BANK FOR INTERNATIONAL SETTLEMENTS

With a little help from my friends: why large financial spillovers require more international macroprudential policy coordination

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1. Motivation: the challenges posed by spillovers

With closer international economic and financial integration have come many benefits. Globalisation, however, also means countries are exposed to shocks from abroad, including those associated with volatile capital flows, with at times adverse consequences on domestic economic and financial conditions. A long tradition in economics has analysed the scope for such spillovers and the potential constraints that they may impose on domestic policies, including on trade-offs between achieving domestic macroeconomic stability and managing external imbalances. Until the global financial crisis (GFC), the consensus view was that spillovers were small, constraints were limited, and most trade-offs were largely benign. Especially with one's house in order, it was thought, little more was needed.

The GFC has reopened the debate, documenting (new) forms and channels for spillovers, and questioning elements of the prevailing paradigm, including the view that policy cooperation efforts would at best produce negligible gains, or could even be counterproductive. International spillovers, especially those associated with monetary policy in advanced economies, have been a particular source of concern for large emerging and developing economies as they can contribute to adverse external pressures and increase risks to financial stability.

There is also evidence to suggest that in recent years financial market volatility in some large middle-income countries has been transmitted back, and to a greater extent, to asset prices in advanced economies and other countries. For instance, the suspension of trading after the Chinese stock market drop on 6 January 2016 affected major asset markets all over the world.[2] Thus, international spillovers have become a two-way street – with the potential to create financial instability in both directions.

International spillovers, especially those associated with monetary policy in advanced economies, are a source of concern for another reason. Even if monetary policy is optimally tailored to macroeconomic and financial conditions in the United States or the euro area – in the sense of being able to promote price and output stability domestically – other countries typically face different circumstances. This is a particularly important concern for large developing economies facing stronger inflationary pressures and

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[1] Deputy General Manager, Bank for International Settlements. These remarks are a summarized version of my BIS paper with Pierre-Richard Agénor, "Financial spillovers, spillbacks, and the scope for international macroprudential policy coordination", *BIS Papers*, no 97, April 2018, and I bear sole responsibility for the views expressed herein; they do not necessarily reflect those of the BIS. I would like to thank the PIIE - Peterson Institute for International Economics, especially Adam Posen and Olivier Blanchard for hosting this roundtable.

[2] Financial market spillovers to advanced economies from the rest of the world are now commonly referred to as spillback effects and are discussed later on.

greater risks to financial stability (Pereira da Silva (2013)). In a context where cyclical positions are not well synchronised, international monetary policy spillovers from advanced economies could well be destabilising for the global economy. This has led observers and policymakers in several major middle-income countries (especially Brazil and India) to issue pleas for increased policy coordination. The argument, as it is usually presented (see, for instance, Mishra and Rajan (2016) and Shin (2015)), is that US and European policymakers must go beyond their mandate – which requires taking account of the external impact of their policies only insofar as they feed back onto their own economies, through spillback effects – and explicitly account for cross-border effects in their policy decisions. These calls for central banks in advanced economies to consider the effects of their decisions on the rest of the world have also been accompanied by greater reliance, at the national level, on macroprudential policies, in both their structural and countercyclical dimensions.[3] These macroprudential policies (especially those of a time-varying nature) appear to have indeed been effective in helping recipient countries insulate themselves from global financial shocks and mitigate the systemic financial risks that international capital flows may create (see Ghosh et al (2017)). Moreover, in response to these shocks there have also been calls for greater coordination of these policies across countries.

The purpose of this roundtable is to discuss, from an analytical and policy perspective, the role of, and scope for, international macroprudential policy coordination in a financially integrated world economy. Therefore, my remarks will: (1) take stock of existing analyses on spillovers and spillbacks and examine evidence about their measurement and transmission, including macroprudental spillovers and regulatory leakages; (2) showcase new empirical and theoretical contributions on the rationale and potential gains of international macroprudential policy coordination; (3) recall the existing mechanisms for international macroprudential policy coordination through regulatory standards and reciprocity principles; and (4) discuss, from a policy perspective, how to go further to strengthen international macroprudential policy coordination in a financially integrated world.

Let me make two preliminary remarks at the outset. First, it is important to note that even though cross-border spillovers and spillbacks may be significant, and may indeed have increased in magnitude in recent years, it does not necessarily follow that they reduce global welfare and that cooperation is prima facie welfare-improving. If the global economy is experiencing a recession, for instance, the coordinated adoption of an expansionary fiscal policy stance by a group of large countries may, through trade and financial spillovers, benefit all countries. But if maintaining financial stability is a key policy objective, the propagation of financial *risks* through volatile short-term capital flows also becomes a source of concern. To the extent that financial risks represent negative externalities that tend to increase with the magnitude of spillovers and spillbacks, which may in turn be exacerbated (through cross-country leakages) by uncoordinated national macroprudential policies, there is a case for macroprudential policy coordination.[4]

Second, in what regards global spillovers and spillbacks we should focus our analysis on major advanced economies and a group of countries that I identify as *systemic middle-income countries* (SMICs),

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[3] Macroprudential policy is usually defined as actions taken by the regulatory authority in its own jurisdiction aiming at promoting financial stability and mitigating systemic risks to its financial system (see CGFS (2010)). These actions use a set of instruments that reduce the vulnerabilities (leverage, market risk or interconnectedness) of the financial system by imposing specific rules or restrictions on the balance sheets of lenders, lending contracts, other non-bank financial agents and the market infrastructure itself.

