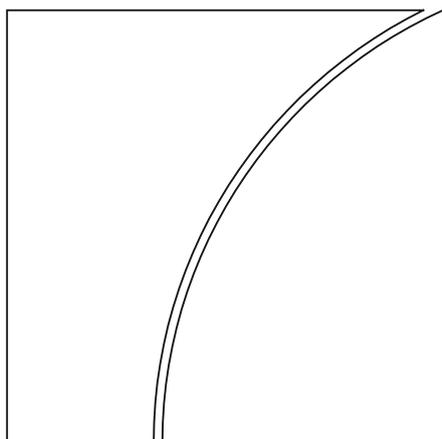




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Macroprudential frameworks, implementation and relationship with other policies

Christian Upper

Emerging market central banks have a long history of using macroprudential instruments. In the aftermath of the Asian crisis, central banks in the region deployed macroprudential tools first to deal with the fallout of crisis and then to prevent vulnerabilities from building up again. Similarly, central banks in Latin America and other regions used macroprudential tools to prevent large swings in external financing from turning into domestic financial booms and busts.

This volume collects the background papers of a meeting of Deputy Governors of central banks from emerging market economies (EMEs), who met in Basel in February 2017 to exchange their experience with designing macroprudential frameworks and implementing macroprudential instruments. The volume includes country notes prepared by participating central banks, as well as the background papers by the BIS.

Goals and objectives

Most central banks carry a heavy responsibility for financial stability, both formally and in the public's mind. But legal objectives are generally vague, do not define success or failure, and say nothing about competing objectives. In some cases, they are missing altogether (Villar, this issue). Unclear mandates raise issues for accountability. These can be particularly severe when it comes to macroprudential frameworks, whose primary objective is to prevent financial stress rather than managing it once it arises.

Clear objectives are important because macroprudential actions are not taken in a vacuum but may have implications for the other objectives of the central bank, most importantly price stability. In Indonesia, financial deepening is a third objective of the central bank, alongside ensuring monetary and financial stability. Financial inclusion also ranks among the multiple goals of the Reserve Bank of India. To make things even more complicated, the Indian government uses state-owned banks to promote financial inclusion. This can lead to tensions with the central bank's goal of ensuring financial stability, even though there haven't been any major conflicts between these different goals so far (see country note).

But even in countries with more narrowly-defined central bank objectives, macroprudential actions are often driven by considerations that go beyond ensuring financial stability. For instance, foreign currency mortgages do not pose a major threat to financial stability in many Central and Eastern European countries, but central banks nevertheless implemented policies to reduce their importance in order to protect borrowers from sharp fluctuations in debt service costs. Similarly, restrictions on auto loans in Singapore cannot be justified purely on financial stability grounds given the small size of the portfolios. Rather, they also reflect consumer protection considerations. At the same time, as one participant warned, mingling financial stability and social policy objectives draws the central bank into government policy realm.

A clear mandate also helps when the central bank bears responsibility for financial stability but does not have control the tools required to do the job. The extent to which this is an issue varies across countries. At the one end of the spectrum, the central banks of Peru and Chile only have monetary policy tools such as reserve requirements (in domestic and foreign currency) under their immediate control, whereas banking supervisors are responsible for prudential instruments such as capital requirements or lending restrictions. This makes some coordination across entities necessary. Different responsibilities can strengthen accountability and help preserve central bank independence. Separation may also increase the diversity of views. At the same time, coordination is made more complex by the fact that the interaction of different tools is not well understood.

Other central banks have more instruments, but these are usually limited to the banking sector. In the Philippines, the central bank is responsible for banking supervision but not for the oversight of other financial institutions. It therefore needs to coordinate with other agencies to ensure that financial stability policies affect the entire financial system. A similar issue arises in Malaysia, where an inter-agency committee has helped to extend macroprudential measures beyond banks.

Coordination issues do not only arise externally but also internally. Economists and financial stability experts do not always speak the same language. Different backgrounds can support better decisions if the same issues are viewed from different angles. But it also makes communication more difficult. One meeting participant described the macroprudential division as a “translator” between the economic and financial stability functions of the central bank. Some central banks, for instance the Central Bank of Brazil, have internal committees to bring all relevant departments together. In Brazil’s case, this committee has a dedicated secretariat that acts as a hub for financial stability work.

Implementation

Participants drew several lessons from their experience with implementing macroprudential instruments. First, macroprudential authorities need to act early if they want to address systemic risk effectively. At the same time, diffuse signals and long reporting lags stand in the way of timely intervention. In addition, political considerations could delay or prevent action (see Arslan and Upper, this issue, and note by Poland).

Second, building buffers or shifting the composition of credit is easier than managing the cycle. A study by the Hong Kong Monetary Authority shows that loan-to-value ratios (LTVs) strengthened banks’ resilience to property shocks even if they had limited impact on house prices themselves. That said, there is some evidence that macroprudential measures do have an impact on the financial cycle. In Colombia, marginal reserve requirements and dynamic provisioning slowed credit growth, in particularly that of risky loans. In general, the effectiveness of macroprudential tools in affecting the cycle depends on the precise nature of the boom. In Malaysia, rapid house price and credit growth reflected speculation, which tends to be very sensitive to credit conditions. High LTVs proved therefore quite effective in slowing down the financial cycle. In Singapore, the house price boom reflected a mixture of strong underlying demand and speculative activity. Here, credit policies were less effective in constraining the boom than other measures such as higher stamp duties and measures to boost supply.

Third, macroprudential measures tend to be better at constraining booms than at dampening busts. One factor contributing to this asymmetry is that loosening requirements could trigger further instability when the financial system is already vulnerable. To be effective in a bust, buffers need to be fairly large and requirements tight to start with and need to be released well before concerns about financial stability become too large. That said, the issue of symmetry does not arise to the same extent when the objective of macroprudential frameworks is to reduce the riskiness of the loan portfolio.

Fourth, although macroprudential tools could, in principle, be targeted very precisely, circumvention by lenders and borrowers require more broad-based approaches. For example, in Malaysia tighter LTV limits on mortgages by individuals led to more home purchases by firms. The Bank Negara Malaysia responded by introducing tighter LTV caps also on loans to corporations. In several countries, borrowers responded to LTV caps or similar restrictions by borrowing from several banks or from unregulated off-balance sheet subsidiaries of banks. Chinese wealth management products are a particularly notorious example of such circumvention. The People's Bank of China (PBoC) responded to the rise of shadow banking by broadening the definition of credit to cover off-balance sheet lending.

Fifth, macroprudential measures and monetary policy can reinforce each other when used in the same direction. A BIS-coordinated research project by a group of Latin American central banks found that macroprudential measures tend to be more effective in dampening the credit cycle if accompanied by countercyclical monetary policy (see Box 1 in Arslan and Upper, this issue). Macroprudential and monetary measures that go into different directions also raise significant communication challenges.

Sixth, the jury is still out whether macroprudential instruments could be used effectively to address regional disparities within economies. For example, the Bank of Korea has applied different LTVs for Seoul and other parts of Korea, reflecting different house price developments. The PBoC also sets LTVs at the regional level, to reflect the very different situation in the property market across the country. Meanwhile in Hungary, house prices in Budapest have outgrown those in the remainder of the country. The central bank has studied the feasibility of deploying regional tools, for instance regionally differentiated capital requirements or debt limits, but had not implemented them by the time of the meeting.

Dealing with external flows and currency mismatches

EMEs have generally been quite vulnerable to fluctuations in global financial conditions, which often result in large swings in capital flows. One factor behind this is that borrowers in many EMEs have traditionally borrowed heavily in foreign currency, often without the corresponding foreign currency revenues. It is therefore natural that central banks in these economies have used macroprudential instruments to address currency mismatches and the impact of fluctuations in capital flows on the domestic financial system and the wider economy. For example, Bank Indonesia limits foreign currency assets and liabilities of domestic bank, and all external borrowing is subject to central bank approval. Non-banks face minimum hedge and liquidity ratios on their foreign currency debt, and foreign creditors are informed in case of non-compliance.

However, there was some debate about the extent to which currency mismatches call for policy action. In one country, huge losses made by one firm on its foreign currency served as a wake-up call for others and made them start hedging their own exposures. The representative of another central bank conceded that it was important to gather information on foreign currency exposures, not least to avoid multiple borrowing, but was reluctant to go beyond reporting requirements. One participant questioned even the need for reporting requirements, arguing that large positions would be reflected in market prices. Others disagreed, pointing to the opacity of hedging markets and the large impact on prices when many players head to the exit simultaneously.

Several central banks used macroprudential instruments to address problems caused by large fluctuations in international capital flows (Patel, this issue). But the evidence on their effectiveness is mixed. The note by Chile found that instruments such as reserve requirement on foreign deposits, limits to capital outflows or limits or provisioning requirements on banks' currency mismatches have little impact on the size of foreign inflows, although they can affect their composition. In Peru, by contrast, capital requirements on currency mismatches did succeed in curbing the growth of dollar credit. In a way, the de-dollarisation programme of 2013-2016 was even too successful: dollar-denominated credit fell more rapidly than dollar deposits, creating currency mismatches where none had existed before. The central bank reacted by offering hedging instruments against dollar appreciation to curb the fallout of such mismatches.

Communication issues

The lack of a clear benchmark of what constitutes financial stability and of intermediary objectives observed in real time, the large number of potential instruments and the high degree of uncertainty about the transmission process complicate the communication of macroprudential decisions (Patel, this issue). At the same time, these challenges make clear communication even more important to ensure that measures are properly understood and are having the desired effects. A key issue is the effectiveness of central bank warnings about developments that could imperil financial stability. In theory, such warnings might quell destabilising developments at an early stage, rendering any remedial action by the central bank unnecessary. In practice, however, there are not that many examples of warnings without concrete action (or the threat of action) having been effective. Examples abound where a central bank issued warnings about developing vulnerabilities but nobody listened, let alone acted. But there were also examples of warnings being followed by altered behaviour, which reduced risks.

One critical issue is timing. Ideally, warnings come early enough to allow market participants to change their behaviour and reduce vulnerabilities. But in practice such early warnings tend to receive much less attention than warnings about risks that are on everybody's radar screen already. This does not just reflect short-sightedness on part of market participants; as discussed above central banks themselves face large uncertainty about the sustainability and effects of current trends and may therefore choose to wait before issuing any warnings.

International spillovers and coordination

As is the case with monetary policy, the impact of macroprudential actions does not stop at a country's borders. Central banks present at the meeting have mostly been on the receiving side of spillovers. For example, research by the Hong Kong Monetary Authority shows that macroprudential actions in home countries of international banks affect lending in Hong Kong. The note from the Singapore Monetary Authority reports that the increase in foreign demand for Singaporean properties in 2009-2011 at least in part originated from countries that had implemented macroprudential measures to cool their own property markets. Similarly, tighter macroprudential measures in Singapore led to increased demand for overseas properties by Singapore residents.

In principle, international spill-overs should make coordination of macroprudential actions more desirable. At the same time, the complexity of the spillovers make such coordination difficult (see note by Mexico on the scope for coordination). Nonetheless, there have been successful examples for coordination, especially concerning actions addressing risks that were cross-border in nature. For example, Hong Kong, Singapore and Malaysia coordinated the lifting of deposit guarantees put in place during the global financial crisis.

Macroprudential frameworks: objectives, decisions and policy interactions

Agustín Villar

Abstract

This note discusses macroprudential frameworks in emerging market economies (EMEs) and the role that central banks play. It reviews how central banks organise themselves to promote financial stability. Much of the discussion is based on the replies to a questionnaire sent in late 2016 a group of EME central banks. Some conclusions are that about two thirds of the central banks surveyed have a financial stability mandate but not necessarily in the form of a quantitative goal. Respondent central banks have control over a large array of macroprudential tools. But in several countries, decision-making powers and control over instruments remain diffused across institutions. In such cases, policy coordination implementation tilts towards favouring the central bank's role of "*primus inter pares*".

Keywords: financial stability, macroprudential policy, systemic risk, central banking

JEL classification: E58, E60, G18, G28

Policy frameworks in many economies have changed notably since the Great Financial Crisis. In particular, central banks now pay greater attention to macro-financial linkages than before and many have experimented with a macroprudential orientation of their financial stability policy. This note discusses macroprudential frameworks in emerging market economies (EMEs) and the role that central banks play within such frameworks. In some economies, the central bank is at the centre of the macroprudential arrangement while in others it has no explicit financial stability mandate. Even so, most central banks devote considerable resources to the promotion of financial stability. The note focuses on how central banks organise themselves to do this. In particular, it considers the advantages and disadvantages of specific arrangements, and looks at a number of open issues. Much of the discussion is based on a questionnaire prepared specifically for the meeting (see the Annex tables for the detailed results).

At the core of the macroprudential approach is a more systemic orientation of prudential regulatory and supervisory arrangements. National definitions of what might constitute “macroprudential” differ but they often distinguish between two intermediate objectives. The first is to increase the resilience of the financial system and the second is to constrain financial booms.¹ The second goal is more ambitious and raises issues about how the framework is implemented and integrated with other macroeconomic policies (Borio (2014)). The framework’s performance is to be assessed against these objectives.^{2, 3}

Not everything in macroprudential frameworks is new. In particular, central banks have been playing a significant role in promoting financial stability for a long time. Most prominent is their function as lenders of last resort (Bagehot (1873)). But they have also been involved in policies directed at preventing crises. Oversight of the payment system and, in many economies, a major role in financial regulation and supervision are cases in point. What is more novel, at least to some extent, is the explicit focus of regulation and supervision on the financial system as a whole, rather than the safety and soundness of individual institutions. This more systemic approach may sometimes require significant changes to existing frameworks.

A number of features are generally regarded as desirable for macroprudential frameworks. First, a clearly specified objective and usable instruments. For instance, what is meant exactly by “systemic”? What instruments may be used to address the two intermediate objectives of ensuring resiliency and preventing outsize boom-bust cycles? Second, a good alignment of decision-making powers over instruments with

¹ Sometimes the two objectives are referred to as defending the banks from the financial cycle and defending the financial cycle from the banks, respectively.

² In the definition of BIS-FSB-IMF (2016), macroprudential policy involves “the use of primarily prudential tools to limit systemic risk. It pursues the following interlocking objectives: (1) increase the resilience of the financial system to aggregate shocks by building and releasing buffers that help to maintain the ability of the financial system to function effectively, even under adverse conditions; (2) contain the build-up of systemic vulnerabilities over time by reducing procyclical feedback between asset prices and credit containing unsustainable increases in leverage, debt stocks, and volatile funding; and (3) control structural vulnerabilities within the financial system that arise through interlinkages, common exposures, and the critical role of individual intermediaries in key markets that render individual institutions too big to fail”.

³ Macroprudential frameworks comprise two dimensions: the time dimension (mainly concerned with procyclicality) and the cross-sectional/structural dimension. This note focuses on the former, which is why it does not deal with capital surcharges for systemically important financial institutions or other issues relating to the resilience of the financial system.

the know-how and willingness to deploy them (Borio (2014)). Otherwise, central banks may be forced to use existing instruments (for instance, monetary policy ones) for purposes for which they have not been specifically designed. Third, a clear relationship between the various institutions mandated with financial stability and other policy objectives. For instance, how should one weigh the side effects of macroprudential measures? Fourth, arrangements to avoid mission creep, so that policies do not drift from ensuring financial stability towards other objectives such as managing the business cycle. Finally, a degree of insulation from political cycles. This is important because systemic risk often builds up over prolonged periods so that measures have to be taken when times appear good.

This note is structured as follows. The first section discusses the relationship between the objective of macroprudential frameworks – financial stability – and central bank mandates. The second focuses on central banks’ decision-making powers. The third lays out how central banks interact with other institutions in pursuing financial stability and how decisions on macroprudential instruments relate to other policies.

