have reduced forecasting biases and supported compliance with a rule or target (see Hagemann (2011)). However, fiscal councils tend to rely on influence and persuasion to be effective and do not have delegated powers such as central banks possess. This difference is not surprising because fiscal choices are primarily distributive (across individuals, social groups or generations) in nature, which precludes delegation to unelected policymakers in democratic settings. There may be lessons here for governance arrangements for macroprudential policies.

The global financial crisis revived interest in the questions of when, and how far, to use fiscal policy actively to dampen and stimulate the economy, including in the presence of risks to financial stability. Clearly-defined fiscal rules to protect the public finances have been partly undone by an explosion of public liabilities triggered by financial instability. Two cases in the euro area illustrate this more general point; in Ireland public debt relative to GDP quadrupled in the course of its crisis, while in Spain, this ratio tripled. In addition, the U.S. and U.K. experienced large increases in their public debt ratios. Thus, the question exists whether a more active fiscal policy would have avoided or dampened this crisis. Some argue that existing fiscal frameworks need to be modified to add arrangements to address financial stability risks.

The concerns referred to earlier, in connection with monetary policy, are relevant here. It may be hard to initiate precautionary fiscal action in the face of a credit boom whose impact is sectoral, and whose risks are hard to quantify and time. This situation is similar to the problem of raising interest rates when inflation is not yet high or projected to be high, or taking action to safeguard fiscal sustainability when the government is running a surplus or can still borrow cheaply. Financial stability therefore seems to call for a dedicated policy framework, enjoying political “insulation”. And in terms of policy impact, the potential costs are higher if policy action affecting the whole economy has to be taken in response to developments that are concentrated in one sector. In a world of interconnected financial markets, the present system of policy assignments is incomplete and its goals are in jeopardy.

Before concluding on fiscal policy, it is important to note that the foregoing addresses only the aggregate, macroeconomic balance impact of fiscal policy—the fiscal stance. This reflects our interest in policy assignments, rules and coordination. Fiscal policy also influences economic and financial stability through many structural or microeconomic channels, including taxes on financial and real estate transactions. Moreover, it offers scope for a more targeted, sectoral impact, improving cost-benefit trade-offs. This aspect of fiscal policy is discussed below in connection with macro-prudential instruments.

c. Macroprudential policy: goals, calibration, instruments, and coordination

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Suppose that the monetary and fiscal policies in a small open economy are sound, and that microprudential regulation and supervision are effective. To be specific, envision a macroeconomic and prudential policy set-up—and spirit of implementation—along the lines of policies in Australia, Canada, Poland, Sweden and Turkey before the global financial crisis. These countries all avoided their own financial crises at the time of the global financial crisis without explicit macroprudential policy regimes. Perhaps, this was due their relatively-fresh memories of their past serious financial sector problems.

Given a sound economic policies and financial supervision, it is fair to ask if any policy gap exists to be filled in a systematic way by macroprudential policies, assuming that interest rates are not at the lower bound. In other words, with an independent monetary policy and a sound fiscal policy, does a combination of “macro plus prudential” allow one to dispense with excursions into new “macroprudential” territory? So, given well-designed macroeconomic policies, will not microprudential vigilance do the trick?

As suggested above, in order for policy frameworks to be credible, they need to be complemented by stronger crisis prevention provisions and that policy frameworks at the macroeconomic level are incomplete. Moreover, pragmatically, having a financial crisis once in every generation to reboot policy immune systems is too expensive in economic and human terms, as the recent crisis has amply demonstrated. A financial stability framework therefore seems desirable. But to author a distinct policy framework, several questions must be addressed. Can one articulate a clear goal to which macroprudential policy can be assigned? Can one establish a distinct rationale for this policy? Can instruments be defined for its use along with their policy calibration? Is it possible to identify a clear accountability framework that carves out a distinct policy domain, as opposed to a cautionary input that would lead one to lean towards a tighter than normal stance in the implementation of macroeconomic and microprudential policies? These questions require some preliminary answers at the national level before we can move on to the international coordination of macroprudential policies.

(i) Goal

Macroprudential policy is usually envisioned as aiming directly to promote financial stability at the systemic level. This contrasts with the focus of microprudential supervision, which is on the financial health of individual financial institutions. An illustration will be found in the text table below, which is from Borio and Dehrmann. Financial instability is easier to identify than financial stability (see Laeven and Valencia (2008) for a data base on financial crises). Thus some have defined financial stability as the absence of a systemic crisis (for a discussion, see Goodhart (2006) and Haldane (2004)). But this definition is unhelpful from an operational policy standpoint because the financial system could still be nearing a tipping point and highly vulnerable to shocks before a financial crisis ensues.

The ECB has defined financial stability “as a condition in which the financial system – comprising of financial intermediaries, markets and market infrastructures – is capable of withstanding shocks, thereby reducing the likelihood of disruptions in the financial intermediation process which are severe enough to significantly impair the allocation of savings to profitable investment opportunities.” Moreover, a stable system can “efficiently and
smoothly transfer resources from savers to investors”, including via the payments system. Risks are “relatively well managed” and “priced reasonably accurately”. However, many of these terms lack precision.

Another approach is to enumerate the key risks that a putative financial stability policy is called on to address. These systemic risks fall into four broad categories:

- Credit growth and associated asset price inflation;
- Excessive leveraging or deleveraging;
- Systemic liquidity risks; and
- Large and volatile capital flows, including foreign currency lending.

These risk categories typically occur in combination with each other, and to varying degrees. For example, the confluence of rapid credit growth, large capital inflows, and excessive leveraging, is one familiar in many emerging market economies. These risks also need to be addressed in two dimensions: structural, in terms of the distribution of risk in the system at any point of time; and temporal – i.e., the build-up of risks and the pro-cyclicality associated with amplification mechanisms.

(ii) Rationale

The rationale for macroprudential supervision rests crucially on the presence of externalities—amplification due to pro-cyclical risk-taking, asymmetric information and agency problems, contagion, and correlation and aggregation risks. Macroprudential policies are more preoccupied with common shocks to the financial system, rather than with idiosyncratic (and uncorrelated) shocks faced by individual institutions, except to the extent the latter propagate through contagion and interconnectedness, in a destabilizing fashion. Macroprudential
supervision has been characterized as a top-down perspective in contrast to the bottom-up perspective of microprudential supervision. The macroprudential rationale overlaps to some degree with the rationale for microprudential supervision. However, the latter rests more heavily on the standard moral hazard argument stemming from explicit or implicit deposit insurance, on adverse selection problems when institutions are under stress, and on the need to ensure private balance sheets that protect the public purse from excessive risk taking. Clearly overlap exists between the two, and principal-agent problems loom large in both. Moreover, effective financial supervision must have both perspectives.

(iii) Triggers and target variables

If the above sets out a rationale for macroprudential supervision, what events should trigger intervention; what should be the target; and what goals should be targeted? It has long been recognized that multiple influences cause systemic vulnerability, and that the indicators relevant to stability assessment are many. A vast empirical literature exists on early warning systems, as well as stress tests to predict banking crises. On this general issue, the reader is referred to Davis and Karim (2008), Lo Duca and Peltonen (2011), ECB (2012); and on measures of financial stability to Gadancez and Jayaram (2008), Borio and Dehrmann (2009). This literature sees the drivers of crises as large in number, diverse, and having both domestic and international origins.\(^3\) IMF staff (Blancher, et al (2013)) have listed 23 indicators that are available to identify systemic risks. This multiplicity of sources and indicators makes the development of a transparent operational target for financial stability—comparable with projected inflation, or the fiscal deficit—a major challenge. However, since the onset of the global financial crisis, the causes and warning signs of systemic crises have been reviewed with a more focused attention on the question of policy tractability. In other words, the search has been on for variables that can serve as a proxy for financial stability, and which macro-prudential policy (or a broad set of macro-economic and prudential policies) can target.

Borio (2012), White (2012) and others stress that financial crises are associated with peaks in the financial cycle, in the tradition of Hayek, von Mises, and Minsky. Financial cycles can be parsimoniously characterized in terms of credit growth and property prices. Thus, they consider it possible to measure accurately the build-up in crisis risks, based on the characteristics of credit booms. Mendoza and Terrones (2012) examined the stylized facts of 70 credit booms in 61 economies during 1960-2010. They found such booms to be synchronized internationally, with similar chances (32 percent) of a banking crisis in both advanced and emerging economies. Credit booms typically followed capital inflow surges, productivity gains, and financial sector reforms. Moreover, 71 percent of the crises were associated with fixed/managed exchange rate regimes. Dell’Ariccia (2012) reported similar findings in a study of 175 credit booms in 170 countries. In sum, this latter body of work underscores that credit growth matters, but not only credit growth; crises are also strongly associated with fixed exchange rate regimes. And (excessive) credit aggregates could be employed as an indicator or intermediate target, while keeping a watchful eye on other relevant variables.