[4] Korinek (2017) derives a welfare theorem for open economies which shows that the conditions that need to be violated to generate Pareto inefficiency under an uncooperative equilibrium and create scope for cooperation are unlikely to hold in practice. However, the premise of his analysis is that the goal of cooperation is to restore competitive behaviour, rather than mitigating financial stability risks to the global economy.

rather than "emerging markets" – a term that has become largely obsolete.[5] Specifically, this group consists of eight countries: Brazil, China, India, Indonesia, Mexico, Russia, South Africa and Turkey.

2. International financial spillovers and spillbacks: measurement and transmission

Cross-border financial spillovers are commonly defined as occurrences where fluctuations in the price of an asset in one country (or region) trigger changes in the prices of the same asset or other assets in another country (or region). These fluctuations can reflect both desirable effects (resulting, for instance, from the incorporation of news into forward-looking asset prices) and less desirable ones (such as the transmission of excess volatility due to financial frictions, especially financial accelerator effects).

How do you measure them? A common approach to measuring financial spillovers is in terms of the impact of domestic asset price movements on asset prices in other economies. Among the most recent studies of this type are those of the IMF (2016a,b,c). In IMF (2016a), spillovers are estimated using a vector autoregression (VAR) model of daily asset returns incorporating global control variables. The results indicate that over the last 20 years, spillovers of emerging market asset price shocks to equity prices and exchange rates in advanced and (other) emerging market economies have risen substantially, and now explain over a third of the return variation in these countries.

The cross-border transmission of financial shocks (triggered, for instance, by a temporary change in risk-free interest rates in major economies or a sudden shift in market risk perceptions) may occur through a number of conventional channels through which financial spillovers are typically deemed to occur. These channels are: (a) spillovers via asset prices and portfolio effects; (b) spillovers via cross-border balance sheet exposures; (c) spillovers through information or confidence effects; and (d) policy spillovers that occur when domestic monetary and fiscal decisions in source countries have the potential to affect foreign financial variables not only indirectly (through the channels outlined above) but also directly, if policymakers in recipient countries respond in the same direction.

Financial spillovers and spillbacks are not necessarily bad if they allow new information about changes in economic fundamentals to be reflected accurately in asset prices across different countries. However, they may be undesirable when they contribute to the propagation of shocks across countries – even in the absence of significant economic linkages among them. This is the case, for instance, if portfolio rebalancing considerations induce fund managers in a core country to sell assets in a periphery country, as a result solely of constraints on exposure they may face.

The role of **global banks** has been important in the transmission process. Between the mid-1990s and the onset of the GFC, cross-border lending and investment activities of banks increased sharply. To a significant extent, this increase reflected a greater direct provision of loans and financial services by global banks, a greater share of foreign assets in banks' trading books, and a proliferation of cross-border

[5] The term "emerging markets" lumps together a fairly disparate group of economies – large and small countries (for instance, China and the Czech Republic), rich and poor countries, manufacturing and commodity-based exporters, and countries with large external deficits and large surpluses. For many substantive issues, including the one addressed in this paper, this amalgam does not help bring to the fore some of the characteristics relevant to the issue at stake. In addition, international organisations (such as the IMF and UN) and private institutions involved in the publication of financial indices (such as MSCI, JPMorgan Chase and FTSE) use a clutter of conflicting criteria to categorise countries they include in the "emerging markets" group. This creates confusion and inconsistencies when making comparisons across measures or over time. Even accepting prevailing classifications, it is often unclear why one country is labelled "emerging" while another is labelled "developed".

branches and subsidiaries, which in turn facilitated the cross-border provision of loans, investments and financial services. A number of studies have documented that large, global banks have played a significant role in the international transmission of global financial shocks, including during the recent financial crisis (see for instance Ahrend and Goujard (2015), Buch and Goldberg (2015, 2017) and Claessens (2017)). There are two main channels through which the transmission of financial risks can occur. First, if domestic lending standards are relaxed at the same time that cross-border lending is increasing (a common occurrence when banks are awash with liquidity) it can weaken the balance sheets of borrowers in recipient countries and heighten systemic risks. Second, a financial institution experiencing difficulties in one of the countries where it operates may fuel financial instability in the other jurisdictions where it operates. In a sense, cross-border banking may create a *credit spillover* channel, which may increase financial vulnerability.[6]

In addition, in a financially integrated world, there could be **macroprudential spillover**: measures taken in some countries can spill over to other countries through cross-border lending and capital flows – a phenomenon that has been referred to as policy leakages (Aiyar et al (2014) and Bengui and Bianchi (2014)). For instance, following a tightening of macroprudential restrictions (such as a lower loan-to-value ratio) at home, domestic banks with a regional or global presence may respond by increasing their lending abroad. The credit spillover channel through which cross-border arbitrage by foreign banks may occur can operate not only through direct lending to foreign country borrowers (firms or households) but also through local lending to foreign branches, as well as a "rebooking" of loans, whereby loans are originated by subsidiaries but then booked on the balance sheet of the parent institution. Leakages can be to banking institutions not directly covered by the specific policy instrument (Aiyar et al (2014)), to shadow banks, or to activities in other geographic regions (Houston et al (2012)). Regardless of the precise channel through which these leakages occur, the presence of foreign branches of financial institutions that are not subject to host country regulation may undermine domestic macroprudential policies.[7] Thus, the relationship between macroprudential policies and international capital flows can go in both directions: not only are these policies responsive to capital flows, they may also affect these flows. These interactions may generate undesirable international spillovers, thereby creating challenges in terms of both macroeconomic and financial stability.