Objectives

The questionnaire responses indicate that most central banks in EMEs have explicit financial stability objectives, although these may be phrased quite differently (Table 1). Out of 24 central banks, 12 have a financial stability objective articulated as “promoting financial stability” or “reducing systemic risk”. Another six have somewhat narrower objectives, for instance ensuring the “soundness of the banking sector” and/or the well-functioning of the main financial infrastructure. One central bank is mandated to oversee the “normal functioning of internal and external payments” and another is constitutionally bound “to regulate credit in the financial system”. Only four do not have a formal financial stability mandate.

In many cases, financial stability objectives are enshrined in law. A statutory mandate provides clarity and certainty to the framework: the central bank is allowed to quantify its objective and take action to achieve it. But it is also held accountable. Of the 18 central banks with a broad financial stability objective, 11 have a statutory mandate and in two cases, Israel and South Africa, legislation to establish one is pending as of early 2017. In most cases, the financial stability objective is contained in the central bank charter. But it can also be part of financial institutions or banking law (Hong Kong, Indonesia and, in draft legislation as of early 2017, Israel and South Africa) or the constitution (in the case of Peru). Where a statutory financial stability mandate is absent, the central bank’s financial stability objective may be set by an external body (eg Brazil, China and the Philippines)⁴ or by the central bank itself (the Czech Republic and Saudi Arabia). In two cases (China and Colombia), the central bank’s financial stability objective is grounded in its charter but this appears not to be a mandatory objective. In both cases, prudential supervision and oversight of the financial system rest with another government body.

⁴ In Brazil and the Philippines, the central bank is part of the body setting the macroprudential mandate. In Brazil, this is done by the National Monetary Council (CMN) and in the Philippines by the Financial Stability Coordination Council (FSCC).

In a number of cases, a central bank also specifies an explicit macroprudential mandate. This is true for seven central bank respondents. In others, a macroprudential objective can be accommodated within the financial stability mandate (Chile) or is identical to it (Thailand). In describing their macroprudential objective, these central banks make reference to “financial (or banking) system resilience” (Brazil, the Czech Republic, Hungary and Thailand), “decreasing systemic risk” or countering “the materialisation of systemic risk” (China and Poland) or “microprudential regulation and supervision” (India). Ten central banks state that they do not have a macroprudential objective, although half of them have financial stability objectives. Finally, five central banks did not provide an answer or said that this was not relevant to their situation, although they make use of some macroprudential tools.

Overall, the responses indicate that roughly one third of the EMEs that have a broader or narrower financial stability objective also have a macroprudential one of some sort. This need not constrain the ability of some of the other two-thirds to use macroprudential tools, but it could raise issues. An obvious one is within what policy framework to deploy them and, if not an articulated one, with what goal in mind.

Instruments

Defining what exactly constitutes a macroprudential instrument is not straightforward and depends on its purpose as much as on its inherent characteristics. Central banks deploy a large array of tools to improve the resilience of the financial system and constrain financial booms but this does not necessarily make them macroprudential. Prudential tools can be used for both micro- and macroprudential purposes, depending on whether they are aimed at strengthening the stability of individual institutions or that of the system as a whole. A good example is the leverage ratio. It is clearly a prudential tool but no country mentioned in the questionnaire responses that it was used for macroprudential purposes. Similarly, instruments, such as reserve requirements, can be used for both monetary and macroprudential purposes. And some central banks use non-prudential tools, such as capital flow management measures, in order to reduce systemic risk. Whether this makes them macroprudential is open to debate.

Central banks’ ability to employ macroprudential instruments varies across jurisdictions. Thirteen central banks have full control over macroprudential tools such as countercyclical capital buffers and capital requirements, margins and haircuts, sector-specific capital requirements for the banking sector and debt service-to-income and loan-to-value ratios, among others (Table 2).⁵ In five cases, these instruments are under the control of another institution.⁶ In two cases, the central bank shares decision-making powers with the banking supervisor or another government body (Brazil and South Africa). In several jurisdictions, some instruments are simply unavailable. For instance, dynamic provisioning and sector-specific and countercyclical capital requirements are not available in Chile, China, the Czech

⁵ The Czech Republic, Hong Kong, Hungary, India, Israel, Malaysia, the Philippines, Russia, Saudi Arabia, Singapore, South Africa, Thailand and the United Arab Emirates.

⁶ Colombia, Korea, Peru, Poland and Turkey.

Republic, Hungary, Korea, Singapore⁷ and Turkey. A smaller group of central banks reported that they can employ capital requirements for specific institutions (eg SIFIs and G-SIFIs).

The link between central bank objectives and the availability of macroprudential instruments appears to be weak. For example, the central banks of the Czech Republic, Hungary and Thailand have both a macroprudential objective and sole control over policy tools. But in Colombia, Indonesia and Poland, the central bank has a macroprudential objective whereas decision-making power over policy instruments rests with another authority. Several central banks make use of macroprudential instruments in pursuit of a macroprudential objective but objective this is not very well defined.

Overall, it appears that central banks have more instruments at their disposal to strengthen the resilience of the financial system than to rein in financial booms (Table 2). Some instruments listed in the questionnaire responses have a strong microprudential focus – for instance, loan maturity and concentration limits. This may reflect a notion of financial stability associated with the soundness and solvency of individual institutions. However, the existence of well capitalised institutions may not provide full protection against a severe financial bust. And the build-up of buffers may not succeed in reining in the growth of credit, asset prices and risk-taking (Borio (2014)). This is a more ambitious objective and decisions relating to the use of some instruments over others can provide a better outcome. The notes from the central banks of Malaysia and Singapore stressed the macroprudential role of LTV, DTI and DSTI ratios in mitigating systemic risks.

But moving forward with macroprudential policy decisions is likely at some point to intersect with macroeconomic policy. Macroprudential policy involves the dynamic adjustment of parameters of a regulatory nature. This tilt of policy towards cyclical risks is new and less established, bringing attention to governance arrangements.

Many central banks also use monetary policy instruments as part of their macroprudential toolkit. For example, those of Argentina, Brazil, Chile, Colombia, Peru and Turkey list instruments with a macroprudential purpose, such as reserve or cash requirements on domestic deposits (Table 2). In particular, central banks in countries where the macroprudential framework is not yet in place resort to monetary tools, as these tend to be under their control. Though not mentioned in the responses, reserve requirements on domestic deposits have been used also in China to moderate credit growth and tighten financial conditions.

Many central banks also list instruments specifically targeted at foreign exchange or asset positions.⁸ Indeed, there is evidence that financial stability in EMEs is intrinsically related to the strength of national balance sheets and foreign asset positions. Instruments used for this purpose include reserve requirements on foreign currency deposits, liquidity requirements on foreign currency liabilities and limits on foreign currency positions. They tend to be under the control of the central bank or bank supervisors. Tools to deal with positions in the non-banking sector often rest with other authorities (ie the ministry of finance or market supervisors) or joint bodies.

⁷ In the Czech Republic and Singapore, the central bank can make use of countercyclical capital requirements.

⁸ These are listed under "Other instruments" in Table 2.

There remains an open debate about the *macroprudential* nature of exchange rate-related instruments. They have the potential to reduce the risks associated with exchange rate movements for individual institutions. By placing limits on positions and exposures, the resilience of the system is positively impacted. Whenever private and social costs of positions and exposures differ – for example, when liquidity in foreign currency might be costly to provide – the cutback in positions might be the goal of policy. But there are costs to such policy, including potential circumvention or spillovers to other economic sectors' balance sheets.

The precedent discussion helps to explain why governance arrangements and control over instruments, especially those operating under time-varying policy, remain diffused. They tend to be under the control of the central bank or the banking supervisors. But the tools required to deal with positions in the non-bank sector often lie with other authorities (ie the Ministry of Finance or market supervisors) or joint bodies.

Coordination

Tool deployment decisions sometimes need to be coordinated across authorities. This could be because decision-making powers are divided. For example, rules may be under the control of independent prudential regulators while the responsibility for system-wide analysis may lie with the central bank. Spillovers and complementarities with other policy measures provide another reason for coordination. Macroprudential measures interact with other policies and may be more effective if they all work in the same direction. Coordination may also broaden political and social support. This is particularly important for tools targeted at narrowly defined activities. One example is restrictions on specific types of lending, as these often have strong distributional consequences and may thus be prone to political pressure.

The most common coordination device is inter-agency committees. According to survey responses, 14 out of 24 countries have such committees, often with the central bank playing a leading role (Table 3).⁹ For instance, the central bank governor chairs the committee in Indonesia, Malaysia, the Philippines, Poland, South Africa and Thailand. In the other cases, the central bank has a seat or holds a senior advisory position. Often, central banks are represented by several officials or draft the initial analysis upon which decisions are based, which enhances their influence.¹⁰

In principle, an inter-agency body could facilitate coordination and help resolve disagreements over macroprudential measures. In practice, however, the experience is not uniformly positive. Only six out of the 14 central banks in countries with inter-agency committees mentioned that these had helped coordinate policies. Several responses stressed that the decision-making power over policy actions remained with each individual authority, which raises questions about the effectiveness of coordination. Another feature is the breath of goals of several such committees.

⁹ Alternatives include bilateral coordination (Argentina and Peru) or making the central bank the sole authority responsible for financial stability (the Czech Republic and Hungary).

¹⁰ In the case of Mexico, the governor and two deputy governors are members. A Bank of Mexico official also acts as Secretary to the committee. In the case of Brazil, the central bank holds the permanent secretariat of the CMN.

Often, the functions of committees do not seem to drive their design; their purpose is simply to bring different authorities together.

Coordinating macroprudential measures with monetary policy is particularly important. The reason is that monetary policy has a strong influence on credit growth, asset price dynamics and risk-taking, which, in turn, are at the heart of financial stability risks. At the same time, coordination cannot go too far because price stability, the main objective of monetary policy, is not within the remit of macroprudential frameworks. The notes prepared by central banks for this meeting show divergent views on the relationship between the two policy areas. The document prepared by the Bank of Thailand emphasises complementarity between macroprudential and monetary policies. The paper by the Bank of the Republic, Colombia, also notes the complementary relationship mentioned by Gomez (2017). By contrast, the paper drafted by the Czech National Bank mentions that they are intertwined but that there is no particular relationship of complementarity or substitution.

Placing the responsibility for both monetary and macroprudential decisions within the central bank may make coordination between the two policy areas easier. But it does not fully address the issue of policy conflicts: any tensions would still have to be resolved. This could be done through the same body taking both types of decision. Our survey shows that this is the case in 11 central banks where either the governor or an internal committee takes both decisions. At four other central banks, decisions are taken by different bodies within the institution, with a large overlap of members. The note prepared for this meeting by the Central Bank of Brazil regards this arrangement as having the advantage of avoiding conflicts of interest.

Central banks' financial stability objectives

Survey among central banks

Table 1

	Financial stability objective		Statutory mandate		Source of mandate		Macroprudential objective
	To promote financial stability	Efficient, solid financial system	Yes	No	Central bank charter	Central bank's mission statement	
Argentina	To promote financial stability		Yes		Central bank charter		
Brazil	Efficient, solid financial system		No		Central bank's mission statement		Yes, narrow objective
Chile	Normal functioning of internal and external payments		Yes		Central bank charter		No. The central bank has the power to accommodate it under its mandate
China	Multiple, all-encompassing and diffuse objective bringing together different policy frameworks and targeting financial institutions, markets and payment infrastructure		No		Central bank charter		Yes, three-pronged macroprudential objective
Colombia	To promote financial stability		No		Central bank charter		No
Czech Republic	Resilience of the financial system that reduces the risk to financial stability		No		Financial stability report		Yes, to set up macroprudential policy
Hong Kong	To promote banking stability		Yes		Banking Law		
Hungary	To maintain the stability of the financial system		Yes		Central bank charter		Yes, resilience of the system (in its wider form)
India			No		Central bank internal organisation		Microprudential regulation and supervision implemented with a macroprudential approach
Indonesia	Stability of the financial system		Yes		Financial sector regulation act		To prevent and reduce systemic risk
Israel	Stability and orderly work of the financial system		Yes				No
Korea			No				No
Malaysia	To promote financial stability, more specifically, soundness of institutions and oversight of markets and their infrastructure		Yes				

(*) The government, the central bank and the banking supervisor promote financial stability through resolving risks.
Source: Central bank replies to the questionnaire, comprising a succinct summary of replies to questions 1a-d.

Central banks' financial stability objectives		Table 1 (cont)		
Survey among central banks				
	Financial stability objective	Statutory mandate	Source of mandate	Macroprudential objective
Mexico	None			No
Peru	To regulate credit in the financial system	Yes	Constitution	No
Philippines	Smooth functioning of the financial system	No	Financial Stability Committee	No
Poland	To eliminate or reduce systemic risk	Yes	Central bank charter	Resilience of the financial system if systemic risk materialises
Russia	Soundness of the banking sector and stability of the payment system and financial markets	Yes	Central bank charter	No
Saudi Arabia	Seamless functioning of the financial system	No	Financial stability report	
South Africa	Monitoring of systemic financial risk and restoring of systemic stability	No	Financial Sector Regulation Act	
Thailand	Soundness of the banking sector	Yes	Central bank charter	Same objective as the financial stability one
Turkey	Soundness and efficient functioning of the banking sector	Yes	Central bank charter	
UAE	None			No

Source: Central bank replies to the questionnaire, comprising a succinct summary of replies to questions 1a–d.

Instruments in macroprudential frameworks

Table 2

	Argentina	Brazil	Chile	China	Colombia	Czech Republic
Countercyclical capital buffers	CB	CB / CMN		CB / CBRC (2)	MoF	CB
Dynamic provisions	CB			CB	SB	
Sectoral capital requirements	CB	CB / CMN			MoF	CB
Countercyclical capital requirements	CB	CB / CMN			MoF	
Margins and haircuts	CB / CNV (1)	CB / CMN			MoF	CB
LTV ratios	CB	CB / CMN	SB	CB / CBRC (2)	MoF	CB
Debt-to-income ratios	CB	CB / CMN	SB		MoF	
Limits on currency mismatches	CB / MoT / MoF	CB / CMN	CB		CB	CB
Other instruments (3)	Cash reserve requirements; D-SIB and capital conservation buffer [CB]	Ratio of reserve requirements [CB]	Reserve requirements on foreign capital inflows; reserve requirements on deposits [CB]	Provisions for foreign exchange forward sales; programme of macroprudential management of cross-border financing; reserve ratio for offshore financial institutions' deposit at onshore financial institutions [CB]	Reserve requirements [CB]	D-SIB capital buffers [CB]
	Limits on financing to individual borrowers [CB/MoT/MoI (4)]; capital flow regulations [CB/MoT]	Time-varying/excepted loss; limits on short spot FX positions [CB/CMN]			Liquidity requirements [SB]; limits on foreign investment [MoF]	
	Capital flow management [MoF]					

¹ Except for those transactions in which a regulated financial institution is involved. ² In the case of the China Banking Regulatory Commission (CBRC), it requires its countersignature. ³ As disclosed by the central banks. ⁴ In the case of financing to provinces.

CB = central bank; CBRC = China Banking Regulatory Commission; CMN = National Monetary Council; CNV = Comisión Nacional de Valores; D-SIB = domestic systemically important bank; MoF = Ministry of Finance; MoI = Ministry of the Interior; MoT = Ministry of the Treasury; SB = Superintendencia de Bancos (Banking Supervisor).

[...] shows the decision-making institution with regard to the instrument.

Source: Central bank replies to the questionnaire, comprising a succinct summary of replies to question 2.