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\(^3\) Typical indicators include: real GDP growth, inflation, the fiscal balance, the real exchange rate, foreign exchange reserves, the current account balance, interest rates, corporate leverage, corporate earnings to debt service, corporate defaults, household debt/debt service to income expenses, capital adequacy, risk premia, credit growth, equity and house prices, and concentration/correlation measures.
Credit indicators received a boost when the Basel Committee on Banking Supervision (BCBS) provided guidance to national supervisors (BCBS (2010)) for employing a common methodology to calculate an internationally consistent credit/GDP gap for purposes of implementing counter-cyclical capital buffers. This guidance included the definition of credit—the broadest coverage possible given individual-national data constraint—and step-by-step calculation instructions. The threshold for this measure can vary from country to country. As the BCBS stresses, this credit/GDP gap should be viewed simply as a useful starting point for country authorities, but country authorities can utilize other variables and qualitative information to assess the sustainability of credit growth and system-wide risks. According to the BCBS, these other variables assessed can be divided into three groups. One, aggregate macroeconomic variables consist of GDP growth, (real) credit growth and deviations of the credit to GDP ratio from a long-term trend, and deviations of real equity prices and of real property prices from their respective long-term trends. Two, key measures of banking sector performance include profits (earnings), proxies for (gross) losses, and deviations in corporate credit spreads from their long-term averages. Three, proxies for the cost of bank funding have been found to be useful. Finally, while the credit/GDP gap need not play a dominant role in country authorities’ stability assessments, it also should be totally ignored.

(iv) Instruments and their calibration

What are the instruments that can be used for macroprudential policy; what are the triggers for action; what goals should they target; and how will accountability work? In a 2011 IMF survey, 51 official-sector respondents cited 34 instruments used to contain systemic risk. These included: (micro) prudential tools (16), foreign exchange measures (6), monetary policy instruments (5), and fiscal measures (2). (The box below contains a partial list (see also Lim et al (2011)). Some reported instruments have been in use since the early 1990s. Many—e.g., the foreign exchange, monetary and fiscal domains—would typically not be considered macroprudential unless their use is motivated by specific concerns for systemic risk. For example, capital flow management (CFM) measures are frequently designed to dampen capital flow volatility (surges and sudden stops), thus complementing fiscal, monetary, and exchange rate polices. To the extent that capital flows pose systemic risks to the domestic financial system, CFM measures can be employed with macroprudential effect, addressing both concerns (IMF (2012)). In this circumstance, the CFM measure could be considered as macroprudential.

Research on the effectiveness of macroprudential instruments is at an early stage. Empirical evidence and case studies suggest that macroprudential instruments can be effective in addressing systemic risk if employed appropriately and well targeted (IMF (2013b)). However, few studies consider differential effects across instruments or their interaction with macroeconomic variables such as output and inflation. Macroprudential tools have been shown to reduce the incidence of credit booms and to decrease the probability that booms end badly (Dell’Ariccia, et al (2012)). Macroprudential tools such as LTV and DTI caps, credit ceilings, reserve requirements, and dynamic provisioning, have been found to mitigate the procyclicality of credit expansion. Cross-border activities of financial institutions pose challenges to macroprudential policy: possible unwelcome leakage effects may weaken the policy impact. The
perimeter of macroprudential policy (like that of microprudential policy) can also shift over time, owing to financial innovation and regulatory arbitrage. In reviewing the literature, the IMF concluded (2013b) that the relative strength of tools and their precise quantitative impacts are difficult to measure; moreover the effectiveness of macroprudential actions in reducing the probability and depth of future crises, remains difficult to quantify. It also appears likely that macroprudential tools may be more effective in dampening a boom than dealing with the aftermath of a bust.

For our purposes, the effectiveness and calibration of macroprudential instruments are assumed to be sufficiently known to permit their use, but less well understood than for traditional macroeconomic policies. This means that the coordination of macroprudential policy with macroeconomic policies faces more of a challenge. Macroprudential policy decisions take place under a considerable degree of uncertainty. Both the probability of a crisis and its costs are unclear. The risk of signaling a false crisis—Type II errors, or “calling wolf”—cannot be ignored; but neither can the risk of waiting too long and failing to forestall a crisis. The benefits of potential crisis avoidance must be weighed against the costs of a Type II error—costs related to foregone output, structural distortions, diminished incentives for financial innovation, and risk-shifting to other countries. IMF staff (Arregui, et al (2013)) have developed a conceptual

<table>
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<th>Commonly Used Macroprudential Instruments</th>
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<tr>
<td><strong>Tools to Address Excessive Credit Expansion in the System</strong></td>
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<tr>
<td>- Time varying capital requirements (risk weights)</td>
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<td>- Dynamic provisions</td>
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<td>- Ceilings on credit or credit growth</td>
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<td>- Caps, possibly time varying, on load-to-value (LTV) ratios</td>
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<td>- Caps, possibly time varying, on debt service-to-income (DTI) ratios</td>
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<td>- Minimum, possibly time varying, margin requirements</td>
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<td>- Reserve requirements</td>
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<td>- Capital flow management measures including residency based measures</td>
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<td><strong>Tools to Address Key Amplification Mechanisms of Systemic Risk</strong></td>
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<tr>
<td>- Limits on maturity mismatches</td>
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<td>- Caps on foreign currency lending</td>
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<td>- Limits on net open currency positions or mismatches</td>
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<td>- Levy on non-core funding</td>
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<td><strong>Tools to mitigate structural vulnerabilities and limit spillovers from stress</strong></td>
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<td>- Additional loss absorbency related to systemic importance</td>
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<td>- Disclosure policy for markets and institutions targeting systemic risk</td>
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<td>- Resolution requirements for SIFIs (Systemically Important Financial Institutions)</td>
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Source: FSB, IMF, and BIS, *Macroprudential Policy Tools and Frameworks, Progress Report to the G20, October 2011*
framework to analyze these benefits and costs, including leakages and unintended consequences. The challenge remains to operationalize such a framework, developing robust estimates of the effectiveness of macroprudential instruments, and the magnitudes and probability distributions associated with the benefits and costs. Brunnermeier and Sannikov (2013) show in a DSGE model that policies, in which the prudential regulator assumes only the tail risk, can improve welfare significantly, particularly when exogenous risk is small and potential endogenous risk is large. They also argue that small policy mistakes can have a huge equilibrium effects and that some prudential policies, such as capital requirements and restrictions on dividends, may lead to material unintended adverse consequences.

d. **Domestic policy coordination**

The domestic coordination issues that dominate the economic policy literature arise when the monetary and fiscal authorities are independent, and focus on outcomes for inflation, real interest rates and output. The implications of inconsistent objectives for the fiscal and monetary authorities have received most attention, especially by political scientists, while economists have tended to focus on time inconsistency of policies. Commitment devices, such as central bank independence and fiscal counsels, have been developed to address these issues. Recent literature on the fiscal theory of the price level (see Canzoneri, et al (2011) for a survey)—suggests that the statutory independence of the central bank is not sufficient to secure price stability. In other words, the central bank needs the support of fiscal policy anchor successfully prices and inflationary expectations.

Coordination between monetary and fiscal authorities may not take place, however. There are several possible reasons including: different objectives; measurement problems; varying economic models; misaligned forecasts; information asymmetries or confidentiality; different time horizons; and dissimilar decision-taking lags or responsiveness. In particular, they may seek to achieve, respectively, lower inflation and lower unemployment targets than are feasible simultaneously given the economic structure. The fiscal authorities—faced with election pressures—may tend to spend without increasing taxes commensurately, relying on public borrowing and seigniorage from the central bank. In short, there is a fiscal deficit bias.

This coordination problem has been studied using a two-person non-zero sum game. As is well established such games can have cooperative and non-cooperative solutions. With an independent central bank, the result can be a non-cooperative solution, sometimes referred to as a game of chicken (Sargent (1987)): inflation may be lower than in other cases, but the fiscal deficit and real interest rates will be higher (see Nordhaus (1994)). As the game is repeated, the fiscal authorities could optimize relative to the monetary regime, producing an outcome with a lower deficit and real interest rates. Thus, the central bank, by taking leadership in this game, can improve the policy mix. In particular, a central bank that is more conservative—more anti-inflationary—than society can offset the fiscal deficit bias and time inconsistency problems, improving social welfare (Rogoff, 1985)). Fiscal rules and fiscal counsels have also been proposed, and implemented in some countries, to cope with fiscal deficit bias (see Calmfors and Wren-Lewis (2011) and Hagemann (2011)).
Financial stability is not indifferent to ‘policy mix’ outcomes. A policy mix that features a “high” fiscal deficit, putting upward pressure on real interest rates, and causing unwarranted real appreciation, is less benign for the financial stability of firms or households. But, this said, the coordination literature has not focused on the impact of policy coordination on financial variables such as credit growth and asset prices.