International financial spillovers can occur with changes in **policy rates and balance sheet effects**. For major middle-income countries, whose corporations and banks borrow heavily abroad mostly in US dollars and with little hedging – unlike other advanced economies – changes in US interest rates are a critical channel for financial spillovers. The accumulation of a large stock of foreign currency-denominated debt in SMICs has heightened the potential for spillbacks to advanced economies. Low US interest rates and a depreciating US dollar boosted credit, asset prices and growth in SMICs in the aftermath of the GFC. A tightening in global financial conditions induced by prospects of higher US interest rates (as is the case at the time of writing) could trigger a reversal of easy liquidity conditions for SMICs. Spillovers to advanced economies from SMIC holdings of specific advanced economy assets, such as sovereign bonds, have increased (BIS (2016)). Studies based on transmission through policy rates include Hofmann and Takáts (2015), who find economically and statistically significant spillovers from the United States to a range of countries.

Evidence on the determinants and effects of **cross-border bank flows and the credit spillover** channel is provided in a number of recent contributions. Studies by Cetorelli and Goldberg (2012), Bruno

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[6] See Cecchetti and Tucker (2016) for a more detailed discussion of these transmission channels, and Cetorelli and Goldberg (2012) and Buch and Goldberg (2017) for a further discussion of the impact of cross-border lending by foreign banks on domestic credit. Krugman (2008) discusses a related idea in relation to the credit channel, which emphasises how interconnections in financial markets may give rise to an international finance multiplier.

[7] Financial institutions, including their branches, are generally supervised on a consolidated basis by their home supervisor. Host countries supervise their domestic financial institutions, which include subsidiaries of foreign financial institutions. Thus, macroprudential tools applied by a host country would not apply to branches located in the host country.

and Shin (2015), Correa et al (2015), Tonzer (2015) and Cerutti, Claessens and Laeven (2017) focus on aggregate banking flows, whereas Reinhardt and Riddiough (2014) focus on disaggregated (interbank and intragroup) flows. By and large, these studies have shown that cross-border bank capital flows are highly sensitive to changes in interest rates in advanced economies and changes in global risk perceptions, and that these changes tend to operate quickly – with potential consequences for financial stability in destination countries.

Studies focusing on how **regulatory leakages** (including macroprudential measures) affect cross-border capital flows, which therefore act as a conduit to financial spillovers, are numerous, and Buch and Goldberg (2017) provide a summary of the evidence. Typically, for example, Avdjiev et al (2017) find that changes in macroprudential policy – in the form of loan-to-value limits and local currency reserve requirements – have a significant impact on cross-border bank lending.

3. The rationale and potential gains of international macroprudential policy coordination

A fundamental rationale for policy coordination is the existence of **externalities**.[8] The literature has identified three types of externalities that might require coordination: those based on incomplete or asymmetric information, those due to asymmetries in incentives, and those due to spillovers (across agents or jurisdictions) associated with specific shocks or policies. These externalities could be either positive or negative, which implies that coordination could either prevent welfare losses or achieve welfare gains. If there are cooperative strategies that could result in a Pareto-improving outcome, there is scope for coordination.

For macroprudential policy in particular, the case for international coordination rests on the existence of cross-border financial sector externalities, related to interconnectedness of financial institutions and markets. Given regulatory leakages, macroprudential measures applied solely to domestic financial institutions may be undermined by cross-border capital flows. Moreover, capital inflows induced by changes in financial regulation in a source country may lead to excessive credit growth and asset price pressures in recipient countries, which may only be partially mitigated by regulatory and macroeconomic policy measures in these countries. Conversely, effective domestic macroprudential policy that helps to contain systemic risks in one country may help promote financial stability elsewhere, creating positive externalities. Indeed, lowering the probability of a financial crisis in one country through timely macroprudential policies may reduce the scope for negative trade and financial spillovers at the regional or international level. Thus, coordination is desirable when it enables countries to improve their policy trade-offs (Engel (2016)).

The **financial trilemma** makes a broader case for macroprudential policy coordination among small open economies – regardless of the exchange rate regime. It is named after Claessens et al (2010, Chapter 2), Schoenmaker (2011) and Obstfeld (2015) and refers to the idea that financial integration with global markets (with no intervention in cross-border financial flows), national control over financial supervision and regulation, and financial stability, are not all mutually compatible. That is, under a financial trilemma, a country can attain any pair of these goals: financial stability and international integration,

[8] In the policy world, cooperation is typically taken to mean collaboration via sharing of information, discussion of common issues and one-off emergency responses, especially during periods of financial stress. Coordination refers to policy actions formally agreed and taken by groups of policymakers – possibly including multilateral institutions – aimed at achieving beneficial outcomes for the international community as a whole. In what follows we maintain this distinction for clarity.

financial stability and independently pursued financial policymaking, or international integration and autonomous financial regulatory policies.[9] However, all three objectives cannot be achieved simultaneously.