List of instruments in macroprudential frameworks	Table 2 (cont)					
	Hong Kong	Hungary	India	Indonesia	Israel	Korea
Countercyclical capital buffers	CB	CB	CB	CB	CB	FSS
Dynamic provisions	CB		CB		CB	
Sectoral capital requirements	CB	CB	CB		CB	
Countercyclical capital requirements	CB	CB	CB	FSA		
Margins and haircuts	CB		CB			
LTV ratios	CB	CB	CB	CB		FSS / FSC
Debt-to-income ratios	CB	CB	CB			FSS / FSC
Limits on currency mismatches	CB	CB	CB	CB		FSS / FSC
Other instruments (1)		<i>Limits on maturity mismatches; systemic risk buffer; O-SII capital buffer</i> [CB]	<i>D-SIB framework</i> [CB]	<i>Reserve requirement based on bank's loan-to-funding ratio</i> [CB]		<i>Loan-to-deposit ratio regulation; G-SIB, D-SIB; regulation on derivative position in foreign currency; macroprudential instability levies in foreign currency</i> [FSS/FSC]

¹ As disclosed by the central banks.

CB = central bank; D-SIB = domestic systemically important bank; FSA = Financial Services Authority; FSC = Financial Services Commission; FSS = Financial Supervisory Service; G-SIB = global systemically important bank; O-SII = other systemically important institution.

[...] shows the decision-making institution with regard to the instrument.

Source: Central bank replies to the questionnaire, comprising a succinct summary of replies to question 2.

List of instruments in macroprudential frameworks

Table 2 (cont)

	Malaysia	Mexico	Peru	Philippines	Poland	Russia
Countercyclical capital buffers	CB	CNBV	SBS		MoF / FSC	CB
Dynamic provisions	CB		SBS			CB
Sectoral capital requirements	CB		SBS	CB	MoF	CB
Countercyclical capital requirements	CB		SBS		MoF / FSC	CB
Margins and haircuts	CB		CB / SBS / T (1)	CB		CB
LTV ratios	CB	CNBV		CB	FSA	
Debt-to-income ratios	CB			CB	FSA	
Limits on currency mismatches	CB	CB (2)	SBS	CB	FSA	CB
Other instruments (3)	Limit on loan tenure [CB]	Caps on interbank exposures [CNBV]; pension fund risk limits [Consar]	Reserve requirement differentiated by currency; additional reserve requirement contingent on credit dynamic in foreign currency; reserve requirement for short-term funding in foreign currency; additional reserve requirement for excessive operations with FX derivatives [CB]	Reserve requirement; D-SIB	Systemic risk buffer [MoF/FSC]; O-SII buffer [FSA/FSC]	Cap on effective lending rates; leverage ratio; limit on certain exposures (due to concentration risk, such as large exposures to a single lender and lenders' common exposure in the system); sectoral provisioning requirement; reserve requirement; liquidity buffer requirement; stable funding requirement [CB]

¹ For repo operations with government bonds, CB jointly with SBS and T. ² Foreign exchange positions: foreign currency liquidity requirements. ³ As disclosed by the central banks.

CB = central bank; CNBV = Comisión Nacional Bancaria y de Valores (Banking Supervisor); Consar = (in Spanish) National Retirement Savings Commission; FSA = Financial Supervision Authority; FSC = Financial Stability Committee; MoF = Ministry of Finance; O-SIB = other systemically important institution; SBS = Superintendencia de Banca, Seguros y AFP (Banking Supervisor); T = Treasury.

[...] shows the decision-making institution with regard to the instrument.

Source: Central bank replies to the questionnaire, comprising a succinct summary of replies to question 2.

List of instruments in macroprudential frameworks Table 2 (cont)

	Saudi Arabia	South Africa	Thailand	Turkey	UAE
Countercyclical capital buffers	CB	CB	CB / MPC-FIPC forum (1)	BRSA	CB
Dynamic provisions	CB	CB	CB / MPC-FIPC forum		CB
Sectoral capital requirements	CB	CB	CB / MPC-FIPC forum		CB
Countercyclical capital requirements	CB	CB	CB / MPC-FIPC forum		CB
Margins and haircuts	CB	CB	CB / MPC-FIPC forum	CB / BRSA / CMB	CB
LTV ratios	CB	CB / NCR/ PA (2)	CB / MPC-FIPC forum	BRSA	CB
Debt-to-income ratios	CB	CB / NCR/ PA (2)	CB / MPC-FIPC forum	BRSA	CB
Limits on currency mismatches	CB	CB	CB / MPC-FIPC forum	BRSA	CB
Other instruments (3)			Any other macro-prudential policies [CB/Joint MPC-FIPC forum]	Reserve requirements [CB]	

¹ Through consultation and issuance of policy recommendations. ² Through the FSOC, subject to the provisions of the Financial Sector Regulation (FSR) Bill. ³ As disclosed by the central banks.

BRSA = Banking Regulation and Supervision Agency; CB = central bank; CMB = Capital Markets Board; FIPC = Financial Institution Policy Committee; FSOC = Financial Stability Oversight Committee; MAS = Monetary Authority of Singapore; MPC = Monetary Policy Committee; NCR = National Credit Regulator; PA = prudential authority.

[...] shows the decision-making institution with regard to the instrument.

Source: Central bank replies to the questionnaire, comprising a succinct summary of replies to question 2.

Inter-agency arrangements in financial stability frameworks

Table 3

Country	Chair	Inter-agency forum	Central bank participation	What decisions can be taken?	Information-sharing arrangements
Argentina		There is no inter-agency body	Responsible for financial stability		
Brazil	Minister of Finance	National Monetary Council (CMN)	Permanent secretariat of the CMN. Four central bank deputy governors take a seat at the inter-agency forum	The CMN through its Technical Commission for Money and Credit sets the framework for policy implementation. Each agency – in particular, the central bank – takes decisions in its sphere of action	The central bank has signed 15 agreements with other agencies to exchange information and coordinate policy action
Chile	Minister of Finance	Financial Stability Council (CSF)	The central bank is a permanent advisor. The central bank governor is an invited member	It does not hold any formal decision-making powers. It may issue non-binding policy recommendations to the relevant supervisor on matters of financial stability	The exchange of information is one of its functions. It can request information for sharing among its members
China	Led by the People's Bank of China	Joint conference on financial regulation and coordination	It leads the conference	Coordination of financial regulation across markets. To implement financial stability policy	The central bank and other agencies are working on establishing a single statistical system under a unified standard of reporting
Colombia	Ministry of Finance	Coordination committee (under the acronym CCSSF)	The central bank governor is a member of the CCSSF. The CB chairs one of its subcommittees, and other officials participate in it or in other subcommittees	To share information about the financial institutions supervised by each agency is one of the main objectives of the body. It also promotes the technical enhancements in processes and standards, and their timely adoption	The exchange of information is carried out under a memorandum of understanding (MOU) between the central bank, the banking supervisor and the deposit insurer
Czech Republic		There is no inter-agency body	The central bank is solely responsible for financial stability		

Source: Based on central bank replies to the questionnaire.

Inter-agency arrangements in financial stability frameworks

Table 3 (cont)

Country	Chair	Inter-agency forum	Central bank participation	What decisions can be taken?	Information-sharing arrangements
Hong Kong	Secretary of Financial Services and the Treasury	Financial Stability Committee (FSC)	The HKMA chief executive is a member of the FSC	The inter-agency body has no decision-making powers. The HKMA chief executive retains the statutory decision-making power	The sharing of information takes place within the FSC and the Council of Financial Regulation (CFR). There is no exchange of information with institutions outside these committees
Hungary		There is no inter-agency body	Responsible for financial stability	The central bank holds all decision-making power on financial stability matters. It deals with financial stability by means of the Financial Stability Board	Not relevant
India	Minister of Finance	Financial Stability and Development Council (FSDC)	The central bank is a member of the FSDC and its governor chairs the domestic college of supervisors that exists within it	The body is entrusted with an ample mandate (financial stability, development and inclusion). There is a focus on the oversight of the activities of financial conglomerates	The exchange of information between different supervisory agencies is carried out on the basis of an MoU
Israel (1)	Central bank governor	No details provided	Half of the seats are reserved for central bank-appointed officials	The inter-agency body does not have any decision-making power on policy matters	
Indonesia	Ministry of Finance	Financial System Stability Committee	The central bank governor is a member	The FSSC has no powers on macroprudential tools. Crisis resolution and monitoring of the system	Regular meetings of the FSSC. MoU with other agencies for exchange of information
Korea					
Malaysia	Central bank governor	Financial Stability Executive Committee	The central bank governor holds the chair and the deputy governor is a member (but not the one in charge of banking supervision)	To issue macroprudential measures to sustain domestic financial stability	There is an exchange of information among the members

¹ Pending legislation. FSSC = Financial System Stability Committee.

Source: Based on central bank replies to the questionnaire.

Inter-agency arrangements in financial stability frameworks

Table 3 (cont)

Country	Chair	Inter-agency forum	Central bank participation	What decisions can be taken?	Information-sharing arrangements
Mexico	Ministry of Finance (Secretario de Hacienda)	Consejo de Estabilidad del Sistema Financiero	Central bank governor and two vice-governors are members of the inter-agency council. One central bank representative holds the position of secretary to the body	The inter-agency body cannot take any decision. It coordinates the policy efforts of different agencies – in particular, the assessment and analysis of financial stability risks. It can make policy recommendations	The central bank, the securities and investment supervisor and the central bank are authorised to fully exchange information
Peru		There is no inter-agency body. The banking supervisor is invited to the central bank board meeting quarterly			
Philippines	Central bank governor	Financial Stability Coordination Council	The central bank chairs the meeting. [Note: participation is voluntary and other government agencies are invited to join]	Proposes measures to identify, manage and mitigate the build-up of systemic risk	A memorandum of agreement is the means used to operationalise the exchange of information
Poland	Central bank governor (1)	Financial Stability Committee	Central bank governor holds a second vote in the event of a tie	Issues non-binding statements or recommendations based on the principle of "comply or explain"	The exchange of information takes place within a working group made up of representatives of each agency
Russia	First deputy prime minister	Financial Stability Committee	Central bank governor and four first deputy governors	Does not hold decision-making powers	The exchange of information takes place in the committee. No information on single institutions is exchanged within the committee
Saudi Arabia					

¹ Except for matter of crisis management.

Source: Based on central bank replies to the questionnaire.

Table 3 (cont)
Inter-agency arrangements in financial stability frameworks

Country	Chair	Inter-agency forum	Central bank participation	What decisions can be taken?	Information-sharing arrangements
South Africa	Central bank governor		The central bank governors, a deputy governor responsible for financial stability and three central bank-appointed members		
Thailand	Central bank governor	Joint Monetary Policy Committee–Financial Institutions Policy Committee	The central bank governor and two deputy governors are members of each committee. The committees have four and eight additional members, respectively	The central bank has a mandate to design and implement micro- and macroprudential policy. There is consultation with other agencies	There are bilateral MoUs for the exchange of information on non-financial institutions
Turkey	Minister in charge of Under secretariat of the Treasury	Financial Stability Committee	The central bank governor is a member of a five-member committee	The decision-making and use of policy tools rest with the institution which holds the statutory mandate. The FSC monitors systemic risks and can raise any concerns or objections with the supervisor	The purpose of the inter-agency body is to enhance information-sharing, coordination and cooperation between its constituent members

Source: Based on central bank replies to the questionnaire.

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Macroprudential frameworks: implementation and effectiveness¹

Yavuz Arslan and Christian Upper

Abstract

We use questionnaire responses as well as new data sets to assess the deployment and effectiveness of macroprudential instruments for a sample of emerging market economies. First, we highlight the challenges that authorities face in the measurement of financial stability and systemic risk, the “ultimate objective” of macroprudential frameworks. We argue that these challenges naturally extend to measuring “macroprudential policy stance”. Second, we document the “inaction bias” for our sample of EM economies and highlight the limited use of numerous instruments that authorities have in their toolkits. Third, we discuss and provide some evidence that governance frameworks, especially the role of central banks, may be relevant for both implementation and outcomes. Fourth, we infer from questionnaires that macroprudential tools are commonly tailored for specific sectors (especially the property sector), regions and institutions. Finally, we provide some evidence that macroprudential measures, indeed, have an impact on a number of financial risk indicators.

Keywords: Macroprudential frameworks, financial stability

JEL classification: E61, E58

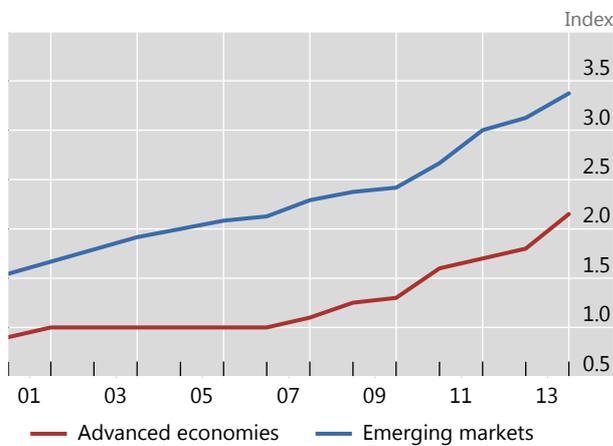
¹ The box is authored by Carlos Cantu. Matthias Lörch and Diego Urbina and provided excellent research assistance.

The macroprudential approach to financial regulation and supervision has been a topic of policy discussions since the start of this century.² But it took the Great Financial Crisis (GFC) to underline that a microprudential approach, even when combined with stable output and inflation, will not suffice to ensure financial stability. As a result, the use of macroprudential instruments has become more widespread, in advanced economies (AEs) as well as emerging market economies (EMEs). To be sure, many EMEs had already been using macroprudential instruments, even if not so identified, probably owing to their previous experience with financial crises (Graph 1, left-hand panel). That said, such instruments have been used more extensively post-crisis in both AEs and EMEs (Graph 1, right-hand panel).

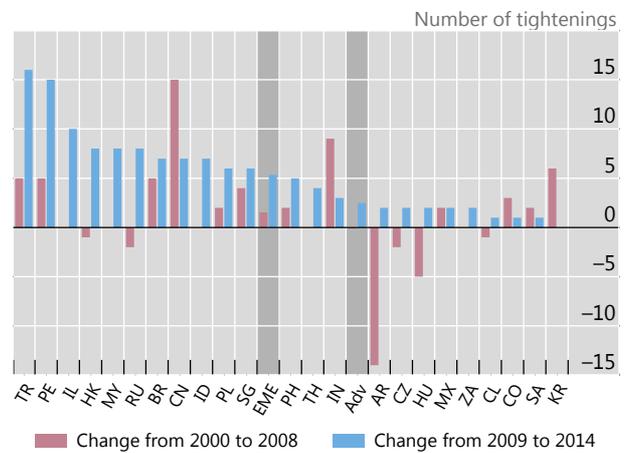
Trends in macroprudential instrument deployment

Graph 1

The number of instruments has been increasing



Macroprudential instruments have been tightened more after the GFC



The left-hand panel plots an index of macroprudential instruments. The index is a cumulative measure of 12 instruments. Each instrument takes value 1 if it is utilised in a country and takes value 0 otherwise. The right-hand panel plots the changes in "cum_PruC2" developed in Cerutti et al (2017). It is a cumulative measure of nine macroprudential instruments. Each instrument takes value 1 if tightened, -1 if loosened and 0 if there is no change. See Cerutti et al (2017) for details. AE = United Arab Emirates; AR = Argentina; BR = Brazil; CL = Chile; CN = China; CO = Colombia; CZ = the Czech Republic; HK = Hong Kong SAR; HU = Hungary; ID = Indonesia; IL=Israel; IN = India; KR = Korea; MX = Mexico; MY = Malaysia; PE = Peru; PH = the Philippines; PL = Poland; RU = Russia; SA = Saudi Arabia; SG = Singapore; TH = Thailand; TR = Turkey; ZA = South Africa. Shaded areas in the right-hand panel are the averages for EMEs and AEs.

Sources: Cerutti et al (2016) and Cerutti et al (2017).

While some efforts have been made to analyse the use of macroprudential tools, our understanding of how they operate is still rather limited. This note will use questionnaire responses as well as new data sets to assess their deployment and effectiveness.³

² See Crockett (2000) and Borio (2003) for early examples.