A much-debated question is the institutional assignment of macroprudential policy. Should macroprudential responsibilities be assigned to the microprudential supervisors, the central bank, the fiscal authorities, or to an entirely new body established for this purpose? One way forward may be to accept that institutional arrangements will necessarily be shaped by country-specific circumstances. ‘One size will not fit all’ (Nier, et al (2011)). However, sound principles governing institutional arrangements may prove more universal than such specific choices. Notably, effective arrangements should (i) support prompt and accurate identification of risk through access to information and relevant expertise; (ii) provide incentives for timely, effective use of policy instruments; and (iii) ensure policy cooperation, while preserving the autonomy of established policy functions. Provided one is clear which of the above systems is operating, and seeks to safeguard these principles, then the choice may be fairly finely balanced.

An obvious starting point is the overlap between macro and microprudential policies, whether these policies are in a single institution or not. The BCBS in its Core Principles for Effective Banking Supervision (2011) establishes as the “ultimate objective” the promotion of “the safety and soundness of banks and the banking system”. Thus, effective supervision should be focused on the banking system as well as on individual banks. In fact, the Core Principles do not make a distinction between macro and microprudential policies, which share common instruments.

With complex, closely interconnected, and concentrated financial firms, a meaningful distinction between the soundness of individual firms and the well being of the entire system may indeed be illusory. Conversely, properly “caring” about the micro-dimension of financial stability also requires “caring” about its macro-dimensions (Ellis (2013)). Compliance and resolution authority, too, is likely to be more effective when micro and macroprudential perspectives are integrated. For these reasons and others, Crockett (2001) spoke of “marrying” the micro and macro dimensions of prudential policy. However, such a marriage could come under strain particularly after financial crisis has erupted. Microprudential supervisors would typically want to build capital buffers to protect banks, while macroprudential supervisors would want to release buffers to prevent a deeper recession.

Some say macro and microprudential policies should be married at the central bank! Indeed recently, the Bank of England and, to a somewhat more limited extent, the ECB have moved in this direction; the Bank of Japan has long had supervisory responsibilities including for financial stability. Certainly, many central banks have the expertise and experience. Moreover, they have already a keen interest in preserving financial stability to safeguard the monetary transmission mechanism and their lender of last resort function. Close and candid communication with financial supervisors is crucial to keep central bank liquidity support from crossing into solvency support, which is the purview of the fiscal authorities. Moreover, macroprudential policies can complement monetary policies particularly during the upswing of the financial cycle and in dealing with sectoral booms such as in real estate. Coordination of such complementary policies can be achieved more completely in a single agency. For this
reason, the application of counter cyclical capital buffers, which would be triggered when the credit-GDP ratio crosses a predefined threshold, is typically considered a central bank function.

However, the housing of macroprudential policy at the central bank is not without its own tensions. Because price and financial stability are distinct objectives and employ very different instruments, they can come into conflict. Higher interest rates may be needed to combat inflation, but higher interest rates could undermine financial stability. Placing these tensions in a single institution does not eliminate them; rather the institution must internalize those tensions. Moreover, monetary policy and macroprudential policy require instrument independence in order to achieve their separate objectives. Therefore, where these functions have been combined at a central bank—see Bank of England and ECB—separate dedicated decision-making bodies/processes have been developed. Nonetheless, having decision-making for monetary and all prudential policies at central bank can pose their challenges—less transparent debate, creation of “a house view”, and more intense lobbying pressures on the central bank related to prudential polices, which could spillover into their conduct of monetary policy (Ingves (2010), Nier et al (2011), and BIS (2011)). Finally, experience in Ireland, Spain, the United Kingdom and the United States carries cautionary messages about policy foresight; and even within a central bank, coordination problems are not be absent.

Other efforts to connect the dots more effectively entail assembling a network of financial supervisors/regulations plus the monetary and fiscal authorities. For example in the United States, the Financial Stability Oversight Council (FSOC) was created in 2010 to respond to emerging threats to domestic financial stability; it is chaired by the Treasury Secretary and is composed of the Federal Reserve Chairman plus the heads of various supervisory and regulatory agencies (e.g., SEC, FDIC, CFTC, FHFA). In a similar vein, the European Systemic Risk Board (ESRB) was created in late 2010 and given macroprudential oversight of the EU’s financial system to monitor, prevent, and mitigate systemic financial risks. The ESRB’s General Board is chaired by the ECB President and consists of the all the Governors of the national EU central banks, plus one representative from the EC, European Banking Authority (EBA), the European Insurance and Occupational Pensions Authority, and the European Securities and Markets Authority. (See the report by the High-Level Group on the ESRB Review that evaluated the ESRB’s operations and made recommendations to strengthen it.) Other examples of committee structures include Australia, Canada, India, Korea, and Mexico.

The broad membership of committees/counsels reflects the multi-dimensional aspect of financial stability, fosters coordination, and facilitates information sharing, interactive analysis, and debate. These bodies tend to be primarily collaborative/cooperative in nature; the individual member agencies continue to have independent decision-making powers. The absence of binding authority issues has been addressed at least partially by power to issue public warnings and recommendations and thus use the public opinion and moral suasion. These recommendations may be further underpinned by a comply-or-explain mechanism. Given their committee structure, a key question relates to their ability to take timely decisions and their accountability in this oversight capacity as opposed to their primary functions. Counsels must typically report to the legislative authority and publish annual reports, minutes, and other

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4 The importance for optimizing social welfare of independent and separated objectives for price and financial stability has been analyzed by Udea and Valencia (2012).
consultative documents. The extent to which parliaments and the public can effectively hold councils accountable remains unclear.

Domestic coordination of macroprudential policy faces a fundamental challenge defined by its regulatory boundaries—its perimeter. On the other side is what is typically called the “shadow banking system”, which competes with, but also finances and borrows from, the banking system. This interconnectivity is vulnerability, but it is also a source of innovation and dynamism. Most securities/market-based financing simply is not subject to conventional macroprudential constraints, which are institutionally focused. Because bank supervision imposes costs upon banks, there is always an incentive to avoid these costs, setting up “a special purpose vehicle” on the other side of the perimeter. Official bodies other than bank supervisors typically regulate non-bank financial institutions, creating scope for “regulatory arbitrage” or “supervisor shopping”. A second perimeter limit is reached at the national border—only domestically-based financial institutions, such as foreign bank subsidiaries, are subject to national regulation. Foreign financial institutions can also lend across borders and domestic borrowers can seek foreign lenders. This perimeter problem is truly “the elephant in the room” and our focus in studying international coordination.

III. Financial Stability and Domestic Coordination under Fixed Exchange Rates

Having examined the case of floating exchange rates, this section focuses on fixed exchange rate regimes. We will seek to show that the domestic assignment and coordination issues for macroprudential policies—and hence the basis for international coordination of these policies—are substantially different under a fixed rate regime; and this will also lay the basis for our later discussion of EMU. But before delving into those aspects, it is useful to discuss what is not different under the two exchange rate regimes.

The objective of macroprudential policies remains financial stability, which continues to be a fuzzy concept. The measurement issues have not changed. In particular, the use of credit aggregates as a proxy indicator for financial instability retains certain advantages (e.g., objective, quantifiable, transparent), but it is subject to both Type I and Type II errors. While compound indicators have better signaling properties, they are not as easily understood, making accountability and communication more challenging. There remain, too, the same questions about the effectiveness and calibration of macroprudential measures, and possible distortions from their use. Distinctions and overlaps between macro and microprudential policies are not affected by the choice of regime. The fundamental issues pertaining to institutional setups for macroprudential policy are also familiar, although the answers require further nuancing, as discussed below. And last but not least, concerns about cross-border financial linkages are in no way diminished and in fact increase in a currency/financial union.

The key difference for macroprudential policy under a fixed exchange regime for a small open economy is the loss of monetary independence. Relinquishing this involves a cost that has been widely discussed in the economics literature, and has to be weighed against the countervailing benefits of exchange rate fixity. The standard framework to explore the real economy costs of losing monetary independence is the optimum currency area (OCA) theory of Mundell (1961) and McKinnon (1963). This theory provides criteria that can be employed to assess the
economic features desirable to have when sharing a currency. Key features included wage and product price flexibility, labor and capital mobility, and financial integration; cross-border asset holdings can prompt international risk sharing to buffer asymmetric shocks (McKinnon (2004)).

If a small open economy shares a currency, or fixes its exchange rate, with other larger economy, the significance of the loss of an independent monetary policy by the former diminishes the more that the two economies are similar. In the extreme when the two economies are identical, it would not be meaningful to ask whether monetary conditions are ill matched to national cyclical conditions. But in the absence of high OCA compatibility, asymmetric shocks can result in the small pegged economy facing adjustment challenges as it operates under monetary conditions ill-matched to its cyclical position. The key point from a macroprudential standpoint is that real interest rates—measured as the policy interest rate less national inflation—will be too high or too low, and cannot be adjusted in light of domestic trends.