The financial trilemma implies that, should countries choose to focus on domestic financial stability and to pursue an independent financial policy – assuming that macroprudential policies are effective in dealing with financial stability issues – a goal of internationally linked financial markets cannot be achieved. National banking authorities may face significant pressures to insulate their financial systems from international competition. Such a strategy may result in financial protectionism (VanHoose (2016)). It may also imply a race to the bottom, involving unilateral capital controls (as discussed by Blanchard (2017)), or "regulatory wars'' (as pointed out by Pereira da Silva and Chui (2017)), both of which would be detrimental to world welfare. By contrast, international macroprudential policy coordination among national supervisory authorities may help address the trilemma and avoid these risks.[10]

Macroprudential policy is also subject to **collective action problems**, which often translate into insufficiently forceful and timely policy responses. This is so, for instance, as a result of the "**first-mover disadvantage problem**", which is caused by an inability of national regulators to internalise the cross-border externalities that a successful national macroprudential policy entails. In a world of integrated financial markets, a reduction of financial risks in an individual country contributes to financial stability in other countries (positive externality), whereas an inadequate response by a national regulator to home country financial risks may increase the likelihood that financial instability may spread to other countries (negative externality). For instance, in a period of rapid credit growth and asset price pressures, a national regulator which chooses unilaterally to tighten its macroprudential policy (through, say, an across-the-board increase in capital requirements) would internalise only *some* of the financial stability benefits of this tightening while bearing all the potential costs in terms of reduced competitiveness of its national financial institutions.[11] Thus, no country will be willing to be the first to tighten its policies unless it believes that other countries are willing to do the same. When financial risks can be transmitted rapidly across national borders, and macroprudential measures – when applied solely to domestic financial institutions – can be promptly undermined by large capital movements across countries, there may be "too little" macroprudential policy response rather than "too much". This may, in turn, reinforce biases in favour of inaction at the national level (Gaspar and Schinasi (2010) and Viñals and Nier (2014)).

Another type of collective action problem in an international context may result from the fact that advanced economies may claim that their **exclusive mandate** is to promote price stability and sustainable growth domestically, which requires taking account of the external impact of their policies only insofar as they feed back onto their own economies. That is, only spillbacks, not spillovers per se, need to be internalised.

The gains from, and obstacles to, macroprudential policy coordination need to be assessed by comparing outcomes under a Nash equilibrium, in which countries act independently, and a cooperative

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[9] Under a fixed exchange rate regime or a managed float, with limited scope for conducting an independent monetary policy, macroprudential instruments may be directed not only towards mitigating financial risks but also towards achieving macroeconomic objectives – although, in the latter case, benefits to financial stability may also result. This has often been the case in Latin America; see Agénor and Pereira da Silva (2013) for a discussion.

[10] Obstfeld (2015) stresses that areas of cross-border coordination relate not only to financial regulation, but also to clear rules of the game for capital controls and enhanced facilities for international liquidity support in key currencies to counteract the downsides of excessive reserve accumulation.

[11] Traditional arguments for international coordination of banking regulation are the need to maintain a level playing field for banking competition and avoid regulatory races to the bottom. These arguments also apply to the macroprudential dimension of banking regulation.

solution, in which they act jointly. More formally, under uncoordinated policymaking, each country's regulatory authority independently sets its policy instrument so as to minimise its own policy loss or maximise its own welfare, taking the choice of instrument of all other countries as given. The resulting policy outcomes typically fail to fully account for cross-border spillovers. In contrast, if the regulatory authorities coordinate their choices by jointly determining instrument settings with a view to minimising a weighted sum of their policy loss functions, or maximising a weighted sum of their national welfare functions, the policy spillovers each of them are confronted with would be internalised. As a consequence, and depending on the nature of the cross-border externality, coordination may enable all policymakers to attain lower policy losses or higher social welfare. In order to discuss the gains (or lack thereof) associated with international macroprudential coordination, there are several analytical approaches.

The first approach is **partial equilibrium models of international banking** and includes Acharya (2003), Dell'Ariccia and Marquez (2006) and Kara (2016).[12] Among the key results of these approaches are, for example: that in the absence of incentives for national regulators to cooperate, a single bank from each country competing for loans in both markets will result in a race to the bottom, in terms of prudential standards; that convergence in international capital adequacy standards cannot be effective unless it is accompanied by convergence in other aspects of financial regulation, such as bank closure policies; and/or that regulation levels in a two-country setting might be *strategic substitutes*: if one regulator tightens the standards in its jurisdiction, the other regulator optimally loosens its own standards. This follows from the fact that macroprudential regulation in an international context – or, more accurately, the global financial stability that it helps to promote – is fundamentally a public good. The banking and finance literature on international macroprudential policy coordination sheds useful light on a number of issues – including the structure of the banking markets across countries and the objectives of financial regulators. However, the partial equilibrium nature of these models also means that they are not well suited to fully assessing the gains associated with international macroprudential coordination – whether in its structural or countercyclical dimensions.

The second approach consists of **specific macroeconomic models** that include Korinek (2014), Bengui (2014) and Jeanne (2014). Korinek shows that international cooperation is not warranted if small countries can use prudential capital controls to respond to domestic externalities. Bengui studies the scope for international coordination in a model with public liquidity provision. Jeanne analyses the scope for international coordination in a model where both domestic macroprudential policies and prudential capital controls generate international spillovers through their impact on capital flows. The uncoordinated use of macroprudential policies may lead to a "capital war" that depresses global interest rates. However, international coordination of macroprudential policies is not warranted, unless there is unemployment in some countries, or one part of the world is in a liquidity trap, while the rest of the world accumulates reserves for prudential reasons.