³ The note uses macroprudential databases developed and analysed in Cerutti et al (2016), Cerutti et al (2017) and Reinhardt and Sowerbutts (2016).

Deployment

Measurement

Although macroprudential frameworks are intended to bolster financial stability and mitigate systemic risk, there is no reliable direct method for measuring how far these objectives are met (see Villar (2017) for a discussion of macroprudential objectives). Even more challenging is to measure the likelihood and cost of financial distress with a sufficient lead and confidence to be able to take preventive action. At the same time, ex post measurement can at least help ensure the accountability of the responsible authorities (Borio and Drehmann (2010)).

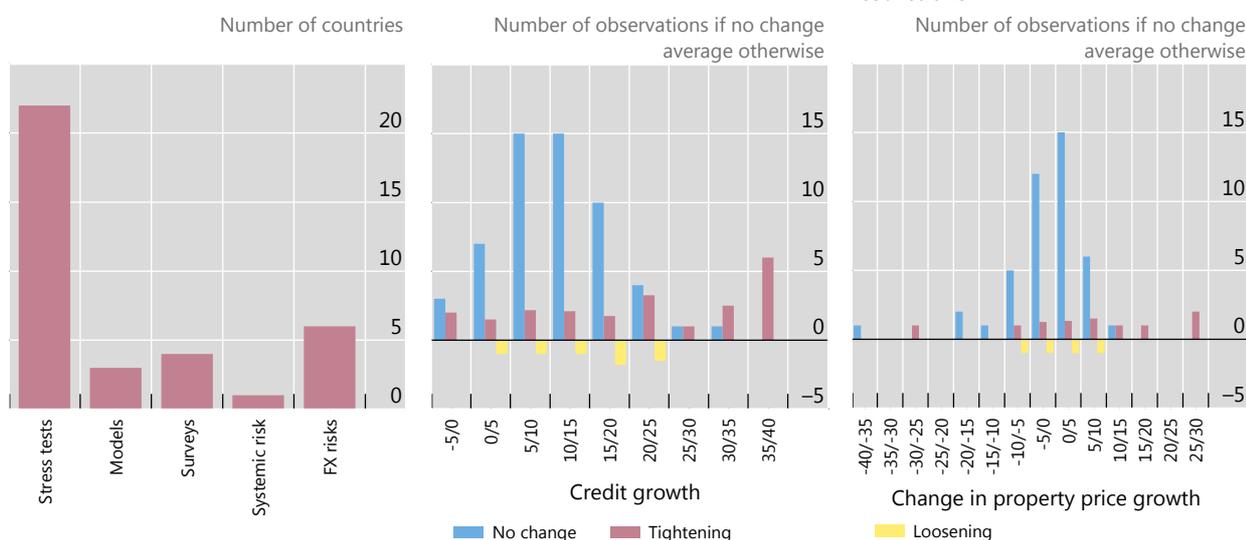
Risk measures and macroprudential instrument deployment

Graph 2

How do countries measure vulnerabilities?

Total credit growth (lagged) and changes in the cumulative measure

Changes in property price growth (lagged) and changes in LTV restrictions



The left-hand panel is constructed from the questionnaire responses by counting the countries that mention specific measures of vulnerability (see Table 1 Appendices). The total credit growth is the change in credit stock between two years (in percentage points). The change in property price growth is the change between the year-on-year growth rates from two subsequent years (in percentage points). In the centre and right-hand panels, blue bars show the number of inactive periods while red bars show average change in the cumulative measure conditional on tightening, and yellow bars show average loosening in the cumulative measure conditional on loosening.

Source: Author's calculations based on data from Cerutti et al (2017), national sources and questionnaire responses.

The questionnaire responses reveal that all jurisdictions use contemporaneous financial variables as proxies for systemic risk (Graph 2 left-hand panel and Appendix Table A1). Indeed, except for Thailand, no country monitors a direct measure of systemic risk, citing the lack of a reliable indicator. Only two countries explicitly mention that they use early warning indicators to gauge financial risks. Most jurisdictions follow various measures of credit, house prices and bank balance sheets (eg capitalisation, profitability, maturity and currency mismatches). Several countries (eg Brazil and China) monitor the financial health of borrowers using detailed firm- or consumer-level data. Russia and China monitor the riskiness of non-banks as well. The HKMA uses housing price and asset-pricing models as well as a statistical method

to assess overvaluation in the housing market. Most of the questionnaire respondents see the various measures as complementary.

Among many other indicators, stress tests stand out, as all countries either use or intend to use them as a systemic risk indicator. Stress tests may be particularly helpful, as they are forward-looking and various extreme scenarios can be consistently studied. However, stress tests too have some shortcomings, such as the difficulties in meaningfully modelling the dynamics of financial distress (Borio et al (2014)). This is underlined by the fact that macro stress tests carried out prior to the GFC did not point to any significant risk in the banking sector.

Measuring not only the objectives but also the “macroprudential policy stance” has proved challenging. Indeed, the survey responses indicate that no consensus exists about the definition of a “macroprudential policy stance”. On the one hand, it is possible to view such a stance as the values taken by macroprudential instruments, irrespective of current financial conditions (unconditional definition). In (conventional) monetary policy, this would correspond to the level of interest rates. But one can also define the stance as conditional on financial developments, ie how binding the instruments are at a given time (conditional definition). An analogue in monetary policy would be deviations from a neutral interest rate.

The lack of a consensus over the definition of a macroprudential policy stance also extends to the methods used to measure it. Of course, knowing whether and how intensively macroprudential instruments have been used gives some indication about the stance, but this information has significant limitations even under the first, unconditional, definition of what such a stance actually constitutes. Most importantly, it is difficult to aggregate different instruments with potentially very different effects on financial risks. An alternative measure falling squarely under the second, conditional, definition of the macroprudential stance involves tracking financial risks as a proxy. For example, Korea calibrates its macroprudential stance according to a systemic risk survey, while Hungary and South Africa use some indices of financial conditions for the same purpose. Finally, the majority of the countries mention that they do not measure the macroprudential stance at all.

Infrequent instrument activation

Authorities not only track financial variables as proxies for systemic risk but may also use them as intermediate objectives for setting policy (see the notes by Malaysia, Russia and South Africa). All questionnaire respondents set intermediate objectives such as limiting credit growth, currency volatility or housing prices (Appendix Table A1). However, due to varying sources of financial stability risks, there is no fixed set of intermediate objectives for all jurisdictions and they may change along with the sources of financial risks.

But even if authorities use intermediary objectives, these do not mechanically feed into policy actions. For example, while most central banks say they track and aim to limit credit growth, they only rarely react to periods of high credit growth by tightening macroprudential measures. Similarly, only in a few cases have episodes of large house prices increases been followed by reductions in loan-to-value (LTV) caps, which survey participants identify as the most common response to excessive house

price growth.⁴ However, authorities appear to become more active when credit or house price growth accelerates even further. Graph 2 also illustrates the prevalence of inactivity. Blue bars in the centre and right-hand panels represent the number of periods in which countries did not react when credit or house price growth was in a given interval. Inactivity is clearly by far the most common choice. Not surprisingly, inactivity lessens, and tightening becomes more likely (red bars) once credit or house prices start to grow more rapidly. A more formal analysis yields a similar result: regressing macroprudential policy changes on lagged changes in credit growth, and LTV caps on house price growth gives statistically significant results, but with low explanatory power. These findings underline the key role of judgment, as confirmed in the survey responses, but are also consistent with the existence of an inaction bias.

There are several possible reasons for an inaction bias. First, serious political economy constraints arise due to the fact that the costs of the measures are immediate and visible while the benefits are harder to identify, even *ex post*, and accrue over time (see ESRB (2014) and the note by Poland for further arguments). Second, any co-movement of the risk measure with some possible fundamental makes it very difficult to make a convincing case for costly action. Third, action may be delayed by the low frequency of the decision points. In their survey responses, many central banks mentioned that there is no fixed calendar for taking decisions. Many decision-making bodies meet twice a year or quarterly, although they can meet more frequently if required. Other than for the HKMA, the responses suggest that policy adjustments are very infrequent. That said, there may be less need to meet frequently and take decisions since systemic risk builds up slowly and the relevant horizon is longer than for monetary policy.

The tendency towards inaction may be asymmetrical. For example, political opposition towards tighter policy is often stronger than one for a more accommodative stance. This could bias policies aimed at managing the financial cycle, especially if policy decisions are not insulated from the political cycle. For measures primarily targeted at building resilience, the bias may go into the opposite direction, as easing buffers tends to be more difficult than building them up in the first place. The reason is that, in periods of distress, any easing measures, eg reducing the countercyclical capital buffer, could be seen as adding to systemic risk. Again, the nature and size of the bias could depend on who is in charge of setting policy. Supervisory authorities that attach a greater value to the stability of individual institutions may be more reluctant to cut buffers than a central bank that tends to take a more systemic perspective.

Inaction bias may be mitigated by a rule-based approach. However, shifting substantially in this direction, while very helpful in principle, would require both reliable indicators and a good understanding of the workings of the instruments (ESRB (2014)). It is unclear how much scope there is at present (Borio (2011)).

Most policymakers appear to have a wide array of macroprudential instruments at their disposal (see Villar (2017) and Tables A2 and A3 in the Appendix).⁵ In theory, a broad range of tools should allow very targeted actions and thus help maintain

⁴ There are several other instruments, such as PTI (interest rate plus principal payment) and DTI (debt-to-income), that authorities use to dampen house prices growth. However, they are used less frequently across countries and over time.

⁵ Even if a particular tool is not in the policymaker's toolkit at a given point in time, this could easily be remedied.

financial stability. However, in practice, only a small subset of the available tools have been used in any given country. For example, only a handful of countries report deploying debt service-to-income ratios, liquidity requirements, credit growth limits or exposure limits (see also data by Shim et al (2013), Cerutti et al (2016, 2017), Reinhardt and Sowerbutts (2016)).

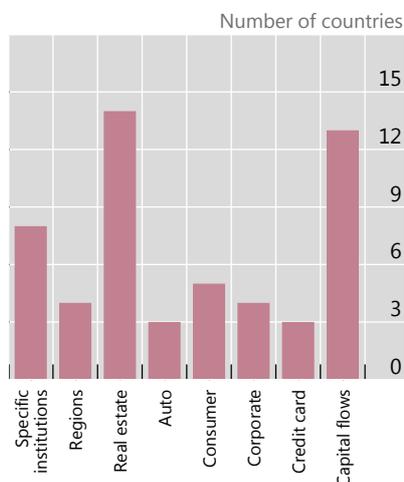
A possible reason could be practical problems posed by using multiple tools. These would make calibration even harder, given the sizeable uncertainty regarding the effects of single instruments and, above all, the interaction of different tools. And the use of multiple tools may further complicate communication (Patel (2017)).

Targeting specific sectors, regions, institutions and capital flows

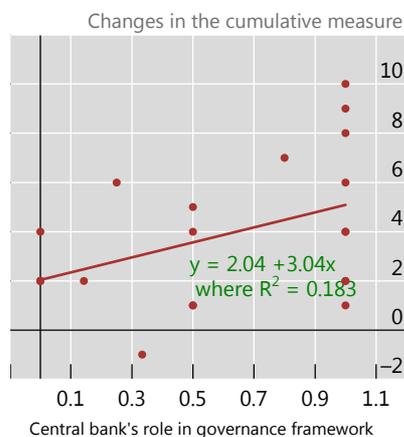
Macroprudential tools are tailored for specific sectors, regions and institutions (Graph 3, left-hand panel, and Appendix Table A2). LTV restrictions are the most commonly used for containing property market risks, limiting excessive household borrowing, strengthening banks' buffers and improving asset quality. Some central banks (eg the HKMA, PBC and Bank of Thailand) adjust LTV requirements for different segments of the housing market or higher-risk borrowers. The central bank of the Philippines limits lending to the real estate sector to not more than 20% of an individual bank's total loan portfolio. Turkey and Brazil apply LTV limits not only to housing loans but also to auto loans. Russia and Turkey use higher capital risk weights for unsecured consumer lending. The survey responses also reveal that some authorities target specific institutions. For example, the Czech Republic, the Philippines and Poland require additional buffers for systemically important ones. Mexico regulates pension funds and adjusts VaRs to limit potential spillovers to the financial sector. Overall, the responses suggest that authorities tailor the instruments to the source of the risk.

Capital flows can influence financial stability, especially in EMEs. For instance, banks' wholesale funding often takes the form of foreign currency-denominated cross-border borrowing. The increased availability of such borrowing will, in turn, affect lending conditions and, therefore, financial stability. Aware of the potential risks, more than half of the survey respondents have used capital flow management tools for macroprudential purposes (Graph 3 left-hand panel, and Appendix Table A2). To prevent short-term speculative inflows, Peru increased required reserves on non-resident deposits and short-term external borrowings by financial institutions. Russia differentiated reserve requirements by applying a higher ratio on foreign currency liabilities to mitigate liquidity risk in addition to setting limits to banks' net open foreign exchange positions. To deal with capital reversals, Argentina imposed a 120-day minimum holding period for non-resident inflows. China established its macroprudential framework for cross-border capital flows in 2015. Israel limited non-resident investment in short-term treasury bills and futures transactions. Eight countries mention that they do not use capital flow management measures for macroprudential ends. Overall, policy actions suggest that such measures remain in the "grey area" of macroprudential frameworks.

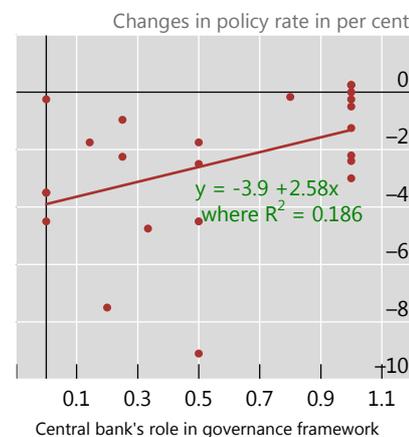
Targeting specific sectors, regions, institutions and capital flows



Greater CB role in macroprudential frameworks is associated with more tightening of macroprudential instruments



Greater CB role in macroprudential frameworks is associated with tighter monetary policy



The left-hand panel is constructed from the questionnaire responses and shows the number of countries that mention specific institutions, sectors and capital flows. In the centre and right-hand panels, for the central bank's role, we use the measure developed by Cerutti et al (2016) as the share of tools that the central banks implement or supervise among 13 macroprudential instruments. Changes in policy rates are calculated by differencing the values at 2008 from 2016. For macroprudential measures, the value of the cumulative measure in Q1 2008 is subtracted from the value in Q4 2014. For the description of the cumulative measure, see the footnote of Graph 1. Significance: CB role in MAP and MP: 5%; CB role in MAP and change in MP: 10%.

Source: Author's calculations based on data from Cerutti et al (2016), Cerutti et al (2017), national sources and questionnaire responses.

Governance and implementation

In contrast to monetary policy, there is still no consensus on appropriate governance for macroprudential policies; frameworks differ considerably across countries, as outlined in Villar (2017). However, governance frameworks may be highly relevant for both implementation and outcomes. For example, a central bank with a greater role⁶ in the macroprudential framework may be able to act more quickly, decisively and effectively. Indeed, there is some, albeit weak, evidence that central banks with a larger number of macroprudential tools under their control deployed them more frequently than did others post-crisis (Graph 3, right-hand panel).⁷

⁶ For the purposes of this note, that responsibility is proxied by the share of macroprudential instruments under the central bank's control, as indicated in the survey responses. The indicator rests on the assumption that governments equip central banks with instruments commensurate with their responsibilities.