If the smaller economy enters into a strong expansion, which will not be damped by interest rate hikes in the much larger economy, then risks to the macroeconomic and financial stability of the smaller economy need to be confronted. Some risks—like that of a currency crisis—have implications for both the macro-economy and financial stability. (An extensive economic literature exists, which we will not repeat, on the susceptibility of pegged exchange rate regimes to speculative attacks; members of a currency union have an advantage in that they are more likely to receive official support (e.g., TARGET2, ESM) from other members of the currency union.) It is useful to distinguish between two motives for using macroprudential instruments:

- **Mismatched monetary conditions are a macroeconomic challenge:** a substantial loss of competitiveness (ultimately needed to help slow the economy) may prove costly to reverse, if wages are downwardly rigid. And there may be misallocation, as resources are deployed in a setting of below-equilibrium interest rates and an overly appreciated real exchange rate. So the concern is not specifically financial stability. To monitor these macroeconomic risks, the preferable indicators seem to be misalignment of the real exchange rate and excessive current account imbalances.

- **Financial stability may be a concern as a result of a strong credit/real estate cycle, perhaps fostered by mismatched real interest rates.** Or, with a fixed, but adjustable, exchange rate, unhedged currency exposures might be a key vulnerability—in which case there may again be a desire to manage the exchange rate misalignment, thus placing pressure on the peg.

If we now situate these concerns in the policy assignment context discussed above, we can see how macroprudential instruments that target the aggregate financial system could substitute to some degree for the lack of an independent monetary policy. In the first case, the rationale for action is not macroprudential but macroeconomic, while in the second case, the rationale is clearly financial stability. In both scenarios, the relative burden on macroprudential measures is greater than under a floating rate regime, reflecting the lack of a monetary policy and exchange rate variability. Additional burden is also placed on fiscal policy by this set up. Indeed, if a prime concern is the real exchange rate, then a shift in the fiscal stance is a standard way of addressing this concern. Structural fiscal measures could also be used to implement an “internal
devaluation” (see Adao, et al (2009), and Schmitt-Grohe and Uribe (2012)).\textsuperscript{5} Coordination between fiscal policy and the use of prudential instruments thus moves to centre stage. In sum, the loss of supporting monetary policy and exchange rate movements places a greater burden on remaining economic policies—fiscal and macroprudential in particular (see Allsopp and Vines (2008), Schmitt-Grohe and Uribe (2012), and Unsal (2013)).

Now, a word to link this discussion with capital flow measures (CFM). With a fixed exchange rate, macroprudential policy could be employed as part of a strategy to create a wedge between domestic and foreign interest rates—effectively, using them as capital flow measures (IMF (2012)). This wedge—an intentional fragmentation of the financial markets—could be positive or negative, allowing domestic interest rates to be aligned with the domestic economic conditions. By moderating a boom, and an associated rise in wages, adjustment costs in the subsequent downturn (stemming from inflexible nominal wages), could be diminished. The welfare gain here is primarily macroeconomic, and not macroprudential. Of course, financial stability would benefit from reducing the probability or scale of a financial crisis.

As shown by Schmitt-Grohe and Uribe (2012), and Unsal (2013), in an economy with downward nominal wage rigidity and a pegged exchange rate, CFM can be welfare-enhancing in the face of financial shocks, allowing a small open economy to regain some degree of monetary autonomy. It can be shown that CFMs are inferior to the fiscal measures used in internal devaluation. However, they may be implemented more readily and precisely than fiscal measures, which require legislative approval; but leakages may undermine their effectiveness (Arregui, et al (2013)).\textsuperscript{6} With a fixed exchange rate, the domestic policy assignment and coordination issues are thus somewhat different from those under a floating rate regime. The distinctions we have drawn here will also be crucial in discussing monetary union, where the interdependency and adjustment nexus is even more complex.

What does this all mean for institutional setups and governance arrangements? First, the need for close cooperation between macro and microprudential authorities remains. Second, under a fixed exchange rate regime, the central bank has no role in determining inflation or setting interest rates—so possible conflicts between monetary and macroprudential policies are absent, supporting the case for assigning financial stability responsibility to the central bank. Third, to the extent that CFMs allow local interest rates to diverge from interest rates in the anchor currency country, some monetary autonomy is reintroduced—and this proxy role may argue for giving a leadership role in coordinating macro-prudential measures and CFM to the central bank. Fourth, coordination between macroprudential measures and the design of fiscal policy is of crucial importance, given the added burden that these policies bear.

\textsuperscript{5} Employment subsidies affect firms’ perceived real wage and demand for labor. A sales/consumption subsidy for non-traded goods will increase its demand, absorbing labor shed from the traded goods sector. These fiscal tools can be unwound as the effects of a shock dissipate, or as real wage flexibility increases. In this case, fiscal policy works not by affecting intertemporal demand, but by affecting relative prices, or expenditure composition. One major difficulty with this fiscal approach is that subsidies would need to be adjusted with the same frequency as the underlying shocks to the economy, and this may not be feasible.

\textsuperscript{6} Capital flow measures are better equipped to address foreign \textit{financial} shocks, such as those caused by misaligned monetary policy or risk premium changes, than foreign demand or productivity shocks (Farhi and Werning (2012) and Unsal (2013)), and are better suited to transitory, rather than persistent, shocks.
IV. International Coordination of Macroprudential Policies

Thus far, we have tried to place on a firmer footing, using a New Keynesian framework, four aspects of macroprudential policies: the goals to which they may be assigned; the relevant variables and instruments; the institutional home for such polices; and the role of domestic policy coordination. These issues are interrelated. For expositional purposes a simplified “credit as a proxy” approach can be contrasted with a multi-indicator approach for purposes of diagnosis and operational policy implementation. The former approach is more compatible with putting the central bank in charge of financial stability policy; the latter approach is more compatible with a coordinating committee set up. Under either approach, macroprudential coordination with microprudential and fiscal policies is important. The type of exchange rate regime also matters for the effectiveness of policies and governance arrangements.

The diminished effectiveness of macroprudential measures owing to cross-border leakages suggests potential scope for international coordination. This issue will be placed in perspective by, first, reviewing the traditional case for international policy coordination, which refers mainly to macroeconomic policies. We will then extend this framework to evaluate the potential scope and effectiveness of macroprudential policy coordination internationally. Finally, the special case of EMU will be explored. In concluding, we suggest that international coordination of macro-prudential policies is not only valuable, but may be essential, for macroprudential instruments to be viable at the national level, particularly in a monetary union.

a. The case for macroeconomic coordination

An important initial distinction concerns the difference between the welfare gains from optimizing domestic policies versus those from coordinating internationally policies that are already optimal domestically. Non-optimal domestic policies have been called a “beggar-thyself” outcome. They are not the focus of the coordination literature, and we will follow this convention when we turn in due course to macroprudential policies.

Assuming that national economic policy is optimally set, the question is whether gains are available through international coordination. The presence of spillovers does not, in itself, intrinsically imply such gains: recipient-country authorities can respond to spillovers, as they would to a non-policy induced shock. Spillovers imply more work for those policy-makers, but spillovers are inherent in an open economy. Indeed, countries can increase their exposure to spillovers by, for example, adopting a fixed exchange rate; but presumably this choice is based upon the benefits outweighing the costs.

For a large, relatively closed economy facing an adverse shock to domestic demand, such optimal (efficient/effective) national policies would imply that domestic demand should be stimulated. Enacting policies to produce export-led growth would be less efficient/effective and could be viewed as a beggar-thy-neighbor policy. The spillover from increased government spending could be decreased thru home-country expenditure bias and import barriers. Import leakage/spillover would be reduced and thereby rising the fiscal multiplier. However, such actions may not represent optimal policies for the home country.
Economic and game theories have been utilized to examine the gains from policy coordination. Using static game theory, the non-cooperative (Nash-Cournot) solution is inferior to the cooperative solution, implying gains from international coordination (see McKibbin). However, international coordination can also produce inferior results in certain circumstances under dynamic game theory (Rogoff (1983), Sachs and McKibbin (1985)). For example, the discipline posed by the exchange rate on a single central bank can be lost when all central banks coordinate, with a higher inflation outcome for all. More generally, if national decision-makers are not pursuing good policies, then international policy coordination could lead to a worse outcome than non-coordination.

Turning to empirical investigations, including calibrated models, McKibbin (1997) surveyed the literature and concluded “in these studies, it is uniformly the case that the gains to coordination of policies, defined as the difference between optimal cooperative and optimal non-cooperative policies, are described by the authors as relatively small (at least in the order of magnitude of 0.5 to 1 percent of GDP found in the original Oudiz and Sachs study (1985)).” McKibbin described these gains as about the size of the estimated gain from the Uruguay Round of trade liberalization. These finding reportedly attained the status of a “folk theorem”: gains from international policy coordination are small relative to the gains from sensible policy responses to shocks at the national level.

With the advent of New Keynesian models, gains from international policy coordination have been revisited. This “second generation” approach employs calibrated DSGE models. Some initial studies (Corsetti and Presenti (2001), Obstfeld and Rogoff (2002), and Devereux and Engel (2003)) again found benefits from monetary policy coordination that were relatively small compared to gains from national-oriented stabilization efforts, confirming the first-generation folk theorem. Small absolute gains to fiscal policy coordination under floating exchange rates compared to national-oriented policies have also been found (see Coutinho), but more research is needed to determine the results robustness to alternative assumptions, such as the absence of Ricardian equivalence.