These two approaches, banking-based and macro-based models, suggest that coordinated macroprudential policies can potentially offer significant gains. However, achieving and maintaining coordinated policies across countries in pursuit of these gains may prove difficult in practice. Why is it so? First, assuming that a cooperative outcome can indeed be achieved, and that regulators have agreed to coordinate, each of them almost invariably has an incentive to **cheat**. Indeed, once one of the countries' regulators has set its instrument at the agreed level, the other typically can set its own instrument at a different value and attain an even lower policy loss or higher welfare. This incentive is stronger the smaller the perceived ex post cost of reneging on a cooperative agreement. Second, cooperative solutions may be inefficient in the presence of **third-party effects**: in a policy game with three or more players, the welfare contribution of a subgroup coalition generally cannot be determined a priori, and it is often the case that policy coordination worsens welfare (see Rogoff (1985) and Cai and McKibbin (2013)). This is

[12] See VanHoose (2016) for a survey of that literature.

important because recent empirical contributions have generally been based on two-country models, in which a "core country" (which can be interpreted as an aggregate of major advanced economies) and a "periphery country" (which can be interpreted as the group of SMICs identified earlier) operate. However, while a two "country" structure may be appropriate to generate analytical insights, as well as broad estimates of the gains from coordination, it does not account for the fact that in practice these groups are not homogeneous and face coordination issues of their own. Among advanced economies, for instance, these issues are equally important between the United States, Japan and the euro area – even though these countries have in the past cooperated sporadically (often in the context of emergency responses to heightened risks to the world economy) in setting macroeconomic policy. This issue is even more problematic in the case of SMICs, given their historical record in that area.

But **how large are gains from cooperation**? The early empirical literature on the gains from international monetary policy coordination, largely based on multi-country econometric models, has traditionally found gains to be modest.[13] This could be related to the fact that in these models international goods market spillovers tend to be very small, because a large part of the adjustment to shocks consists of relative price changes – which themselves tend to be relatively limited, especially with sticky prices and a low degree of trade integration.[14] However, the most important reason as to why the early literature finds only small gains from international monetary policy coordination may well be the fact that for the most part it does not account for various types of capital flows (bank and non-bank related) and largely abstracts from the financial system and its role in magnifying the response to shocks. In the area of macroprudential policy coordination, where contributions have only recently begun to emerge, these features have figured prominently in model design. In addition, some models also account for the fact that macroprudential regimes affect the monetary transmission mechanism – in line with the closed economy literature on monetary policy.[15] As discussed earlier, the international interconnectedness of financial markets, the possibility that regulatory leakages may weaken the ability of national policies to mitigate financial risks in a world with global financial institutions, and the fact that frictions in national financial systems can amplify the cross-border effects of domestic shocks, suggest indeed that significant gains from coordination may exist.

Nevertheless, model-based contributions focusing on the gains from international macroprudential policy coordination remain scarce. Instead, recent studies have focused more on measuring the magnitude of cross-border financial spillovers themselves, rather than providing quantitative estimates of the gains from coordination.[16] Among the few contributions available, based explicitly on a game-theoretic approach, are Chen and Phelan (2017), Agénor et al (2018) and Agénor and Pereira da Silva (2018). The first study focuses on the case where financial frictions relate to the inability of countries to issue equity to each other. In that setting, coordinated macroprudential policies (in the form of borrowing limits) improve welfare. The second and third contributions study the gains from international macroprudential policy coordination in a two-region, core-periphery model with a global bank and financial frictions, with periphery banks borrowing from the core global bank to fund domestic lending. Both studies find that these gains, when unconstrained policies are used, are significant. In addition, gains are not equally distributed across countries; depending on the nature of the shock, gains

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[13] Taylor (2013) and Frankel (2016) provide a critical review of the early academic literature on the gains (or lack thereof) from international monetary policy coordination.

[14] However, this latter point depends on the structure of the model; as shown by Obstfeld and Rogoff (2002), the case for coordination may be the weakest precisely when goods market integration is high.

[15] Establishing that the macroprudential regime matters in the transmission of shocks across countries, and that macroprudential instruments are effective in terms of mitigating financial risks at the national level, can be viewed as preconditions for making a case for international macroprudential policy coordination.

[16] Recent contributions based on multi-country models of the world economy with extensive macro-financial linkages include Benes et al (2016), Dieppe et al (2017) and Vitek (2017).

for the periphery can be larger than those accruing to the core region. This could point to potential political economy obstacles to the implementation of cooperative policies – an issue we return to later on. Another contribution that also accounts for financial frictions in a game-theoretic setting is Agénor and Jia (2017). They focus on the case of a two-country currency union where investment in each country is financed by credit from national banks only, subject to collateral-based frictions. Monetary policy is conducted by a common central bank (which follows a Taylor rule), whereas macroprudential policy (which involves setting a reserve ratio on bank deposits) can be conducted either by national regulators or a union-wide regulator.

The few studies summarised above provide important insights into what may affect, quantitatively, the gains from international macroprudential policy coordination. In particular, they suggest that the welfare gains from coordination are stronger when (a) models are capable of generating large cross-border financial spillovers (as observed in recent years); (b) financial frictions and financial amplification mechanisms at the level of individual countries are accounted for, as well as asymmetries in financial market imperfections across countries; and (c) global regulators, entrusted to implement a cooperative solution, are able to internalise the fact that national regulators are subject to collective action problems and may have a higher preference for financial stability, and thereby end up putting a higher weight on that objective in the global policy loss or welfare function.