⁷ The relationship is complicated by the possibility that central banks with a limited number of macroprudential instruments available may use them quite intensively. For example, the central banks of Turkey and Peru have a very small toolbox by international standards, comprising only reserve requirements and a few other tools, but they have used them very actively since 2008. Nevertheless, if Peru and Turkey are excluded from the analysis, the relationship still holds. Controlling for inflation and credit growth increases the statistical significance of the results.

Central banks with a greater responsibility for financial stability may also use interest rates more actively to safeguard it. The left-hand panel of Graph 3 plots the degree of central bank responsibility for macroprudential policy, again proxied by the share of tools available to them, against policy rates. It shows that, in countries where the central bank plays a greater role in the macroprudential framework, policy rates have declined by less than elsewhere. Of course, this finding is only a correlation; more research would be required to establish an explicit causal relationship. That said, it is not easy to come up with alternative convincing explanations.

Given that central banks have more expertise in economic analysis and are more likely to deploy macroprudential tools, why don't governments provide a larger role for them? One reason may simply be institutional inertia. In some countries, historically microprudential tools may have been under the control of institutions other than the central bank (most commonly the banking regulator). As many macroprudential instruments have evolved from their microprudential counterparts, their governance may have stayed in that institution (see the note by Poland). Another possibility is that governments may wish to retain control over macroprudential instruments and hence do not wish to give up all responsibility to an independent institution, which might also become too powerful.

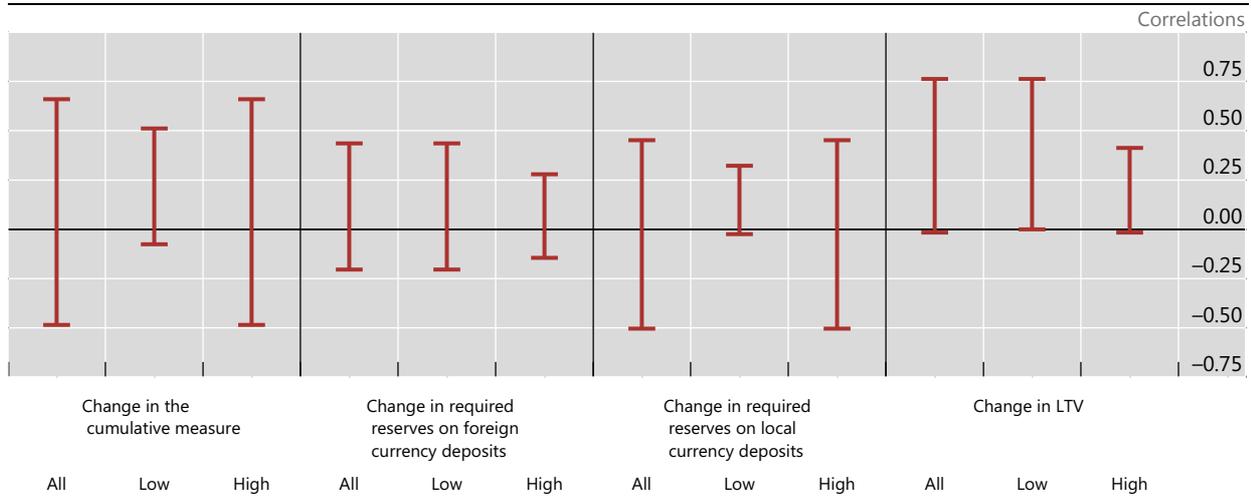
Monetary policy and macroprudential instruments may have spillover effects on each other's objectives. When used in the same direction, tighter monetary policy, for example, can restrict bank credit, thereby further reinforcing resilience. Indeed, this is one of the results of the projects that use credit registry data described in the box below. How are the two policies used in practice? Graph 4 shows the correlation ranges between changes in monetary policy stance and those in macroprudential measures for different governance frameworks. The graph shows a large degree of variation across countries. Only the LTV measure is positively correlated with monetary policy in all countries that have used it. Indeed, some aggregated measures for macroprudential tools actually have a negative correlation with monetary policy in some countries.⁸ This contrasts with a finding in Bruno et al (2016) that in Asia macroprudential instruments and monetary policy were more successful when used in the same direction.

⁸ We use aggregated measures, as changes in individual measures are infrequent.

Correlation of changes in macroprudential measures and policy interest rates

All countries and countries grouped by low and high central bank role; data since 2000, annual

Graph 4



The graph plots the range of correlations of annual changes in policy rates and macroprudential instruments. “Low” means only countries where the fraction of instruments under the central bank’s control is smaller than 0.5 are included, “high” that it is greater. The classification is based on data from the Cerutti et al (2016) database. The data comes from Cerutti et al (2017).

Source: Author’s calculations based on data from Cerutti et al (2016) and Cerutti et al (2017).

The effects of macroprudential instruments

Macroprudential actions are effective if they ensure that the financial system remains stable and fulfils its main purposes (to allocate capital, manage risks etc). But this definition is probably too general to be useful when assessing the effectiveness of individual tools. Narrower measures of effectiveness could focus on whether a specific action has been able to increase the resilience against shocks of a particular set of market participants, for instance households or banks, or to restrain a financial boom.

The questionnaire suggests that central banks appear to be broadly satisfied with the effectiveness of the macroprudential tools they have used (Appendix Table A3). Of course, there is a selection bias in the responses: central banks tend to use the tools they regard as most effective. Moreover, the authorities’ evaluation is mostly judgmental, as formal quantification is limited. That said, some instruments are mentioned consistently across countries. For example, LTV restrictions are found both to dampen risks in the property market and to safeguard bank asset quality (see the note by the HKMA for a detailed discussion). Similarly, authorities consider reserve requirements as effective in managing the credit cycle and mitigating foreign currency risks (in the case of required reserves on foreign currency funding). By contrast, capital and liquidity requirements are not frequently mentioned among the main tools used.

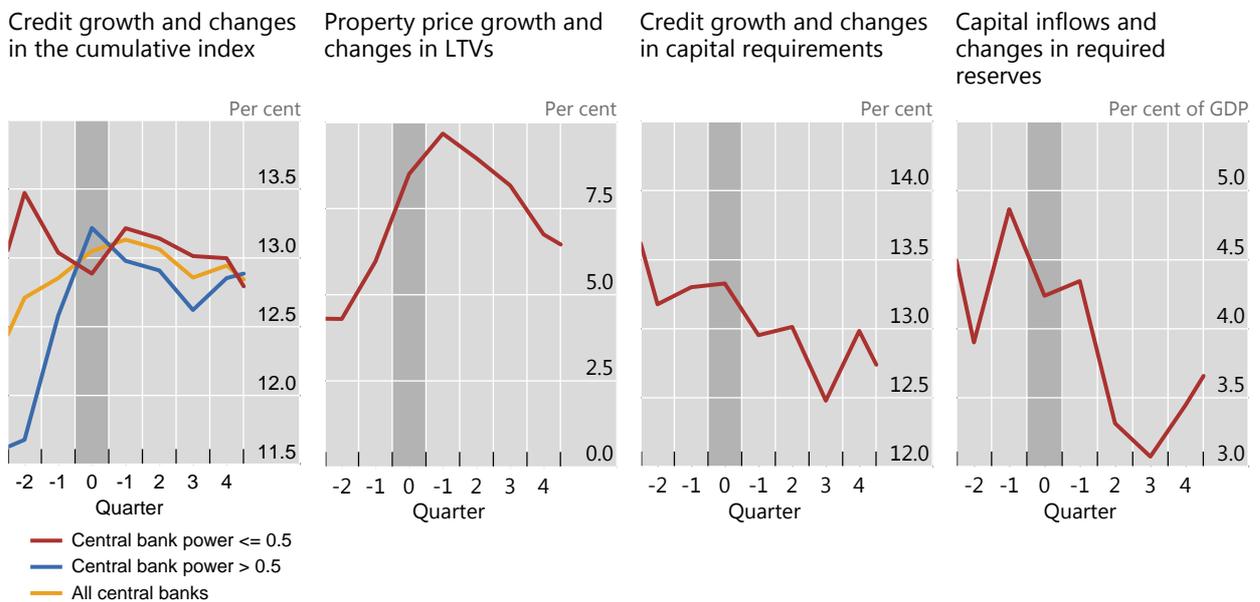
Empirical research finds that macroprudential measures have an impact on a number of financial risk indicators (see Galati and Moessner (2014) and Claessens (2015) for literature reviews). Cross-country studies find that some, but not all, tools dampen credit and house price growth (Claessens et al (2016), Kuttner and Shim (2013), Lim et al (2011), Akinci and Olmstead-Rumsey (2015), Fendoglu (2015), Dumičić (2017)). Bank-level analysis leads to a similar conclusion (Aiyar et al (2014) and Claessens et al (2013)). At the micro level too, studies using credit registry data

find a significant impact (see Camors and Peydro (2014), Jiménez et al (2017), Saurina (2009) and the box below). Kim and Mehrotra (2017) find that the instruments not only affect the financial risk but also output and inflation. In general, caps on LTVs or DTIs tend to have the strongest effects on credit growth and house prices, while the evidence for capital ratios and other measures primarily aimed at enhancing resilience is more mixed. By contrast, a simple event analysis does not show major differences. Graph 5 shows the evolution of various intermediate objectives before and after activation of specific macroprudential instruments. For example, credit growth tends to fall after an increase in capital requirements (third panel). Similarly, house price growth declines after a tightening in LTV limits (second panel). Finally, higher required reserves tend to be followed by a fall in net capital inflows (fourth panel).

Impact of changes in macroprudential measures

t=0 is the period of a change in the macroprudential measure; quarterly data since 2000; averages across countries.

Graph 5



The graphs plot the dynamics of several risk economic variables before and after the activation of instruments. The first and third panels plot total credit growth after the change in the cumulative macroprudential index (see the footnote of Graph 1) and capital requirements. The second panel plots house price growth before and after changes in LTV restrictions. The fourth panel plots net capital inflows before and after a change in required reserves. All figures plot averages across countries.

Sources: Author's calculations based on data from Cerutti et al (2016, 2017); national sources.

The empirical work also suggests that the impact of many macroprudential instruments may not be symmetrical. For example, both Kuttner and Shim (2013) and Cerruti et al (2016) find that instruments such as LTV or DTI caps tend to be more effective in the boom than in the bust phase.

Macroprudential measures can mitigate individual bank risks as well as macro risks. A recent study based on bank-level data covering more than two decades (Altunbas et al (2017)) finds that the default risk of banks that are small, less well capitalised and with a higher share of wholesale funding react more to changes in macroprudential tools aggregated into an MP index (Table 1). Tools that primarily aim at enhancing resilience (MP resilience index) tend to have stronger effects than tools that focus above all on taming financial booms and busts (MP_cyclical index),

as one would expect.⁹ That said, even the asset-based tools, reserve requirements and currency instruments covered by the cyclical index appear to reduce bank risk.

Tighter macroprudential policy reduces banks' expected default frequency

Table 1

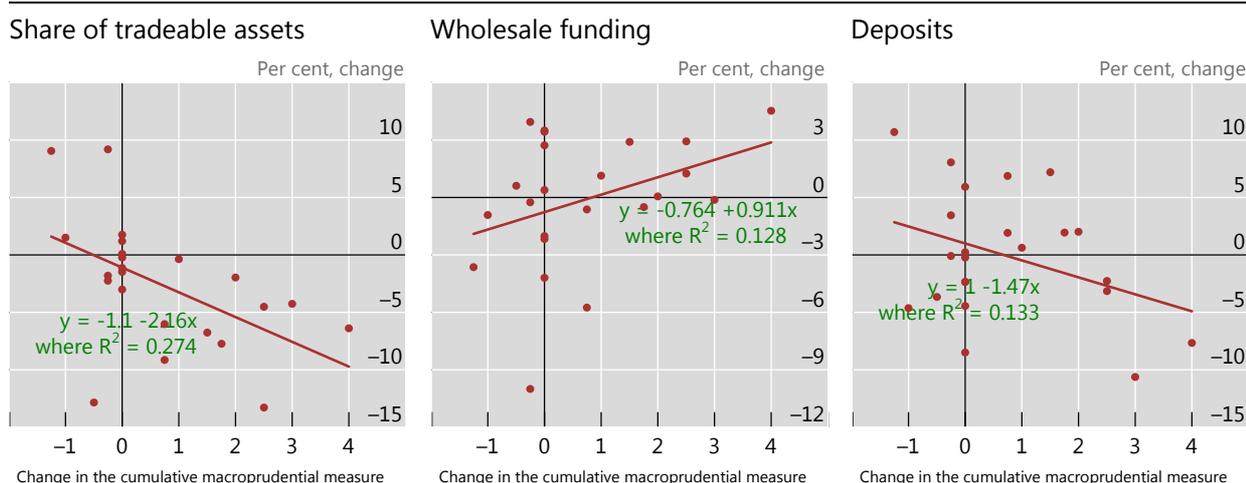
	Dependent variable: annual change of expected default frequency over a one-year horizon					
	(I)			(II)		
	Coeff	Std Err		Coeff	Std Err	
<i>Dependent variable</i> _{t-1}	0.067 ***	0.003		0.0225 ***	0.0053	
<i>MP_index</i> _t	-0.058 ***	0.017				
<i>MP_cyclical index</i> _t				-0.2715 ***	0.0279	
<i>MP_resilience index</i> _t				-0.0129 **	0.0052	
<i>Controls</i>	Yes			Yes		
Sample period	1990–2012			1990–2012		
Observations	5,756			5,756		

Notes: The results are taken from Altunbas et al (2017). *MP_index*, *MP_cyclical index*_t, *MP_resilience index*_t takes value 1 if tightened, -1 if loosened, and 0 otherwise. These indices are constructed by aggregating several instruments. See the paper for more details. Standard errors (clustered at the bank level) are reported. The symbols *, **, and *** represent significance levels of 10%, 5%, and 1% respectively. The coefficient for the banking crisis dummy is not reported.

Implementation and effectiveness also tend to depend on governance frameworks. There is some evidence that in countries where central banks have more instruments (or more responsibility), macroprudential tools are tightened earlier and credit growth is lower on average (Graph 5, first panel).

Macroprudential measures and bank business models

Graph 6



The graph plots the changes in the cumulative macroprudential measures after the crisis (between 2007 and 2008) against several bank variables. The changes in bank variables are the differences between the 2012–15 and 2005–10 averages. A longer window is chosen for the initial period to limit data availability problems. Trade: trading assets plus liabilities; wholesale debt: other deposits plus short-term borrowing plus long-term funding. Significance: trade: 1%; wholesale funding: 10%; deposits: 10%.

Source: Author's calculations based on data from Bankscope and Cerutti et al (2017).

⁹ The resilience index covers capital and liquidity based instruments, whereas the cyclical index focuses on asset side instruments, reserve requirements and currency instruments.

Macroprudential measures also appear to influence bank business models, although not necessarily making banks safer. For example, banks in countries that tightened measures more between 2007 and 2008 reduced the share of tradable assets in their balance sheet by more than banks elsewhere (Graph 6, left-hand panel). On the other hand, banks in these countries also reduced the share of deposit funding and increased that of wholesale debt (Graph 6, centre and right-hand panels). While the impact of changes in the share of tradable assets on risk is unclear, the shift towards wholesale funding is generally regarded as pointing to higher risk.

Box 1

The impact of macroprudential measures in Latin America and their interaction with monetary policy: An empirical analysis using credit registry data.