It has been theoretically shown (Canzoneri et al (2005)) that, if productivity shocks are not perfectly correlated across traded-and nontraded-goods sectors of an economy (as assumed in previous studies), the gains monetary coordination can be at least as large than those reacting well to shocks at the national level. The same result could apply to sector-specific demand shocks. However, when sectoral shocks are not correlated, monetary policy is not very effective—closing only an estimated 30 percent of the welfare gap—since it lifts demand in all sectors uniformly; monetary policy cannot generate the needed sector-specific response. Further research is needed to examine whether fiscal or macro-prudential policies can provide a better-tailored response.

Using a calibrated model and an actual covariance matrix of sectoral shocks, Canzoneri calculates that the gain from coordination of monetary policies could be 30 percent higher than the national response alone—but even so relatively small: 0.001 percent of consumption. Coutinho reports similarly small gains from the coordination of fiscal policies. Thus, the folk theorem seems to still be alive! That said, Canzoneri aptly observes that some simplifying assumptions employed to allow numerical solutions “can also produce collateral damage…. 
they probably give an unrealistic view of the true welfare costs of nominal inertia.” In addition, the assumption of perfect foresight can significantly narrow the estimated gains from coordination. The possibility to learn about the “true model” over time might bring to light greater coordination gains (McKibbin).

To summarize, there are gains from coordination of macroeconomic policies, but they appear to be small. Potential coordination costs, which have not been estimated in the above calculations, would further reduce or invert the net benefit. What do these conclusions portend for international coordination of macroprudential policies?

b. Potential gains from macroprudential coordination

To our knowledge, no rigorous analysis has been conducted of gains from international coordination of macroprudential policies, alone the lines of that employed for macroeconomic policies. Following the same framework, such analysis would have as its benchmark that optimal national macroprudential policies cannot be improved upon with each country acting independently—a non-cooperative solution.

There are several reasons to suspect that gains from the international coordination of macroprudential policies may exceed those available in the case of macroeconomic policies. As discussed earlier, assuring financial stability requires national authorities to deal with various externalities—procyclical risk-taking, asymmetric information, agency problems and non-linearities. Cross-border network externalities in the global financial system mimic interconnectedness externalities on the domestic scene. Also, the social costs of foreign borrowing, in terms of crisis risks, may be underpriced and result in over-borrowing—just as domestic liquidity may be under-valued in times of market calm (Bengui (2011), Korinek (2012)). In addition, macroprudential policies can be undermined by the presence of foreign branches of financial institutions that are not subject to host country regulation, and by cross-border purchases and sales of securities.

One approach to these issues is to examine two relevant dimensions of systemic risk—structural and time varying. The structural risk distribution is inter alia related to sector-specific shocks, their correlation, portfolio concentration, and inter-connectedness of institutions. While all these aspects are important, cross-border inter-connectedness is the most critical and challenging for international coordination. Criticality has been illustrated by the subprime crisis and Lehman/AIG, and by the need for the US Federal Reserve to provide swap lines to other major central banks. In addition, the presence of bank branches, which are subject to home, not host, country supervision, reduces the effectiveness of macroprudential policy in the host country. For example, estimates of UK-wide leakages (offset) on credit growth, owing only to bank branches, from the application of changes in minimum capital requirements, were 30 percent (Arregui (2103)). Leakage would have been higher if foreign banks had a larger share of UK lending. Macroprudential policies could also be less effective to the extent that speculative positioning (e.g., derivatives and off-balance sheet activities) rather than capital flows is the prime driver (IMF (2013d)).
The presence of foreign financial institutions (e.g., subsidiaries, representative offices) likely facilitates access by local borrowers to foreign financing, yielding cross-border flows to the nonfinancial sector. This channel would also reduce the effectiveness of macroprudential policies, an aspect not captured in the UK estimates above. Cross-border leakages have figured prominently in analysis of countries of Central and Eastern Europe. More generally, macroprudential policies face a challenge from circumvention owing to limits on their applicability/perimeter. This circumvention challenge—regulatory arbitrage or “shadow banking”—is present both within and across borders.

International coordination could plug these leaks. But will it? An affirmative response from the BCBS came in the context of the operation of counter cyclical capital buffers (CCCBs). As part of their 2010 guidance to national supervisors, the concept of “jurisdictional reciprocity” was introduced. According to this concept, when the host supervisor applies a CCCB, they would promptly inform their foreign counterparts so that their counterparts can require their banks to respect the host’s CCCB up to the specified maximum limit for CCCBs; the home supervisor for each bank is responsible for ensuring that the banks they supervise correctly calculate the CCCB. The home supervisor can always require the banks that they supervise to maintain higher CCCBs if they judge the host authorities’ buffers to be insufficient. But, the home supervisor should not implement a lower CCCB for their banks’ exposures to the host jurisdiction. However, this reciprocity principle does not apply to other macroprudential tools including LTV, DTI, and CFMs and only applies to banks. Thus, these other macroprudential tools are subject to leakages caused by cross-border financial transactions and a limited regulatory perimeter. Coordination, as opposed to cooperation, of these other tools is complicated by the factors that bedevils policy coordination in general (e.g., multiple objectives/actors, asymmetric benefits, model uncertainty, disagreement over spillovers/distributional implications, interest groups) and financial regulation in particular (see Annex III for a financial regulation discussion).

Institutional arrangements have been developed recently to fortify international cooperation. The Financial Stability Board (FSB), which brings together national authorities responsible for financial stability, is a key forum to exchange information and to discuss macroprudential issues (as well as other financial stability matters). Indeed, the FSB was established in 2009, “to coordinate at the international level the work of national financial authorities and international standard setting bodies and to develop and promote the implementation of effective regulatory, supervisory and other financial sector policies.” However, all FSB members retain their independence and autonomy. In a regional (EU) context, ESRB provides macroprudential oversight to the entire EU financial system and is mandated to identify and prioritize systemic risks, issue warnings when those risks are significant, and make non-binding recommendations regarding remedial actions; both warnings and recommendations require a comply or explain response. The coverage of both the FSB and ESRB extends beyond the banking sector to include insurance, securities markets, and pension funds.

In sum, the international coordination of macroprudential policies is likely to be more beneficial than for macroeconomic policies, where relatively small gains have been found. Greater gains from macroprudential coordination are likely because major externalities are present in the financial sector. In this regard, the interconnectedness of financial institutions and markets across borders is key. Cross-border interconnectedness can undermines the effectiveness of
national macroprudential policies, implying high gains from coordination. Coordination gains will also be greater when time-varying risks, such as those associated with credit booms, are off-cycle across borders, allowing prudential supervisors to support each other over time. In a repeated game, mutual self-interest would encourage coordination amongst authorities that face broadly similar-sized financial risks; however, authorities in large economies do not much incentive to assist those authorities in small economies because the latter have only a minor impact on large economies.

c. The special case of EMU

From a macroprudential standpoint, EMU presents a special case of international coordination among countries. As a non-optimal currency area with very strong financial interconnections, the euro area is prone to the kinds of (macroeconomic and) macroprudential hazards discussed above in connection with fixed exchange rate regimes. On the other hand, existing supranational institutions (EC/ECB), close political ties, and interdependency across many other areas, make coordination easier.

How the euro-area system responds to asymmetric shocks has been the subject of much reflection. The research stream most relevant to policy coordination concerns the adjustment dynamics of the euro area, and the role of fiscal policy. This research focused on the interlinked adjustment of euro-area economies following asymmetric shocks. In particular, it addressed the question whether divergences in competitiveness and current account imbalances can be expected to resolve themselves relatively smoothly, quickly and efficiently, without giving rise to destabilizing macroeconomic or macroprudential risks. These adjustment dynamics pose a different set of issues EMU policy architecture than were the focus of its founding fathers. They were concerned with fiscal imbalances driven by deficit bias (e.g., “common pool” problem) among member governments and sovereign debt sustainability; consequently, the need to avoid sovereign bailouts was enshrined in the Maastricht Treaty and buttressed by the Stability and Growth Pact (SGP).