At the same time, given that in practice (as noted earlier) disagreement over models may be a significant impediment to coordination, it is important to establish the robustness of these results and to explore other channels that may affect the gains – or lack thereof – from coordination. In particular, the performance of simple rules should be compared with fully optimal policies – even though the latter are often very complex and difficult to implement. The idea that the presence of quantitatively important economic non-linearities and asymmetries, especially in the financial system, may enhance the benefits from international macroprudential policy coordination also needs to be studied further. And the fact that leakages through global financial institutions can undermine the effectiveness of national macroprudential policies, and thus magnify the gains from coordination, should be explicitly accounted for in multi-country policy models. Finally, it may be important to use or develop models with more than two countries, to understand (as discussed earlier) how sub-coalitions can weaken or strengthen global gains from coordination.

Finally, last but not the least, an important question is whether **monetary and macroprudential policies be coordinated across borders**.

There is now a large amount of evidence to suggest that monetary policy may affect not only price stability but also financial stability, through various channels – including a risk channel, as discussed by Borio and Zhu (2012) and Adrian and Liang (2018). Indeed, changes in interest rates affect not only aggregate demand and supply but also financial conditions through intermediation costs, asset prices, borrowing and collateral constraints, banks' balance sheets and risk-taking behaviour, and default risks, as well as capital flows and exchange rates. Conversely, it is also well established that macroprudential policy regimes can affect the monetary transmission mechanism – possibly in substantial ways (Agénor and Pereira da Silva (2014)). These interactions have led to an ongoing debate on whether, at the level of the domestic economy, monetary and macroprudential policies are complements in achieving macroeconomic and financial stability.

Fundamental to research on this issue is an understanding of the division of tasks. Many observers have argued that macroprudential policy cannot be a substitute for sound monetary policy, and that the priority for monetary policy should remain price stability. At the same time, macroprudential policy's primary focus should be on containing systemic financial sector risks. Such clear mandates serve to protect the independence that policymakers need to conduct countercyclical policies and simultaneously achieve or maintain price stability and financial stability. Others, however, have argued that there are circumstances where monetary policy may still need to "lean against the wind" and respond to financial sector distortions – because macroprudential policies alone may not be sufficiently effective in containing systemic risks arising from macroeconomic imbalances – whereas macroprudential policy may be needed to attain

macroeconomic stability objectives (as in the case of a currency union, discussed earlier). The view that macroprudential and monetary policies are complements in achieving price and financial stability, and should therefore be coordinated at the individual country level, has gained greater acceptance in recent years.[17] It has also been supported by some recent empirical evidence.[18]

Therefore, at the level of a single economy, there are some valid arguments regarding the desirability of **coordinating macroprudential and monetary policies** – given their characteristics, their interactions, and the requirements of financial stability.[19] In light of this growing consensus, and given the issue at stake, should there also be coordination of these policies at the international level?

The answer to this question is not straightforward. First, although some studies (including Rey (2015)) have found that US monetary policy is a key global driver in asset prices, risk premia, and other financial variables, the magnitude of this effect has been questioned in others (see Cerutti, Claessens and Rose (2017) and Arregui et al (2018)). But even if cross-border spillovers associated with changes in US interest rates are large, it does not follow that monetary and macroprudential policies should also be coordinated across countries; fluctuations in financial variables do not necessarily heighten financial risks – the strength of the recipient country's prudential regime, and the pervasiveness of domestic financial frictions, matter also.

Second, in practice the requirement to coordinate macroprudential and monetary policies presents a greater challenge for international coordination. Monetary policy coordination across borders is more difficult because it is often less rules-based and mechanistic than *structural* macroprudential regulation – except in emergency situations.[20] At the same time, a policy regime that involves *countercyclical* macroprudential and monetary responses introduces more discretion and judgment to a level above rules-based systems, with a greater demand on international coordination.

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17 See BIS (2016, Chapter 4), Adrian and Liang (2018) and Agénor and Flamini (2016) for a discussion. For a dissenting view, see Svensson (2016), who argues that with less effective macroprudential policies, using monetary policy entails too high a sacrifice ratio. One caveat to all this literature, however, is that the effectiveness and calibration of macroprudential instruments remain insufficiently understood, compared to monetary policy.

18 Bruno et al (2017), for instance, find that macroprudential policies tend to be more successful when they complement monetary policy in Asian economies, by reinforcing monetary tightening, rather than when they act in the opposite direction. Gambacorta and Murcia (2016) find that macroprudential policies that are used as complements of monetary policy have larger negative effects on credit growth than other types of measure. Moreover, the degree of complementarity between monetary and macroprudential policies depends on the type of policies implemented: policies with countercyclical objectives are more likely to exhibit complementarity with monetary policy than policies (involving, for instance, setting capital levels) that are more structural in nature.

19 The issue of coordination of macroeconomic policies, at both the domestic and international levels, also arises for other combinations of instruments. Gaspar et al (2016), for instance, discuss the scope for international coordination of monetary and fiscal policies to sustain global output growth.