Only very few studies on the effectiveness of macroprudential measures use loan-level data from credit registries. In part, this is because such data tend to be highly confidential. This box presents the results of a joint BIS-coordinated project by a group of Latin American central banks (Argentina, Brazil, Colombia, Mexico and Peru) on the impact of macroprudential measures and their interaction with monetary policy using micro data at the bank-client level.^① To ensure comparability, the five central banks used a common methodology even though the confidentiality of the data precluded the construction of a common database. The analysis was complemented with work for three more countries (Canada, Chile and the United States) on the effects of specific measures using alternative approaches.^② Table B1 shows the macroprudential measures analysed by the each country group and summarises the findings.^③

The preliminary results are, first, that macroprudential measures adopted by the sample of countries have helped dampen credit cycles and reduce banking sector risk. In particular, measures used for countercyclical purposes, such as reserve requirements and dynamic provisioning, restrained credit growth. Bank-specific characteristics influenced the impact of macroprudential measures on credit. For example, the supply of credit originated by banks with more stable funding (eg with higher ratios of deposits to other liabilities) was less affected by the introduction or tightening of the measures. The effects of the measures were more pronounced for less stable financial institutions (Colombia), less strongly capitalised banks (United States and Brazil), and less liquid intermediaries (Brazil).

Second, the measures tend to be more effective in dampening credit cycles when they are accompanied by countercyclical monetary policy (Brazil and Colombia).

Third, the measures have helped reduce the procyclicality of credit and stabilise the economy. In particular, a cumulative index of the measures for Colombia was negatively related to GDP growth. In Mexico, provisions set by banks on the basis of their internal models were negatively correlated with GDP growth.

Finally, prudential measures directed at increasing the resilience of the banking sector, such as higher provisions and capital requirements, were effective in reducing the growth of non-performing loans (Argentina and Colombia), and of credit to riskier borrowers (Colombia). In contrast, measures designed to dampen credit growth, such as limits on external borrowing position and deposit requirements on external loans, had a more limited impact on the volume of loans, but not on the overall accumulation of banking sector risk. However, the imposition of reserve requirements in Brazil affected access to credit for riskier borrowers.

^① The research network was set up under the financial stability group (CGDFS) of the Consultative Council of the Americas (CCA), comprising representatives of the eight BIS shareholders in the Americas region. ^② Callem et al (2016) evaluate recent changes introduced by the Comprehensive Capital Analysis and Review, the Dodd-Frank stress tests, and the Leveraged Lending Guidance in the United States. Allen et al (2016), using information at the borrower level, focus on the evaluation of measures in the housing market related to changes in LTV ratios in Canada. Finally, Alegría et al (2016) estimate the effect of loan-to-value in the housing loan market originating from an unexpected Chilean central bank statement concerning housing price dynamics. Gambacorta and Murcia (2016) describe the joint project in detail, using meta-analysis techniques to summarise the results obtained at the country level. ^③ Measures are sorted into two categories depending on the specific aim targeted (see main text). For measures that work towards both aims (eg countercyclical capital ratios) the introduction of the policy was classified as reinforcing resilience and the tightening of the policy as cyclical.

Macroprudential measures by country group

Table B1

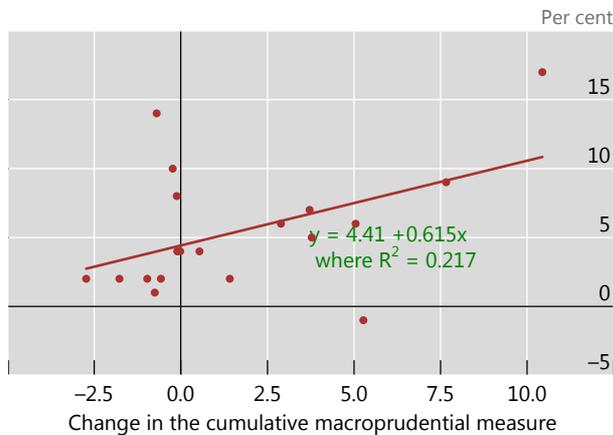
Country	Type of measure	Specific measures	Main results
Argentina (Aguirre and Repetto (2016))	Resilience/cyclical	(i) Introduction and tightening of a capital buffer.	Dampened credit cycles, particularly strong effect on effect on non-performing loans.
	Cyclical	(ii) Tightening in foreign currency net global position.	
Brazil (Godoy de Araujo et al (2016))	Cyclical	(i) Introduction of loan-to-value limits for certain subsidised loans.	Led to higher down-payments for borrowers constrained by the new regulation.
Brazil (Barroso et al (2016))	Cyclical	(i) Reserve requirements.	Slowed credit growth, especially riskier loans.
Colombia (Gómez et al (2016))	Resilience	(i) Dynamic provisioning (DP).	DP and RR had a negative effect on credit growth. ER did not have a statistically significant effect. DP had a negative effect on the growth of non-performing loans.
	Cyclical	(ii) Countercyclical reserve requirement (RR).	
	Cyclical	(iii) External borrowing reserve (ER).	
Mexico (Levin et al (2016))	Resilience	(i) Banking provisions based on expected losses.	Lowered credit growth, with larger on local currency loans than on dollar credit.
Peru (Cabello et al (2016))	Resilience	(i) Dynamic provisioning (DP).	DP had a significant effect on credit growth. CR had a significant effect on the share of loans denominated in foreign currency.
	Cyclical	(ii) Conditional reserve requirement on deposits in foreign currency (CR).	

Source: Gambacorta and Murcia (2016).

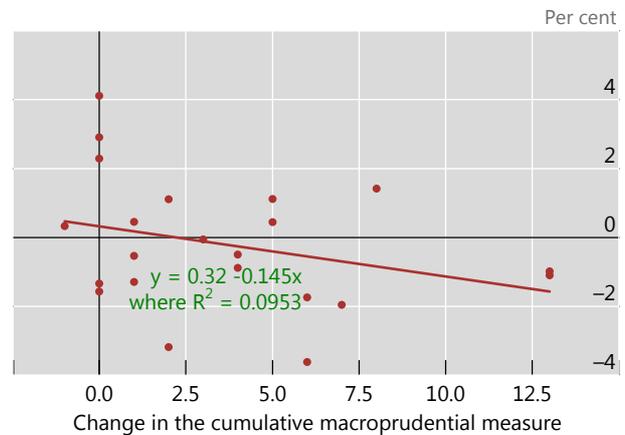
Avoidance

Central banks mention several ways in which market participants may work around macroprudential measures. An obvious example would be firms issuing bonds abroad or borrowing directly from foreign banks. The left-hand panel of Graph 7 shows that, indeed, there is a strong positive relationship between the increase in the activation of instruments and the international debt issuance of non-financial firms. But only one country mentions this avoidance mechanism in the survey, arguing that it is likely to have a limited significance as only large firms have access to international markets.

The rise of international debt issuance



Fiscal policy stance



The left-hand panel plots changes in international debt issuance against changes in the cumulative macroprudential policy index. Both variables are changes during the 2008–14 period. The right-hand panel plots changes in the cyclically adjusted primary balance as a share of GDP against changes in the cumulative macroprudential policy index. For primary balance, the average for the 2007–11 period is subtracted from the average for 2012–16. For the cumulative macroprudential index, the differences between 2011 and 2007 are used. Significance: debt issuance: 5%; fiscal and MAP: no significance (excluding Argentina makes it significant at 10%).

Source: Author's calculations based on data from IMF, *Fiscal Monitor*; Cerutti et al (2017); BIS data.

Macroprudential measures applied to the banking sector may shift risks to unregulated entities. In the Philippines, real estate developers have extended in-house financing to buyers through contract-to-sell agreements. The HKMA points to a similar avoidance scheme. In Malaysia, following the November 2010 introduction of an LTV ratio limit of 70% for the third or subsequent outstanding housing loan for individuals, there was an increase in housing loans taken out by non-retail clients – possibly an attempt to circumvent the measure by borrowing in a corporate name. Therefore, in December 2011, the Central Bank of Malaysia extended the maximum LTV ratio limit to all housing loans by non-individuals. The note by the Bank of Korea mentions a similar avoidance mechanism. After the introduction of LTV and DTI measures, there was a continuous increase of household loans not subject to the regulations, such as loans by non-bank institutions or secured by other collateral.

Unintended consequences

One potential unintended consequence of macroprudential measures might be to limit the access to finance for those parties who need it most. That said, an analysis of the World Bank Financial Inclusion database shows that there is no significant relationship between macroprudential measures and changes in the percentage of the population with financial accounts. Still, a more detailed analysis would be needed to reach a more robust conclusion. By contrast, Ayyagari et al (2017) find that macroprudential measures tend to lower SMEs' access to financing.

The relationship between the fiscal policy stance and the activation of macroprudential measures is a priori unclear. On the one hand, as governments typically have some control over both fiscal policy and macroprudential instruments, one might expect that fiscal policy would become more prudent in the regions where

macroprudential instruments were tightened more, with both policies working in the same direction. On the other hand, the government might take advantage of a tighter macroprudential stance to loosen policy or even compensate for it if it were deemed too restrictive on output. The evidence appears to support this second hypothesis (Graph 7, right-hand panel). After 2008, the fiscal policy stance loosened more in countries that had tightened their macroprudential measures to a greater extent.¹⁰ Whatever the underlying reason for this relationship, it is likely to reduce the overall effectiveness of macroprudential measures.

¹⁰ The possibility of reverse causality, ie loose fiscal policy leading to financial imbalances and then macroprudential tightening, is not likely: the changes in macroprudential instruments lead the changes in fiscal stance by several years (see the notes in Graph 7).

Appendices

How do authorities measure vulnerabilities?

Table A1

Tools used to measure vulnerabilities	
Argentina	(1) Banking system indicators: aggregate intermediation, asset and liability structure, credit portfolio quality, currency and interest rate mismatches, solvency and liquidity positions, leverage levels, profitability, among other aspects. (2) Fixed income and equity markets, yields, volatilities, financing flows, sovereign debt. (3) The financial conditions of the corporate and household sectors. (4) Credit conditions, market expectations surveys. (5) Asset prices, leverage, liability dollarisation of the corporate sector, developments in the payment system. (6) Stress tests. (7) Financial risk dashboard.
Brazil	(1) Credit, liquidity and market risks. (2) Earnings, funding and capital developments. (3) System-wide stress tests. (4) Credit growth, performance, pricing and maturity indicators are produced by size, ownership (government-owned vs private sector) and business model. (5) Solvency, liquidity and profitability indicators. (6) Changes in real housing prices. (7) Credit risk indicators for households and enterprises respectively, including non-bank debt. (8) Consumer credit growth and household disposable income. (9) Non-performing loans (NPLs). (10) Debt service-to-income ratio (DSTI).
Chile	(1) Stress tests for the banking system. (2) Indebtedness of the household sector. (3) Evolution of real estate prices. (4) Indebtedness and currency mismatches in the corporate sector. (5) Evolution of risks in the banking sector, including stress test results.
China	(1) Amount and rate of NPLs, capital adequacy ratio, profit growth etc. (2) The business performance of listed companies, profit and asset indicators of securities, futures companies and funds etc. (3) Structural configuration of assets, insurance premium growth, asset liability matching etc in the insurance sector. Exploring quantitative methods such as stress tests in recent years to improve the effectiveness of assessments.
Colombia	(1) Financial stability map. (2) Index of financial stability. (3) Indicators of credit booms and financial fragility. (4) Further early warning tools and a stress-testing framework are under development.
Czech Republic	(1) Stress tests. (2) Comprehensive financial cycle indicator. (3) Credit-to-GDP gap. (4) Credit growth. (5) Real estate price gap. (6) External vulnerability indicators. (7) Concentration indicators.
Hong Kong SAR	(1) Credit-to-GDP gap and property price-rent gap. (2) Property price and transaction volume indicators; indicators of speculative activities, such as confirmer transactions and short-term resale activities; affordability indicators, including price-to-income ratio and income-gearing ratio, and buy-rent gap as a user cost measure. (3) Macro stress testing of retail banks' credit exposure. (4) A housing price model and an asset pricing model. (5) A statistical method to detect any property price bubbles.
Hungary	(1) System-wide financial stress index. (2) Credit-to-GDP gap. (3) Cyclical systemic risk map with additional early warning indicators. (4) Credit growth. (5) Value of collaterals (real estate and vehicles). (6) Repayment capacity of borrowers. (7) Household indebtedness. (8) Stress test based on the Liquidity Coverage Ratio (LCR) and its components reported by banks at a monthly frequency. (9) Solvency stress tests.
India	(1) Systemic risk survey. (2) Single-factor sensitivity analysis. (3) Banking stability maps and indicators. (4) Estimation of expected loss, unexpected loss and expected shortfalls of banks. (5) Macro stress testing. (6) Stress testing of the derivatives portfolio of banks. (7) Financial network analysis. (8) Major global and domestic economy indicators. (9) Banking stability indicators: asset quality, capital adequacy, profitability, liquidity and efficiency. (10) Interconnectedness. (11) Aggregate and sectoral credit growth. (12) Loan-to-deposit ratios. (13) Credit-to-GDP gap from long-term trends. (14) Growth of non-performing assets. (15) Interest coverage ratio.
Indonesia	(1) Financial System Stability Index, financial distress indicators, network analysis and risk profile analysis. (2) Interbank stress test, systemic impact analysis and transmission map of any identified shock. (3) Banking stress test (top-down approach), Systemic Risk Assessment Model (forthcoming), liquidity stress testing (forthcoming), granular individual bank stress testing and other sensitivity analysis. (4) Qualitative methods.
Israel	(1) Leading indicators. (2) Stress tests. (3) Subjective assessment of all variables to assess the vulnerability of the financial system.
Korea	(1) Financial stability index and map. (2) Private credit-to-nominal GDP ratio and gap. (3) Financial market price volatility. (4) Soundness/profitability/interconnectedness of financial institutions. (5) Housing prices etc to grasp the signal of sectoral financial risks. (6) Micro data of households and corporates, additionally, to seize potential (or tail) risks in advance.
Malaysia	(1) Leading and key financial soundness indicators on credit, market and liquidity risks, capitalisation and profitability. (2) Macro and micro stress tests. (3) Standalone sensitivity tests. (4) Indices on banking sector vulnerabilities, financial market volatility, and consumer and business sentiment. (5) Probability-of-default model for large corporate borrowers. (6) Financial leverage and house price cycles.
Mexico	(1) Risk analyses and stress testing. (2) Banking sector performance: profitability, liquidity and leverage, periodically. (3) Individual credit portfolios.
Peru	(1) Indicators of credit cycles (eg credit-to-GDP gap, credit growth). (2) Degree of financial dollarisation of credit and deposits. (3) Indicators of currency mismatches (eg banks' net FX position).
Philippines	(1) Macro and micro prudential indicators. (2) Rating systems. (3) Early warning systems. (4) Various periodic reports/publications.
Poland	(1) Financial cycle indicators. (2) Credit gap. (3) Early warning indicators. (4) Detailed analysis of various segments of the credit market. (5) Stress tests. (6) Individual-level data (ie household level) to assess the degree of risk taken by particular sector.

How do authorities measure vulnerabilities?

Table A1
(cont)

Tools used to measure vulnerabilities	
Russia	(1) Domestic and global macroeconomic outlooks. (2) Financial soundness of banks, non-bank financial institutions and significant non-financial corporates. (3) Financial market developments. (4) Credit and liquidity risks of the banking system. (5) Systemic risk dashboard. (6) Risks in the rouble money market, FX money market, foreign exchange market, equity market, state and corporate debt market and also in global markets. (7) Risks of large-scale withdrawal of deposits, large-scale conversion of roubles into foreign currency and collateral deficit, funding volatility, and also indicators of interest rate risk and credit risk of the banking sector.
Saudi Arabia	(1) Solvency and liquidity stress tests. (2) Early warning indicators. (3) Macroprudential dashboard.
Singapore	(1) Property prices and transactions. (2) Property valuation metrics. (3) Banks' exposure to the property sector and the risk profile of housing loans, including LTVs and debt servicing ratios. (4) Credit-to-GDP gap, real economy, banking sector and asset market indicators. (5) Annual industry-wide stress test.
South Africa	(1) Risks in institutions identified as systemically important, shadow banks, asset markets and the non-financial sector. (2) Level of leverage, and general credit market conditions. (3) Maturity and currency mismatches. (4) Changes to lending standards. (5) Stress tests. (6) House prices, commercial property prices and asset valuations in equity markets. (7) Government and corporate bond spreads, credit default swap spreads and measures of risk premia. (8) Underwriting standards, and asset quality and credit conditions.
Thailand	(1) Heat map. (2) "Ms Muffet Spidergram". (3) Systemic risk (network model, CoVaR). (4) Risk build-up over time (financial cycle, heat map). (5) Micro stress tests. (6) Macro stress-testing framework under development.
Turkey	(1) Heat map. (2) Credit developments. (3) Credit risk, liquidity risk, FX net position and deposits. (4) Vintage analyses and interest rate risk scenarios. (5) DuPont analysis. (6) Studies on the impact of macroprudential tools.