Research on euro-area adjustment dynamics studied two countervailing forces on a member’s economy in the wake of an asymmetric shock with unchanged nominal interest rates. Take, for example, a positive shock to a small euro-area economy that produces a country-specific boom. National wage-price inflation accelerates, rising about the euro-area average entailing a loss of competitiveness that will ultimately contribute to slowing the economy and bringing its cyclical position back in line with euro-area monetary conditions. But national real interest rates will decline (with higher inflation) falling below real rates for the euro area as a whole; at the same time, the national output gap is smaller than the euro area as a whole, which normally would imply a higher national real interest to restore balance. As a consequence, euro-area monetary conditions are not well suited to the national economic circumstances. This ‘perverse real interest rate effect’ will further stimulate the national boom, triggering a greater and faster loss of competitiveness, and resulting in a wider current account deficit. These dynamics were central to the “Walters critique”. For economic and macroprudential policies it matters greatly how inherently stable these dynamics prove to be.
One assessment, based on DSGE modeling work in the European Commission, was that the process was typically stable although divergences in competitiveness and in current account balances could be quite large and protracted because wages in some economies could prove to be very rigid downwardly (European Commission (2006)). An alternative view, based on academic modeling work (Allsopp and Vines (2008)), shown that if consumers and firms are not sufficiently forward-looking (say owing to liquidity constraints or myopia), then this dynamic process could exhibit overshoot, producing long cycles, or even be unstable. This result arose because prices and wages did not move sufficiently fast to a new equilibrium. If the economy was not sufficient forward-looking to ensure stability, Allsopp and Vines suggested that fiscal policy could serve as a corrective feedback mechanism by targeting the real exchange rate—dampening deviations in national wage-price inflation from the euro-area average. They demonstrated furthermore that under some circumstances that fiscal policy based simply on SGP-rules would not achieve stable euro-area dynamics. Ferrero (2009) demonstrated that large welfare gains result from pursuing a national fiscal policy with a countercyclical feedback rule related to economic activity compared with strict SGP adherence. The euro-area crisis confirmed the risk that current account deficits might widen to a point where they are a source of vulnerability, and that competitiveness would diverge to a point where its correction—with downwardly rigid wages—can entail very high costs in terms of output and employment.

While such analysis was insightful, the euro-area crisis drew attention to another (understudied) driver of this dynamic internal adjustment process—euro-area financial markets. The convergence shock associated with the elimination of exchange rate risk was much studied. However, country credit risk was not analyzed as an element of the euro-area adjustment mechanism; perhaps because sovereign credit risk spreads narrowed to virtually nothing in the early 2000s. (No consensus exists as yet to explain this narrowing.) With this double convergence shock, current account deficits widen owing to country-specific booms, notably in Greece, Ireland, Portugal and Spain. With deteriorating net foreign asset positions, country credit risk spreads should typical rise, lifting national real interest rates and counter acting their perversely low levels. Wider spreads would also serve as a warning sign to the authorities to tighten national policies in order to dampen the country-specific boom. This market-based adjustment mechanism however engaged much to late and when it did eventually engage, it did so with brutal consequences for countries in the euro-area periphery. Still going forward, a key policy question relates to the extent that these market forces can be relied upon to equilibrate the economy and signal the need for official action.

While movements in sovereign spreads may help equilibrate, the same cannot be said of bank spreads and their funding cost more generally. Economic theory and empirical evidence (Ho and Saunders (1981), Saunders and Schumacher (2000), Gropp, et al (2007)), identifies various determinants of bank loan-deposit spreads including: the volatility of short-term interest rates, the steepness of the yield curve, bank market power, loan default risk, administrative expenses and taxes, including regulatory burden. The Modigliani-Miller proposition implies that banks’ capital ratio should have no long-run impact on spreads, but empirical evidence indicates bank capital and reserve requirements do matter, at least in the short run. Thus, to varying degrees depending on the country context, bank spreads widen in recessions and narrow in expansions (Dueker and Thornton (1997)). This movement is procyclical, meaning that real interest rates on
loans will decline further in the upswing than foreseen by Allsopp and Vines, creating more divergent dynamics.

A second bank feedback loop pertains to the real economy, bank asset quality, and the public finances. In the upswing, banks’ balance sheets appear strong and lending risks to the private sector appear smaller; government revenues are flush. After the bust, the actual and potential need for the government to bail out weak banks, producing a link between sovereign spreads and bank risk. This cycle has turned out to be an Achilles heel for the euro-area adjustment process, as impaired bank assets damage confidence in the sustainability of public debt and lower prices on sovereign debt further impairs bank balance sheets. Consequently, banks funding costs rise, lifting their lending rates, while capital shortfalls curtail lending to the private sector. These dynamics reinforce the economy’s downward spiral.

Euro-area authorities have taken various steps to redress these adverse dynamics. For example, the ECB established the Securities Market Program (SMP), which made purchases of sovereign debts to lower interest rates in periphery countries; the Long-Term Refinancing Operation (LTRO) was instituted to ensure adequate funding for banks at low rates; and the Outright Monetary Transactions (OMT) was announced to work in conjunction with the European Stability Mechanism (ESM) to help euro-area governments that have requested assistance. The ESM (and its predecessor, the EFSF) provides a common euro-area backstop to lend to euro-area members requiring macroeconomic adjustment programs. In late 2011, compliance rules—related to the excessive deficit procedures—for the SGP were strengthened; in particular, euro-area states are required to submit their draft budgets the EC for review and the EC can issue a warning to the parliament if the draft budget was found to be inconsistent with the SGP. In addition, a macroeconomic imbalance procedure (MIP), which was intended as an early warning mechanism, was introduced along with monitoring and compliance features. Amongst the MIP indicators are the current account deficit relative to GDP, the net international investment position relative to GDP, unit labor costs, and the real effective exchange rate. This represents a step in the direction advocated by Allsopp and Vines, although experience with the MIP is too limited to gauge how big a step has been taken.8

Looking forward, the banking union proposals would help break the economy-bank-sovereign linkage. Its two euro-area pillars are the Single Supervisory Mechanism and the Single Resolution Mechanism. Prior to the ECB assuming its duties as the single supervisor, an asset quality review (AQR) will be completed (by November 2014) to determine the capital needs, if any, of major financial institutions with the euro area. For financial institutions shown to need capital, the EC has proposed a process to protect taxpayer resources. Under this proposal insured deposits would be fully protected, but shareholders would be “bailed in,” and to the extent necessary, debt holders would also experience “haircuts.” Finally if that national resources were not sufficient, the ESM could provide direct recapitalization to banks. By providing assistance directly to banks, rather than via the sovereign, ESM assistance would help bring the sovereign-bank linkage. These major improvements in cross-border coordination are hard to imagine other than where political ties are as close as in the EU. Still, these

8 None of these measures involve the structural reforms that would move the euro area closer to meeting the OCA conditions. Structural reforms are more difficult to calibrate, implement, and take longer to reach full effectiveness.
improvements fall short of the “steel-framed” banking union that would be established by an euro-area wide deposit insurance scheme with a sufficiently funded common backstop.

In the future, national authorities will be able to utilize CCCBs to dampen country-specific credit booms. Meanwhile, the ECB have micro and macroprudential responsibilities for major financial institutions and matching powers. The EBSR will also be able to issue warnings and make recommendations regarding emerging national financial fragilities. These actions have a financial coverage that extends beyond major financial institutions and can include instruments, such as LTV and DTI, which are outside the authority of the ECB. As both the ECB and the ESRB engaged in macroprudential oversight of the euro-area financial system, the fact that the ECB chairs the ESRB (with 27 national central bank governors in attendance) should facilitate coordination of these two institutions. The ECB has an edge because it can mandate actions, albeit limited to major financial institutions, while the ESRB reaches the entire financial system, albeit making only non-binding warnings and recommendations. The effectiveness of these arrangements and tools is yet to be demonstrated. A key question is also whether macroprudential tools will be employed solely to preserve financial stability or whether they will also be utilized to maintain macroeconomic balance by assuring suitable country specific monetary conditions.

Given high capital mobility within the monetary union and very interconnected markets and financial institutions, a national macroprudential approach will not be effective without coordination with other members of the currency union. This is true whether the national authorities seek to maintain financial stability or achieve macroeconomic balance using macroprudential tools. The ECB and ESRB (along with relevant national authorities) need to develop an effective working relationship. Furthermore, some tension exists between using macroprudential tools to in practice inhibit cross-border flows with the monetary union, and the goal of promoting a single financial market. On the other hand, appropriate differentiation of national monetary conditions will help preserve the economic and monetary union.

V. Conclusions

This paper has adopted a New Keynesian perspective to explore the goal, design and domestic coordination of macroprudential policies. With that foundation, we delved into the potential gains available from the international coordination of macroprudential policies, including in the special case of EMU.

At the national level, macroprudential policies can contribute to assuring financial stability by tackling various externalities associated with the financial sector. However, macroprudential policies need to be effectively integrated with microprudential supervision and the conduct of monetary and fiscal policies. This integration faces various challenges because inter alia financial stability is a “fuzzy” concept and a large number of macroprudential instruments, which also overlap with other policy areas, exist whose impact are not as yet well calibrated. Properly designed governance arrangements can help deal with these challenges but adaptations to existing monetary and fiscal frameworks may also be necessary. Different types of domestic governance arrangements can be put in place; there is no “one-size-fits-all” solution. In all
cases, it will be important to have clear lines of responsibility and accountability plus clear communications.

Under all circumstances, however, some priorities can be suggested, and coordination with monetary and fiscal policy is desirable. Under a fixed exchange rate regime, macroprudential policies take on added importance, given the interrelated macroeconomic and macroprudential challenges that arise without an independent monetary policy.