20 The creation of US dollar liquidity swap lines in December 2007, which involved central banks in both advanced and middle-income countries, is a recent example of monetary policy cooperation at a time of crisis – a sort of "global lender of last resort". In October 2013 these swap lines were converted to standing arrangements. The agreement among G7 partners in February 2013 on a "Currency War Ceasefire" represents the most substantive example of international economic policy coordination in the last few years (see Frankel (2016)). However, the agreement made no explicit reference to monetary policy and did not mention what sanctions could be imposed to enforce it.

4. Existing international macroprudential policy coordination: regulatory standards and reciprocity principles

There are already ways through which international macroprudential policy coordination has been promoted: the adoption of **minimum regulatory standards** and reciprocity principles. National macroprudential policies that are designed to contain risks associated with a rapid expansion of domestic credit can be subject to leakages from an increase in cross-border borrowing, which in turn may weaken their effects. In addition, during a crisis or its immediate aftermath, a protectionist national financial policy response may favour local banks. When that occurs, fragmentation increases, with the best example being Europe, where the intertwined problems of banks and sovereign risks culminated in the 2010–12 euro area debt crisis (see Baldwin and Giavazzi (2015)). Global coordination may help to avoid these outcomes.

Another area of coordination has been the adoption of a **capital surcharge for systemic financial institutions, or SIFIs**, including those with extensive cross-border operations, G-SIFIs, and especially G-SIBs.[21] Recognition of the unique nature of G-SIFIs – with global activities but regulatory and resolution authorities which are largely circumscribed by national boundaries – has led in recent years to international cooperation in designing a consistent framework covering the resolution of these institutions. The key motivation is that the failure of one G-SIFI can send contagious shockwaves across national borders and lead to a squeezing or even a seizing-up of liquidity in key financial markets, with adverse effects on the provision of credit to the real economy – even in countries where banks were not exposed to the underlying risks.

Finally, last but not the least, the BCBS established the principle of ***jurisdictional reciprocity*** **in the context of the use of countercyclical capital buffers**.[22] Under this principle, foreign supervisors must apply (at least) the same additional capital buffers imposed by the host supervisor to their banks' lending to the host country. The goal is to ensure that all banks operate on a level playing field when lending to entities in the host country.[23] Moreover, the principle aims not only to address the issue of regulatory arbitrage but also to help whenever credit exposures are large, and hence systemic with respect to the host country, but small and hence of little significance in relation to the lending institution's portfolio – a fairly common situation, as noted earlier, given the size of internationally active banks.[24]

The reciprocity clause built into global rules on cyclically varying capital buffers may help alleviate the problem of leakages and tackle the inaction bias, alluded to earlier, inherent in macroprudential policy.

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21 SIFIs encompass banks, insurance companies and other financial institutions which, in the event of financial stress/failure, can trigger a global and severe financial crisis.

22 Fundamentally, the countercyclical capital buffer is intended to counterbalance the procyclical behaviour of banks by building up buffers in good times that can absorb losses in times of stress. It is a prudential instrument calibrated to achieve a macroprudential objective. Critically, the level of the buffer depends on the state of the financial cycle in a given jurisdiction. The framework allows for a large degree of judgment and tailoring to local circumstances.

23 More precisely, under these provisions the home country of an international bank must impose a capital buffer that is a weighted average of the capital requirements in the host countries where the bank operates, with weights determined by the share of the bank's exposure in different countries. For instance, a bank that has half of its exposure in its home country and half of it in another country will face capital requirements equal to the average of the two countries' required capital ratios – subject to the provision that the requirements be no lower than those imposed by the home country on domestic banks. Reciprocity becomes binding when some countries decide to impose stronger requirements than the minimum recommended in Basel III.

24 Authorities in the European Union (EU) have developed a similar, voluntary approach aimed at all measures targeting exposures. Guidance is also provided to EU countries on how to treat exposures to third countries that fail to take macroprudential measures (see ESRB (2014)).

It also provides an important first step towards an international coordination regime for countercyclical macroprudential regulation.

5. Conclusion: going further to strengthen the framework for international coordination of macroprudential policies

A number of recent contributions have established that under some circumstances potentially significant gains can be achieved for the world economy if macroprudential policies are coordinated across countries, compared to non-cooperative policies. At the same time, however, international coordination of countercyclical macroprudential policies has been viewed by some as being somewhat unrealistic and unlikely to occur in practice, considering the exclusively national mandates of central banks, regulators and supervisors. Surely, measures of the magnitude and sign of spillovers and spillbacks can be further improved but determining the gains from coordination depends heavily on the type of models and metric used (policy loss functions or household utility) in estimating the difference between cooperative and non-cooperative equilibria.[25] The issue then is the following: if there is an analytical case for coordination but with parts still missing– especially with respect to quantifying the gains from coordination, how can we promote a pragmatic approach to international macroprudential policy coordination between countries that may potentially benefit the most from it, namely, major advanced economies and SMICs, given their increased degree of trade and financial interconnectedness?

To promote macroprudential policy coordination among major advanced economies and SMICs, a sensible approach would be to use the existing **international cooperative arrangement, involving the IMF, BIS and FSB, to develop the following agenda**:

1. Continue the **statistical effort** through which information about the types, timing and circumstances of usage of macroprudential instruments is currently collected, formatted and disseminated (see IMF-FSB-BIS (2016)); in particular, the current data sets need to incorporate more granular information about the nature (structural or countercyclical), direction (tightening or loosening) and intensity (vis-à-vis some initial conditions) in the usage of the range of available macroprudential instruments as well as their effectiveness in affecting the financial cycle.