Source: Replies to questionnaires by central banks, comprising a succinct summary of replies to question 6. Replies are enumerated to improve readability.

Macprudential tools used and their aims and effectiveness

Table A2

	Tools	Aims	Effective-ness
Argentina	Limits on currency mismatches.	Address banks' and banks' clients' financial mismatches.	1
	Limits on financing to individual customers (private, public and financial sector).	Reduce individual exposure to both private and public debtors.	1
	Cash reserve requirements.	Reduce the probability and intensity of a run scenario.	1
Brazil	LTV.	Enhance auto-loan underwriting practices.	1
	Reserve requirements.	Manage credit cycles and ease liquidity constraints.	1
	Consumer loans.	Focused on personal credits, payroll-deducted loans and vehicle financing, involving longer maturities or higher LTV.	1
	FX swaps.	Reduce volatility in FX markets; offer FX hedge to market agents and provide more liquidity.	2
	Capital flow management.	Stem volatile carry trades, lengthen maturities of the inflows, and ease persistent appreciation pressures on the currency.	2
Chile	Warning messages through the FSR.	Raise concerns to mortgage lenders re their credit standards.	1
China	Macroprudential assessment system.	Make the macroprudential policy framework resilient and sufficiently complete to prevent systematic risk.	1
	Provisions for forward sale of foreign currency.	Eliminate speculative trading and adjust foreign currency liquidity.	1
	All cross-border management pilot programmes.	Control leverage and currency mismatch risk.	1
	Application of legal deposit reserve ratio.	Improve the deposit provisions regime and adjust cross-border renminbi flow in the long run.	1
	LTV limits.	Control the housing market through countercyclical adjustment.	1
Colombia	Marginal reserve requirement.	Limit credit growth.	2
	Limits on FX positions.	Limit currency risk.	2
	LTV limits.	Limit household leverage and financial institutions' exposure to house price movements.	1
	Dynamic provisioning.	Stabilise credit growth.	2
Czech Republic	Capital controls.	Reduce currency mismatches and discourage speculative flows.	3
	CCyB rate.	Increase resilience.	
	D-SIB buffer rate.	Increase resilience.	
Hong Kong SAR	LTV limits.	Decrease excess leverage.	
	LTV limits for mortgages.	Provide equity buffers for banks against default.	1
	DSR limit and stressed DSR limit for mortgages.	Reduce overindebtedness and risk of default.	1
	Risk weight floor of 15% for residential mortgage portfolio of banks using IRB for calculating the capital charge for their credit risk.	Ensure that IRB banks maintain a higher level of regulatory capital as a cushion.	1
	SFR.	Ensure that banks maintain sufficiently stable funds to support their lending business.	1
Hungary	CCyB.	Build additional capital during periods of high credit growth.	1
	PTI and LTV limits.	Avoid excessive household lending.	1
	Mortgage funding adequacy ratio.	Reduce maturity mismatch and lower interest rate risks.	1
	Systemic risk buffer.	Enhance the resilience of institutions with large stocks of problem project loans, and incentivise banks to wind down their problem portfolios.	1
	FFAR, FECR.	Mitigate maturity and currency mismatches.	2
India	CCyB.	Absorb negative impacts of a potential financial crisis.	2
	Countercyclical provisioning and capital requirements.	Increase the resilience of banks and limit credit growth.	1
	Prudential tools to deal with interbank exposures.	Reduce interconnectedness in the banking system.	2
	Prudential limits to reduce bank exposures to capital markets.	Reduce bank exposures to the equity market and mutual funds.	2
	Buffers for SIBs.	Address moral hazard for systemically important banks.	2
Israel	Capital and provisioning requirements for bank exposures to entities with large foreign currency exposures.	Signal to the real sector not to have excessive foreign currency exposure.	1
	LTV limit.	Reduce the risk to banks derived from high-LTV mortgages.	2
	Limiting the proportion of new mortgages at variable rates.	Minimise the interest rate risk to households and banks.	2
	PTI limitation on new mortgages, term to repayment limit.	Reduce the risk to banks derived from high-PTI mortgages.	2
Indonesia	Additional capital allocation requirements for housing credit.	Increase the capital buffer for mortgages.	2
	RR based on LFR.	Manage liquidity risk for excessive LFR.	2
	LTV limits on mortgages.	Limit the build-up of systemic risks that may arise from high mortgage loan growth and increasing property prices.	1
	CCyB.	Prevent systemic risk arising from excessive credit growth.	

Macroprudential tools used and their aims and effectiveness

Table A2
(cont)

	Tools	Aims	Effectiveness
Korea	LTV and DTI limits.	Hold down mortgage loan size and house prices.	1
	Loan/deposit ratio regulation.	Instil sound management practices in financial institutions.	1
	Foreign exchange soundness regulation.	Reduce the volatilities in foreign capital flows.	1
Malaysia	LTV limit, capital risk weights.	Curb speculative activities and promote a sustainable property market.	2
	Maximum loan tenure.	Ensure prudent expansion of credit to households.	1
	DSR limit.	Promote responsible financial behaviour among borrowers and credit providers.	1
Mexico	Limits on foreign currency operations.	Limit the possible effects of changes in FX on banks.	1
	Capital requirements.	Prevent possible contagion of problems.	–
	CCyB		
Peru	Asset transfer authorisation for banks and related counterparties.	Ensure that these operations take place under market conditions.	1
	Higher RRs for foreign currency.	Mitigate the liquidity risk created by dollarisation.	1
	Additional RRs for dollar-denominated loans.	Speed up the reduction of credit dollarisation.	1
Philippines	Cyclical adjustment of RRs.	Smooth the domestic credit cycle, particularly in FX.	1
	RR on banks' short-term external liabilities.	Limit banks' exposure to sudden reversals.	1
	LTV ratios.	Manage bank lending.	1
Poland	Limits on lending to specific sectors.	Manage risks concentration.	1
	Limits on single borrower and related parties.	Strengthen arm's length transactions.	1
	Limits on net open currency positions.	Manage FX funding risks.	1
Russia	Limits on currency mismatches.	Manage FX funding risks.	1
	FX lending restrictions.	Stop new FX lending.	1
	LTV limit.	Limit excessive credit growth and enhance the resilience.	1
Saudi Arabia	DSTI limit.	Limit excessive credit growth, enhance the resilience of financial institutions and limit overindebtedness.	2
	OSII buffer.	Limit risk related to OSII banks.	
	CCyB.	Counteract cyclical risk.	
Singapore	Reserve requirements.	Limit foreign currency risks.	2
	Provisioning, capital risk weights.	Limit systemic risk in the unsecured consumer lending segment. Stimulate the provision of mortgage loans with a reduced level of risk. Limit the risk of high-risk mortgages.	2
	Measures to support the de-dollarisation of the economy.	Reduce dollarisation.	2
Thailand	LDR.	Liquidity risk.	1
	LCR, NSFR.	Liquidity risk.	1
	LTV.	Credit risk.	1
Turkey	LTI.	Credit risk.	1
	CCyB.	Credit risk.	1
	LTV	Encourage financial prudence among borrowers. Mitigate loss exposures of financial institutions from loan defaults.	1
Singapore	Loan tenure limits	Encourage financial prudence among borrowers.	1
	Total debt servicing ratio framework	Encourages financial prudence among borrowers.	
	Seller's stamp duty	Strengthens credit underwriting practices.	1
Thailand	Additional buyer's stamp duty	Curbs speculative property investments.	1
	LTV limit.	Mitigates excessive investment demand, through additional duty on second or more property purchases.	1
	Dynamic provisioning (through possible impaired loans).	Prevent speculation and mitigate the build-up of risk in the real estate loan market.	2
Turkey	Maximum credit line on credit cards and personal loans.	To build up extra cushion in good times.	2
	Minimum salary/payment on credit card requirement.	Dampen concern about household debt.	2
	LTV limit and consumer loan restrictions (risk weights, provisioning, maturity restrictions).	Contain credit growth and household debt.	1
Turkey	Reserve requirements.	Improve the quality of the liability side.	1
	Credit card restrictions (limits on credit balances, instalments, maturities, minimum payments, risk weights).	Mitigate and prevent excess credit growth, maturity transformation and leverage.	1
	Higher capital requirements for D-SIBs.	Create capital buffer for systemically important banks.	1

CCyB: countercyclical capital buffer; D-SIB: domestic systemically important banks; DSR: debt service ratio; DSTI: debt service-to-income ratio; DTI: debt to income; FFAR: foreign exchange funding adequacy ratio; FECR: foreign exchange coverage ratio; IRB: internal ratings-based; LCR: liquidity coverage ratio; LDR: loan-to-deposit ratio; LFR: loan-to-funding ratio; LTI: loan to income; LTV: loan to value; NSFR: Net stable funding ratio; OSII: other systemically important banks; PTI: interest rate payment plus principal payment; RR: required reserves. Effectiveness indicators: (1) very effective; (2) moderately effective; (3) not effective; (4) counterproductive. Source: Replies to questionnaires by central banks, comprising a succinct summary of replies to question 8.

Tools that target specific sectors, regions or institutions and foreign capital flows

Table A3

	Tools that target specific sectors, regions or institutions	Tools that target foreign capital flows
Argentina	None.	Minimum holding period for non-residents' capital inflows. Reserve requirement for non-residents' inflows. Limits on banks' General Exchange Position.
Brazil	Higher regulatory capital requirement for auto loans with long maturities and high LTVs. Eliminated required reserves for the banks that were most affected by liquidity shortage. Reduced reserve requirements for large banks under certain conditions. Special conditions for foreign and domestic currency liquidity.	Tax on foreign purchases of domestic bonds and equities.
Chile	The tool used was aimed at the real estate sector.	RR on foreign capital flows (mid-1990s).
China	None.	Provisions for forward sale of foreign currency. All cross-border management pilot programmes. Legal deposit reserve ratio applied to offshore financial institutions.
Colombia	LTV applies only to mortgage loans. Liquidity risk Indicator: specific formula that differentiates between credit establishments, stock brokers and mutual funds. Dynamic provisions for commercial and consumer loans.	Limits on FX positions and FX lending. Reserve requirements for short-term external borrowing. Limit on exchange rate derivatives exposure. Deposit for foreign portfolio investment. A minimum permanence period for foreign direct investment.
Czech Republic	D-SIB buffer rate.	None.
Hong Kong SAR	Property mortgage lending.	Lower LTV caps for borrowers whose income is mainly derived from outside Hong Kong.
Hungary	Systemic Risk Buffer (SRB) targets financial institutions. The mortgage funding adequacy ratio sets a minimum required level of mortgage-backed funding relative to the amount of household mortgage loans. LTV and PTI target household loans.	None.
India	Sector-specific prudential tools for certain sectors. Prudential measures to reduce interconnectedness. Prudential measures to reduce excessive foreign currency borrowing by corporates.	Caps for various sectors receiving foreign investment. Sector- and company-specific caps for external borrowing.
Indonesia	LTV requirement for mortgage loans.	Minimum holding period for Bank Indonesia Certificate (SBI). Hedging ratio. Credit rating requirement.
Israel	Additional capital requirements for mortgage credit.	Limits on investments by non-residents in short-term treasury bills and MAKAM and in short-term futures transactions.
Korea	LTV and DTI target real estate sector and specific regions. Additional capital requirement for SIBs.	Regulations on derivative position in foreign currency. Tools to strengthen the management of foreign currency. Macroprudential instability levies and taxation on non-deposit liabilities in foreign currency.
Malaysia	LTV and capital risk weights target property market. Maximum loan tenure for consumer and mortgage loans.	In 1994: limits on non-trade-related external liabilities of banks; prohibition of forwards (bid side) and non-trade-related swaps; requirement to place ringgit-denominated funds of foreign banks held in non-interest bearing vostro accounts with the central bank. Currently: none.
Mexico	Loan loss provisions (calculated by expected losses) for non-revolving consumer and mortgage lending, for federal and local governments and for commercial lending. Higher limits on VaRs for retirement funds (in 2009 and 2010). Limited authorisation to banks to use internal models for the estimation of their expected losses.	None.
Peru	RR differentiated by currency. Additional RR depending on the performance of mortgage and auto loans in dollars.	RR on FX short-term foreign funding.
Philippines	Banks' loans to the real estate sector must not exceed 20% of their loan portfolio. Larger buffers for D-SIBs.	Limits on banks' total gross exposures to all forms of peso NDF transactions.
Poland	Buffer for "other systemically important institutions".	None.
Russia	Additional provisioning requirements and higher capital risk weights for unsecured consumer lending. Differing capital risk weights based on the level of effective lending rates on loans.	Tools to support the effort to de-dollarise the economy. Reserve requirements on liabilities in foreign currency.
Saudi Arabia	LTV ratio (70%) targets the real estate sector. LTI ratio (33%) targets households.	Imposing ownership limits and minimum qualifications for international institutions for "gradually" opening up the market.
Singapore	LTV limits, loan tenure limits, TDSR framework and stamp duties are targeted at the property market.	None
South Africa	None.	None.
Thailand	LTV ratio was segmented into high-rise and low-rise properties and also by value of the property (whether more or less than THB 10 million). Credit card and personal loan requirement for low-income individuals.	None.
Turkey	Tools on consumer loans (risk weights, provisioning, and maturity restrictions). Tools on credit cards (higher provisions, number of instalments). Caps on LTV ratios on housing, commercial real estate loans and auto loans. Higher risk weights on general purpose loans, credit card receivables and auto loans. Lower general provisions for SME and export loans.	None.

D-SIB: domestic systemically important bank; DTI: debt to income; LTV: loan to value; RR: required reserves; MAKAM: short-term securities issued by the Bank of Israel; NDF: non-deliverable forward; PTI: interest rate payment plus principal payment. Source: Replies to questionnaires by central banks, comprising a succinct summary of replies to questions 9 and 10.

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Macroprudential frameworks: communication¹

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Abstract

This note discusses key issues regarding communication of macroprudential frameworks and draws on a recent survey of emerging market economy central banks to highlight factors that are of particular relevance to emerging market economies.

Keywords: Macroprudential frameworks, communication, emerging market economies

JEL classification: D83, E58, G28

¹ This note has been prepared by Nikhil Patel. Matthias Lörch and Diego Urbina provided excellent research assistance. The paper draws on a recent survey of EME central banks that was conducted specifically for this meeting.

Introduction

Effective communication is a critical element of any policy framework. This is particularly true of macroprudential frameworks, given their short history and the complex linkage between actions and goals. Communication serves a variety of purposes. First, it can help the public understand the objectives, strategy and policy process. This allows the public to put any warnings and measures into context. Second, communication helps the authorities share their risk assessment with both the affected parties and the broader public, which should enhance the effectiveness of policy instruments. In the extreme, communication may even be viewed as a separate tool, used to influence market participants' behaviour or to pre-commit to future actions.² Third, communication is essential for accountability and reputation.

For communication to achieve the desired effects, the message needs to be delivered effectively to the right audience. The content, sophistication and channels used are in large part determined by the primary target audience.

Drawing on our survey responses as well as the broader literature, this note discusses the key issues involved in communicating macroprudential policy and how central banks deal with them. Section 1 outlines the main issues and Section 2 the different communication channels. It gives particular emphasis to financial stability reports (FSR), which most central banks identify as the main communication channel. A box presents evidence showing that the language used in the FSRs of emerging market economies (EMEs) is often very complex, suggesting that simpler language might improve communication.