Macroprudential policies, under both fixed and floating exchange rate regimes, are highly vulnerable to leakages through connections with foreign financial institutions and markets. This suggests that the gains from cross-border coordination should be larger than in the case of macroeconomic policy coordination, where the literature typically reports modest gains. A partial step in that direction has been taken by the BCBS with the introduction of the “jurisdictional reciprocity” principle wherein foreign supervisors mandate banks under their supervision to adhere to the host country counter-cyclical capital buffers with respect to their exposures in the host country. However, this principle applies only to this single macroprudential tool and only to banks, leaving a large remaining coordination gap.

In the context of EMU, a non-optimal currency with a high degree of financial integration, the pursuit of national macroprudential policies can help secure national financial stability and appropriate national monetary conditions. These national macroprudential policies face larger challenges along with possible larger gains from coordination than elsewhere in the world. The ECB as the single supervisor and ESRB with broader macroprudential oversight can help assure adequate EMU coordination. Strong preemptive national fiscal polices and deeper EMU fiscal coordination are also needed complements.
Annex I—The Economy in a New Keynesian Perspective

Partly stimulated by the Neo-Classical (Lucas) critique\(^9\) of standard Keynesian economics, the New Keynesian economics has provided explicit micro-foundations for macroeconomics. In particular, households and firms engage in inter-temporal optimizing behavior subject to the usual budget constraints plus information/search and adjustment costs and imperfect ( monopolistic) competition.\(^10\) The latter create an endogenous (in) efficiency, or markup, wedge. Households decide how much labor to supply and how much capital to accumulate, given capital accumulate costs; capital can be used more intensively as its rental price rises. Together, these constraints produce frictions/persistence in the goods and labor markets that affect short-run dynamics—giving rise to an implicit Phillips curve—and impose long-run social costs, owing to the efficiency wedge, compared to the competitive equilibrium.

In contrast to standard Keynesian economic models, behavior is based on forward-looking expectations of the economy rather than just historical developments or inertia. For example, expectations of higher future income or wealth, will lead to increased current consumption. Households consume both a domestic and foreign goods, which are imperfect substitutes, and their relative consumption depends on their terms of trade. The law of one price prevails determining the nominal exchange rate; deviations can occur in the short run, adding to exchange rate dynamics. Uncovered interest rate parity also prevails; thus, the domestic interest rate is equal to the foreign interest plus the expected exchange rate movement. A risk premium term can be added to reflect the presence of default risk, which is frequently an increasing function of the debt-GDP ratio.

Both academics and policy makers (e.g., central banks, finance ministers, BIS, IMF) (see Tovar (2010)) have utilized these New Keynesian foundations and the real business cycle approach to build estimated Dynamic Stochastic General Equilibrium (DSGE) models to provide a coherent framework for policy analysis that is not subject to the Lucas critique. DSGE models are employed to examine the dynamic—business cycle—properties of key economic variables (e.g., consumption, inflation) when subjected to a variety of shocks (e.g., preferences, technology, policy). Advances in estimation techniques have allowed DSGE models to track and forecast key economic variables as well as other approaches (see, for example, Smets and Wouter (2003)), but data and statistical challenges remain (as listed by Tovar (2010)).

The real business cycle approach has been utilized to build micro-foundations for the goods and labor markets. To examine the role of macro-prudential policy (or monetary policy), the micro-foundations of the financial sector had to be developed. A recognized starting point is Bernanke, Gerler, and Gilchrist (1999) who introduced financial frictions into the New Keynesian framework; the financial accelerator amplifies shocks to investment via net worth changes, adjustment costs, and more costly external financing for firms, which increases with higher firm

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\(^9\) Robert Lucas (1976) argued estimated macro-models were not invariant to policy regimes because the optimal decision rules for economic agents will reflect any change in policy. The lack of micro-foundations was a fatal flaw of such macro-models.

\(^10\) Monopolistic competition may derive from differentiated—heterogeneous— goods/skills (a la Dixit-Stiglitz) or preferences (e.g., home bias).
leverage. Housing activity received attention given its importance to aggregate demand, net wealth, and the financial sector (see Iacoviello (2005) and EC (2006)). Costly contract verification, asymmetric information, principal-agent problems, and collateral constraints are among the frictions (Brunnermeier et al (2012) survey the literature). While anticipated fluctuations in income results in consumption smoothing (savings-dissavings), uncertain income fluctuations owing to incomplete financial (insurance) markets produces a demand for precautionary savings because agents cannot borrow fully and quickly. Movements in precautionary savings also amplify fluctuations in aggregate demand. The major take-away is the significant pro-cyclically induced by financial frictions.

Financial institutions (banks for short) can serve a useful role by pooling agents’ risks—offering insurance for diversifiable risks—by providing liquidity/maturity transformation, and by reducing monitoring/collateral costs. In this manner, banks can mitigate these financial frictions. However, intermediation creates the possibility of bank runs based on the advantages gained by early exiting/panic, as well as motivated by insolvency concerns (Diamond and Dybvig (1983), Allen and Gale (1995)). Bank capital—“skin in the game”—is intended to protect against runs and bad loan outcomes. Greater leverage, portfolio selection (moral hazard), and shirking on their monitoring responsibilities (principal-agent problem) to lower costs increases banks’ profitability, and the resulting risks are shared with depositors and potentially with the economy as a whole. This fragility however can provide an incentive for depositors to discipline (monitor) financial institutions (as in Diamond and Rajan (2001)). Credible public deposit insurance—no “too-big-to-save” problem—militates against panic-induced runs, but it diminishes depositors’ incentives to monitor/discipline banks. Bank (micro) supervision can provide the needed oversight and protection of the public sector balance sheet. Supervisors can also possess an information advantage over depositors, particularly small ones. Two take-away are that even small shocks can have big consequences, owing to contagion, and that government oversight/insurance can play a useful role.

With a floating exchange rate and long-run wage-price flexibility, monetary policy can provide the nominal anchor employing the nominal interest rate, owing to money demand volatility. As is customary, the central bank seeks to minimize deviations in actual inflation from its target and deviation in actual output from potential with a sufficiently high weight on inflation deviations. In the shorter-run with nominal rigidities, monetary policy can influence aggregate demand—the output gap—via changes to the nominal and therefore real interest rate. Greater stability in inflation however can only be achieved by greater output volatility and vice versa; this relationship is sometime called the sacrifice ratio. How aggressive the central bank should pursue its inflation target depends inter alia on the sacrifice ratio; the central bank may also engage in smoothing of interest rates and the exchange rate. The appropriate response for interest rates will depend on the nature of shocks (e.g., productivity, wage push, preferences/demand). For our purposes, it is not necessary to delve into technical issues related to the design of optimal monetary policy or choice of inflation target (e.g., CPI, GDP deflator, or nominal income).

It is however important to make a distinction between the conduct of monetary policy under “normal” economic conditions (as discussed above) and under extreme conditions. The latter would include at the zero interest rate lower bound (ZLB), under fiscal dominance and/or with
unsustainable public debt, and after a financial crisis. Recent experience has shown that these elements can occur in a mutually reinforcing to create vicious circle. Macro-prudential policies as well as traditional macroeconomic policies should therefore seek to steer the economy away from these extreme conditions, which are socially costly. The effectiveness of various policy instruments is also altered under these extreme conditions, making it more difficult to move the economy to safer ground. Thus, economic policy coordination faces important, but distinctly different, challenges under these extreme circumstances. Therefore discussion of issues related to crisis prevention and crisis resolution will be kept separate in this paper.
Annex II—Fiscal policy in a New Keynesian Framework

An understanding of the micro-foundations for fiscal and macro-prudential policies is essential to a deeper understanding of coordination issues. In developing the micro-foundations of fiscal policy, the long-run level of government spending including transfers is determined by social choice—a fiscal objective/target. (Effectively, households receive value, or welfare, from government spending.) Government spending is financed by distortionary taxes and public borrowing, which is subject to the government’s intertemporal budget constraint—no Ponzi scheme. Distortionary taxes (along with monopolistic power in the product and labor markets) create a wedge that reduces the technical level of output to its “socially efficient” level—the relevant metric for macro-financial policies—determining the output gap. With the long-run level and composition of real income tied down in this manner, fiscal policy only has a long-run impact on relative prices—the slope of the aggregate supply curve.

Using the tax smoothing analysis initially developed by Barro (1979) and then extended (e.g., Benigno and Woodford (2003)), government debt acts optimally as a shock absorber to stabilize both spending and taxes and government debt therefore follows a random walk around its long-run target ratio (Schmitt-Grohe and Uribe (2004)). Put another way, the cyclically-adjusted fiscal primary balance seeks to stabilize the ratio of public debt to GDP around its long-run target. This argument provides an economic rationale for the fiscal policy framework employed by the EU. It is also optimal to assign monetary policy to demand—output gap—management rather than to assign fiscal policy because deviations in government spending and taxes needed for demand management are more costly to social welfare (Woodford (2011)). Fiscal policy is better suited however than monetary policy to offset asymmetric shocks to individual sectors, which has national relevance in circumstances where the exchange rate is pegged or in a currency union. Taxation and spending policies can also be employed to effect relative prices and real mark-up costs in the product and labor markets, tilting the supply curve.