2. Explore further the **evidence on financial cross-border spillovers**, dwelling on the literature that has recently emerged on the topic (see, for instance, Buch and Goldberg (2017)), to improve existing models of spillovers, their underlying methodology, and better understand policy responses.

3. Improve the **measurement of the national and cross-border effects of the implementation of macroprudential tools**. At the national level, the evidence on the benefits of macroprudential policies is still mixed.[26] At the international level, as noted earlier, there is evidence that cross-border financial spillovers and spillbacks have increased in magnitude in recent years – and so

[25] Moreover, it is clear from the past and ongoing difficulties of the Basel process (for instance, its current unanimous decision rule with a smaller insider group of primus inter pares advanced economies) that political economy considerations often play a role when countries complain about other countries' policy actions. As noted by Frankel (2016), these concerns are sometimes put forward to avoid working on one's necessary adjustments and reforms, and thus avoid addressing domestic distortions and disagreements among special interest groups.

[26] Claessens et al (2013), for instance, find that, using bank-level data for 48 countries for the period 2000–10, macroprudential measures aimed at borrowers (loan-to-value ratios, limits on credit growth, and so on) are effective in reducing bank leverage and asset growth. By contrast, in a study also based on bank-level data but covering up to 125 countries over the period 1998–2011, Deli and Hasan (2017) find that bank capital regulations have only a weak negative effect on loan growth.

have the potentially negative externalities associated with them, especially in countries where financial systems tend to be highly procyclical.

4. Accumulate further **analytical and empirical evidence regarding the potential gains of macroprudential policy coordination**, in both its structural and countercyclical dimensions. In that particular aspect, the BIS (perhaps in a collaborative effort with the FSB) could further strengthen its current research effort in order to produce a regular and comprehensive assessment on international macroprudential policy coordination encompassing statistical, empirical and analytical work.

5. Develop **better indicators and models to assess systemic risk both within and outside the banking system (shadow banks).** Because financial stability is a broad concept with several dimensions, including a complex relationship between national and international levels, no common metric exists and it may not be possible to establish one (comparable to the role that, for instance, the consumer price index plays in an inflation targeting regime). More theoretical and applied research is required, not least to better identify what kind of data are needed, when and how these data should be collected, and what type of analysis is warranted with what type of modelling framework.[27]

More generally, international coordination of macroprudential policies needs to be built not only on shared information, but also on shared analysis. Various mechanisms for such shared analysis between the BIS, the IMF and the FSB already exist: they include IMF surveillance and, to a lesser extent, Financial Sector Assessment Program (FSAP) assessments, FSB peer reviews and bimonthly meetings of senior central bank officials at the BIS.

The capacity to develop a modelling framework with some common core elements is also important to provide legitimate advice. As noted earlier, the lack of consensus on the direction and magnitude of spillovers, and the impact of policies to mitigate them, can undermine international cooperation – especially with respect to countercyclical responses.28 An analytical effort to develop some common model – dwelling for instance on multi-country models already in use in several international institutions – to provide robust evidence showing the gains from coordinating policies may not, of course, change current mindsets and doubts overnight, but it may help to confront points of view and discuss why countries may disagree. Conversely, there also needs to be an assessment of the welfare losses resulting from the lack of coordination, which may take the form of financial protectionist measures, such as capital controls. Such an outcome could indeed emerge in a world of excessive volatility in capital flows and unwillingness by major advanced economies to engage in policy cooperation, leaving major middle-income countries with no other option but to impose restrictions on capital movements.

Some problems will surely remain: what if there is no agreement on a common modelling framework or yardstick to measure the gains from macroprudential policy coordination, the magnitude of financial spillovers and spillbacks, the very definition of financial stability, or the appropriate policy responses? What if participants in the discussion forums do not reach either empirical or analytical common ground? Sharp and well publicised disagreements could lead to credibility losses, which in turn could undermine the legitimacy of the proposed work programme and its ability to influence policy choices. At the same time, this scenario is not new; indeed, it has been a perennial issue confronting international cooperation on a range of issues. In fact, this is an argument that also favours a tripartite

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[27] A promising new direction is the measure of financial stability based on the probability distribution of future GDP growth developed by the IMF (2017). However, further validation tests are needed.

[28] This view is consistent with Bayoumi (2014), who emphasises the need for greater consensus on estimated spillovers to promote international cooperation, and Eichengreen (2014), who suggests (based on historical evidence) that international economic policy coordination tends to be more successful when it involves broad agreement among experts on technical matters.

approach in some of the aspects of the proposed work agenda. It is easier not to pay attention to one individual international institution. But it would be more difficult not to listen to a set of robust empirical and analytical results coming from a group of well established institutions, which together represent best practices and policy advice on promoting macroeconomic and financial stability.

To conclude, in a financially integrated world, international coordination of macroprudential policies may not only be valuable, but also essential, for macroprudential instruments to be effective at the national level. A first step towards coordination has been taken with Basel III's principle of jurisdictional reciprocity for countercyclical capital buffers, but this principle needs to be extended to a larger array of macroprudential instruments. Further empirical and analytical work (including by the BIS, FSB and IMF) on the benefits of international macroprudential policy coordination could play a significant role in promoting more awareness of the potential gains associated with global financial stability.

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