Fiscal policy can have more of a role to play, than discussed above, in aggregate demand management when Ricardian equivalence—private savings offsets fully government deficits, or dissavings—does not hold. Ricardian equivalence may not hold for a variety of factors including: some households are liquidity constrained consumers so they can’t borrow to smooth consumption; other households are myopic, discounting the future at faster pace than the equilibrium interest rate; firms have finite planning horizons, which is consistent with an equity premium; distortionary taxes; and government investment, such as on infrastructure or education, enhances private productivity. Using these non-Ricardian assumptions, the IMF has developed an open economy DSGE model—GIMF (Anderson (2013)). A recent OECD empirical study (Rohm (2010)) rejected full Ricardian equivalence for a panel of 16 OECD countries with an average offset coefficient of 0.4, although there is considerable heterogeneity

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11 Fiscal policy is passive—it reacts to stabilize government debt, while monetary is active, reacting strongly in order to achieve the inflation target (Leeper (1991), Kiransova (2010)). This assumption rules out a deficit bias. This assumption will be relaxed shortly.
12 Because the infinitely-lived representative consumer engages in consumption smoothing to maximize utility, it is optimal for government to smooth its spending and taxation plans. Utility gained from government and private goods is separable.
Correspondingly, fiscal multipliers for debt-financed government spending are larger, owing to the relatively small offset by increased private saving.

Notwithstanding an extensive literature, no consensus has emerged regarding the size of fiscal spending multipliers (Christiano et al, (2011), Baum, et al (2012)). Fiscal multipliers differ widely across countries, tending to be smaller in more open economies and in countries with larger automatic stabilizers. The size of the fiscal multiplier also depends upon the response of monetary policy—strict inflation targeting or various Taylor rule variants—to a larger fiscal deficit (Woodford (2011), Anderson (2013)). For example, fiscal multipliers for deficit contraction at the zero bound for nominal interest rates found by DSGE models are typically more than double (above 2) their size away from that boundary (Christiano (2011), Anderson (2013)). More generally, recent evidence suggests that fiscal multipliers are larger in recessions than booms (Baum et al (2012)). For purposes of this paper, the size of fiscal multipliers is not central; however, it is important that they are sufficiently large and vary with monetary policy to make macroeconomic policy coordination a meaningful exercise.

Fiscal policy must also be well anchored in DSGE models. A no-Ponzi scheme requirement is built into these models to ensure long-run debt sustainability. This long-run requirement assures that the government debt-to-GDP ratio—and hence the deficit-to-GDP ratio—eventually converges to its target level over time. Thus, the option of a sovereign default is excluded. In addition, public sector financing cannot lead to a situation of fiscal dominance, where monetary policy—effectively the Taylor rule—is overwhelmed by fiscal needs. In the short-run, fiscal policy is allowed to pursue for run counter-cyclical policies. Such counter-cyclical policies could entail discretionary actions as well as the operation of automatic stabilizers.

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13 Interestingly, full offset cannot be rejected for Germany (although it is for France).

14 The present value of future primary surpluses determines the real value of government debt. It is important that the private sector decisions are based upon the belief that the government will act in a Ricardian manner—raising future taxes to pay for current spending; there is no free lunch. The inflation tax and default are two possibilities if the government does not raise future taxes sufficiently to cover spending plus the assumption of contingent liabilities, such as those related to the financial sector. The former results from fiscal dominance while the latter follows from an unsustainable public debt. As perceived government creditworthiness wanes, the risk premium embedded in the interest rate on sovereign debt increases, compounding the needed fiscal consolidation. Blanchard (2004) shows that central bank efforts to lower inflation by raising the real interest rate could increase the probability of government default, making government debt less attractive and inducing a depreciation rather than the customary appreciation. In such circumstances, fiscal policy is the proper instrument to reduce inflation rather than monetary policy.
Annex III—Supervisory Coordination Issues

Economic policy coordination has been rigorously and extensively analyzed (see Hamada (1974), Fischer (1987), Obstfeld and Rogoff (2002), and Eichengreen (2012)), including using game theory approaches. In general, game theory has been shown that spillovers—externalities affecting outcomes/payouts—and strategic complementaries—where the optimal policy of one player reinforces on the policy choice of the other player—can produce multiple equilibriums, allowing welfare-enhancing improvements. These externalities could stem from private, as opposed to public, information, outcome uncertainty, and gains that are too small to overcome coordination costs. Strategy choices may be limited by an inability to communicate, by the possibility of false signaling, and by the absence of commitment devices or punishments/sanctions. Gains from coordination are typically distributed based upon negotiations which depending upon the process and other factors tends to favor the party with the stronger hand. Coordination by financial supervisors been less directly studied, instead has drawn heavily upon results obtained from regulatory, and public choice theories.

Financial regulators are often analyzed based on their pursuit of two objectives—ensuring financial stability and the profitability of their financial institutions (see Dell’Aricca and Marquez (2006)). The focus on the profitability of national institutions implies that supervisors compete with each other. As they show, this could entail a race to the bottom in terms of prudential standards. A coordinated structure with higher prudential standards is more likely to emerge if: (i) the impact upon profitability of prudential supervision is similar; (ii) the weights assigned by supervisors to financial stability and competitiveness, are similar; and (iii) the weight assigned to financial stability by the supervisors is larger than that assigned to competitiveness of their banking system. If those conditions are met, the costs of moving to a more coordinated system are smaller and the benefits reaped from financial stability are greater. However, if high costs are imposed on institutions, and supervisors assign a high weight to their profitability, then they would be reluctant to coordinate on standards.

Increased presence of foreign banks, subject to foreign prudential standards, can have two effects. Greater internationalization tends to increase the costs on domestic banks to higher domestic prudential regulation. It also tends to lessen the effectiveness of domestic supervision for domestic financial stability. Thus greater internationalization tends to lower prudential standards when supervisors are independent. At the same time, the benefits from coordination increase with financial integration. However, coordination is not necessarily more likely because the negative impact on one financial system from imposing a common standard is amplified.

While a common prudential standard is desirable because it places all financial institutions on a level playing field, it is not the only way forward. A local prudential authority could decide to implement higher national standards relative to other countries because their expected costs of financial instability were relatively high and/or the relative weight assigned to financial stability is larger. However, such action would make their national financial institutions less able to compete with foreign financial institutions and the effectiveness of higher prudential standards could be undermined by leakages. One possibility would be for the foreign supervisor to adopt the same higher standards for its financial institutions that are established by the local
authorities. Effectively, branches would be treated like subsidiaries, falling under the regulatory authority of the host country. Foreign institutions when operating in their home country would not face the higher standards/costs. Costs to foreign financial institutions of such higher standard would thus be reduced, making it easier for the foreign supervisor to implement them.

An obvious problem is that borrowers in the host country could shift their business to the foreign financial institutions in the foreign country, bypassing the costs associated with higher standards imposed by the host supervisors. In response, the host country could impose capital flow measures to prevent such foreign borrowing. But capital flow measures are also subject to leakages, especially if, as in this scenario, they would be a lasting feature. The foreign supervisor could assist the host supervisor by ordering their financial institutions to apply the host supervisor’s standards when engaged in any lending to host-country residents even lending originated outside the host country. This type of supervisory cooperation would increase the effectiveness of the host supervisors’ actions, but it would also reduce the profitability of foreign financial institutions. Such cooperation would be more in the self-interest of the foreign supervisor, the more that the soundness of its supervised financial institutions was threatened by exposure to financial instability in the host country; such as in the case where their loans to host-country borrowers was large relative to total assets or capital. On the other hand, if the foreign financial institutions were relatively large—basically, therefore, immune to the risk exposure emanating from the host country—the foreign supervisor would have little incentive to assist the host supervisor. Cooperation incentives amongst members within a currency union would likely be greater, but whether those incentives would be sufficiently great is still an unanswered empirical question.

Prudential supervisors also encounter time-varying risks that require time-varying application of prudential measures. If these time-varying risks were fully synchronized across countries, then prudential supervisors would undertake similar time-varying actions at the same time without coordination. Consequently, the gains from coordination would not be large unless time-varying international externalities also existed. The Great Depression of the 1930s and the Great Contraction of 2007-10 may offer examples of such time-varying externalities. At the other extreme, if time-varying risks were completely off-cycle between two economies of similar size, the prudential supervisors would mutually benefit from assisting each other over time. In particular, the foreign supervisor could tighten its prudential practices over lending by its financial institutions to the host country experiencing a credit boom. The host supervisors would reciprocate when the foreign country was experiencing a credit boom.

This intertemporal (dynamic) coordination is different from the static set up discussed earlier. However, as the two economies become less similar in size, the benefits from such intertemporal coordination become less symmetric, lessening the gains the bigger economy can obtain from the smaller economy. Coordination based upon self-interest is less likely to arise when benefits are asymmetrically sized.
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