1. Main issues

Communication is a particularly challenging element of macroprudential frameworks, probably more so than in other policy areas such as monetary policy. This is related to the broad scope of frameworks, the long and diverse list of potential instruments, and difficulties in defining the relevant objectives,³ let alone observing how specific actions contribute to attaining them. Contrast this with monetary policy today, where the link between objectives, actions and their likely outcome is relatively well understood, or at least agreed upon. Numerical benchmarks such as inflation targets also provide a natural scorecard for assessing the performance of monetary policy. On the other hand, difficulties in quantifying financial stability make the assessment of macroprudential policy much harder.

The diverse timing of costs and benefits of macroprudential action makes communication both more challenging and more important. While the benefits of macroprudential action cannot be seen in real time and may be apparent only in retrospect, and even then with uncertainty, the costs are often immediate and visible. For example, regulation restricting bank leverage is likely to have an immediate

² See CGFS (2016) for an overview of the literature on expectations formation and learning in the context of macroprudential policies.

³ Policy objectives are discussed in the note on Macroprudential frameworks: objectives, decisions and policy interactions.

impact on profits, whereas the impact on financial stability, say, in terms of reducing the probability or depth of an economic downturn, cannot be clearly identified over a short horizon. This makes communication of the reasons and analysis behind a decision even more important.⁴

Content and timing are the most critical aspects of communication. Risk warnings may be most beneficial in the early phase of a financial cycle, but the absence of tangible risks means that it is precisely at that point that they are most likely to be ignored, questioned or criticised (see note by Malaysia).

The danger of waiting too long is that communicating vulnerabilities at a later stage in the cycle, just before financial distress sets in, can in fact be counterproductive (see note by Brazil). In the presence of vulnerabilities in the financial system, crises can often be precipitated by coordination failure among market participants. Authorities therefore need to be careful of not instigating self-fulfilling prophecies that do more harm than good. For example, a warning from the regulatory agency expressing concern about the fragility of bank funding models can lead to a bank run, causing the risk to actually materialise. Communicating at a relatively early stage, before banks get too reliant on fragile funding, may give them time to shift to more stable funding sources.

The example also illustrates that complete transparency may not be in the public interest, especially in later phases of the financial cycle. There may also be situations in which truthful and detailed communication to the public about vulnerabilities (pertaining to systemically important financial institutions, for instance) may not be feasible for legal reasons. Conversely, as pointed out by the note from the People's Bank of China, communication may also be hampered if the regulator has an informational disadvantage vis-à-vis the market.

The complexity of communication is another dimension that raises trade-offs. While on the one hand the increasing complexity of financial systems calls for more information to be communicated, clarity and brevity are crucial to ensure that the message is effective. In our survey, the Reserve Bank of India (RBI) provides an interesting option to address this trade-off. For regulations that have a wide ambit and are relevant to the general public, they design short press releases explaining the regulation in a simplified manner that is accessible to an audience with limited financial literacy, while the rationale behind the policies is explained more elaborately and technically through supplementary publications for more sophisticated audiences. Similarly, for measures relating to the mortgage market, the Hong Kong Monetary Authority (HKMA) reports organising special media briefings to reach out to individuals who are less informed about financial markets.

More generally, the media are an important conduit for reaching a broader audience. Establishing links with the media is an important part of the communication strategy of many central banks. For example, the Reserve Bank of India (RBI) reports conducting media workshops to explain the background and rationale behind different regulatory decisions. Similarly, the Bangko Sentral ng Pilipinas (BSP) has launched a programme to promote economic and financial learning among the media and the public. Moreover, the BSP also maintains a media management unit,

⁴ One way to deal with the lack of an observable final objective is to set and communicate intermediate objectives (CGFS (2016)). These could include measures of credit growth, lending standards, currency volatility and asset prices (see Arslan (2017) for a discussion of different measures used by central banks that participated in our survey).

explicitly dedicated to handling challenges arising from communication through different facets of the media, including social media.

In addition to content and timing, agencies also have to decide on the frequency of communication. On the one hand, while a higher frequency may ensure that the public is kept well informed, it may also lead to communication fatigue if the same message is repeated too often, giving rise to an escalating spiral of ever stronger risk warnings with limited effectiveness. On the other hand, reducing the frequency of communication too much could allow risks to build up until it is too late. Our survey responses indicate that most central banks follow a regular cycle (annual or semiannual) for publishing financial stability reports and other publications, and augment these with press releases, speeches and interviews on a discretionary basis when information needs to be disseminated more promptly.

Communication becomes even more complex when different agencies are tasked with assessing and implementing macroprudential measures. To the extent that these agencies work and communicate to the public independently from one another, the audience ostensibly benefits from perspectives based on more than one assessment. However, contrasting messages from multiple agencies may be self-defeating, as they make it more difficult to distil the information. Moreover, some agencies may adjust their communication to try to influence the actions of other agencies, for example by overemphasising risks in order to elicit a response from those agencies. This could compromise the clarity and transparency of communication, thereby hurting the reputation and credibility of the authorities concerned.

2. Financial stability reports (FSRs)

Responses to our survey suggest that financial stability reports (FSRs) have become the primary and most efficient means of communication of financial stability risks. All but one of the central banks publish FSRs. And the exception plans to start publishing one soon.

2.1 Evolution and effectiveness

FSRs have a relatively long history and have become very common. The first central banks to start publication were the Bank of England, Sweden's Riksbank, and the Central Bank of Norway, all in 1996–97 (Čihák (2006)). Less than a decade later, the number of central banks producing FSRs had increased to 40 (Oosterloo et al (2007)), and it has grown substantially since then.

The aims and motivations behind the publication of FSRs are bound to vary across countries and over time. As an example, while the Bank of England introduced its FSR primarily as a forum for the discussion and debate of issues related to risks in the financial system,⁵ the focus changed, following a major revision in 2006, in favour of explicitly identifying downside risks to the financial system and communicating

⁵ In their first FSR published in 1996, the Bank of England stated three explicit aims: (i) to promote the latest thinking on risk, regulation and financial markets; (ii) to facilitate discussion of issues that might affect risks to the UK financial system; and (iii) to provide a forum for debate among practitioners, policymakers and academics.

them effectively to flag vulnerabilities and forestall any disruptions. Our survey responses indicate that most EME central banks also consider communicating assessments of risks to the financial system as the primary purpose of FSRs.

In line with the spread of FSRs, evidence documenting their impact on both financial variables and the real economy has grown. In their analysis of 1,000 releases of FSRs and speeches by 37 central banks over the past 14 years, Born et al (2014) find that FSRs have a significant effect on the stock market (in the expected direction) and dampen market volatility. Based on this type of metric, Wilkinson et al (2010), who study the United Kingdom, Sweden, Netherlands and Spain, also find FSRs to be the most effective means of communication, although they find that speeches and interviews were also highly effective during the financial crisis between 2007 and 2010. Alegría et al (2016) show that the FSRs introduced in Chile in 2010 significantly affected bank lending terms. In particular, warnings about vulnerabilities in the real estate market were followed by a shift towards lower-LTV loans. However, given the limited timespan, the jury is still out on whether FSRs are able to reduce systemic risk in a broader sense – for instance, by reducing the frequency of deep downturns and crises.

2.2 Content and complexity of financial stability reports

FSRs, as in the case of any central bank publication, must strike a balance between accessibility and sophistication. In practice, they appear to have become both more complex and rigorous. For example, Čihák (2006) reports substantial improvements in the underlying analytical tools, including surveys, stress tests, and other model-based risk analysis frameworks. In our survey, the People's Bank of China, which started publishing FSRs in 2005, pointed out the increased role of quantitative methods, including stress tests. While analytical rigour has its benefits, there might be a risk that communication may be becoming too complex to be effective (see eg Oosterloo et al (2007)).⁶

The complexity of the language used may also affect the efficiency of communication (Domanski and Ng (2011)). A textual analysis on the complexity of language used suggests simplifying the use of language may improve effectiveness (Box A). The gains may be particularly high where financial literacy and sophistication are lower.

⁶ They report that FSRs have become increasingly sophisticated and analytically rigorous, but that this does not seem to have increased the banking system's health, as measured by Moody's weighted average bank financial strength index (source: IMF, *Global Financial Stability Report*) and the financial system soundness indicator of Das et al (2004).

Measuring the complexity of financial stability reports

Language complexity can have a significant bearing on the ease of reading and comprehensibility of a text. Based on two metrics designed for the English language, this box reports results of a textual analysis of FSRs from select central banks that participated in our survey.

For background, Table A provides an example of how two short paragraphs conveying broadly the same information can differ significantly in their ease-of-reading scores. It presents two widely used statistics, namely the Flesch-Kincaid grade level and the Flesch reading ease index. Both indices are based on the length of words and sentences. A higher Flesch-Kincaid grade level indicates a passage that is harder to read, while the opposite is true for the Flesch reading ease index (see Kincaid et al (1975) for details of the statistics).⁷

Ease of reading indicators: Illustrative example

Table A

	F-K grade level	Flesch reading ease level
Paragraph 1: What makes the financial system particularly vulnerable is not only risk that is exogenous to the system, but also risk that can materialize endogenously within the system. While central banks can have a direct impact on the latter through their policies, they can also affect the sensitivity of the economy to exogenous risk.	12.0	25
Paragraph 2: The vulnerability of the financial system depends on both exogenous as well as endogenous risk. Central banks can have a direct impact on the latter through their policies. In addition, they can also affect the sensitivity of the economy to the former.	10.9	41.5

Note: The reading ease index is defined as $RE = 206.835 - (1.015 \times ASL) - (84.6 \times ASW)$, where ASL = Average Sentence Length (ie the number of words divided by the number of sentences) and ASW = Average number of syllables per word (ie the number of syllables divided by the number of words). The F-K grade level is defined as $RE = (0.39 \times ASL) + 11.8 \times ASW - 15.59$

Table B presents an analysis of readability statistics for FSRs from selected central banks that participated in our survey, along with some comparators including the Bank of England's November 2016 FSR, the *BIS Annual Report*, an article on macroprudential regulation by the *Economist* magazine and a popular novel. The numbers reported in Table 2 seem to indicate that the FSRs in our survey by and large use more complicated language and are harder to read than the Bank of England FSR, the *BIS Annual Report* or the *Economist* article, which in turn are more difficult to read than a popular novel like Harry Potter.

⁷ The F-K grade level is defined as $RE = (0.39 \times ASL) + 11.8 \times ASW - 15.59$, where ASL = Average Sentence Length (ie the number of words divided by the number of sentences) and ASW = Average number of syllables per word (i.e., the number of syllables divided by the number of words). The reading ease index is defined as $RE = 206.835 - (1.015 \times ASL) - (84.6 \times ASW)$.

Ease of reading indicators for Financial Stability Reports

Table B

Country	F-K grade level	F reading ease level	Benchmarks	F-K grade level	F reading ease level
Argentina	18.01	32.35	BIS Annual Report	13.53	35.81
Brazil	19.06	20.55	Bank of England FSR	15.32	31.02
Chile	15.19	35.9	Harry Potter 1	6.25	73.79
China	16.44	23.53	Economist article	12.0	32.3
Czech Republic	16.69	30.9			
Hungary	18.11	40.4			
India	17.91	26.04			
Israel	15.52	35.59			
Korea	23.06	13.21			
Malaysia	21.24	8.78			
Mexico	20.15	32.23			
Poland	16.06	27.27			
Russia	17.55	25.54			
Singapore	19.2	25.91			
South Africa	17.72	23			
Thailand	19.26	34.98			
Mean	18.2	27.3			

Note: In each case, the latest financial stability report available in English as of mid-December 2016 is used. Appendices are omitted from the document before computing the indices. "Harry Potter 1" is the first book of the series by J K Rowling: *Harry Potter and the Philosopher's Stone* (1997). "Economist article" refers to an article published in an August 2014 edition of the *Economist* entitled "What macroprudential regulation is, and why it matters".

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Macroprudential frameworks: cross-border issues¹

Nikhil Patel

Abstract

Drawing on a recent survey of emerging market economy central banks, this note highlights the different channels through which the influence of macroprudential measures can extend beyond national borders, and discusses the need and scope for international cooperation of macroprudential measures.

Keywords: Cross border spillovers, policy coordination, emerging market economies

JEL classification: E58, G28

¹ This note has been prepared by Nikhil Patel and the box by Stefan Avdjiev.

Introduction

Given the globally interlinked financial system, the influence of macroprudential measures can extend beyond national borders. Spillovers can arise through many channels, ranging from global banks' regulatory arbitrage and national authorities' ring-fencing to global investors' choices in response to capital flow restrictions.

Based on our central bank survey, this note discusses some of the cross-border issues associated with macroprudential frameworks. Section 1 focuses on direct cross-border effects, including those stemming from regulatory arbitrage. Section 2 discusses the scope for international coordination and the role of international organisations in facilitating such coordination.

1. Cross-border effects and regulatory arbitrage

In principle, cross-border effects of macroprudential measures can be both positive and negative. The most natural positive effect concerns the public good aspect of financial stability, wherein actions enhancing financial stability in one country benefit also others. For instance, policies that prevent the build-up of systemic risk in one jurisdiction may reduce the probability of crises that subsequently spread elsewhere. But cross-border effects can also be negative, particularly if they induce regulatory arbitrage. In such a case, macroprudential measures in a particular country can end up shifting part of the risks to other jurisdictions. Such negative effects are particularly challenging when agencies do not have sufficient control over all institutions operating within their jurisdictions. For example, branches of foreign banks operating in a country that are not completely subject to national regulation may step in when domestic banks face tighter regulation, undoing some of the intended impact.²

Survey responses note instances of regulatory arbitrage (Table 3). For example, the Reserve Bank of South Africa notes that the introduction of countercyclical capital buffers (CCBs) by the Bank of England (BOE), Swiss National Bank (SNB) and others affected the South African economy through the amount of capital held by banks with parents or subsidiaries in these countries. Similarly, Cabezas and Jara (2016) show that Chilean banks responded to higher capital requirements abroad by increasing their domestic lending. Taking the example of residential real estate purchases, the Monetary Authority of Singapore (MAS) illustrates how Singapore was recently involved in cross-border spillovers both as a receiver in 2009–2011, when foreign demand from countries implementing tighter macroprudential policies contributed to an increase in property prices, and subsequently as a propagator, when overseas property purchases by Singapore residents increased as MAS stepped up its measures to cool property prices. Furthermore, by documenting a positive correlation between the use of macroprudential instruments across countries and international debt issuance by nonfinancial firms, Arslan (2017) shows that regulatory arbitrage is not

² This is an issue even within one country, when tighter restrictions on banks may result in risks shifting to less regulated non-banks (Arslan (2017)).

limited to banks or financial institutions. Non-banks may also borrow abroad, bypassing local banks.³

Looking beyond our survey responses, the literature is replete with evidence of sizeable cross-border spillovers, both from prudential and capital flow management measures.⁴ Box A summarises recent research on the spillover effects of prudential policies, focusing in particular on work done in the context of the International Banking Research Network (IBRN).

Although the existing literature seems to point to significant negative spillovers, there are at least two caveats. First, identifying positive spillovers is econometrically more challenging, not least because financial stability is hard to measure. Second, publication bias is likely to overstate the prominence of spillovers. Indeed, the majority of central banks in our survey reported that cross-border spillovers are not a significant issue (Table 3). Furthermore, as pointed out by the note by the MAS, alternatives to macroprudential measures may involve even bigger spillovers.

Summary of responses to the question: “Have you been affected by macroprudential measures taken by other economies?”

Table 3

Yes (7)	No (11)	Maybe/inconclusive (4)
South Africa, Malaysia, Brazil, China, Chile, Mexico, Singapore	Saudi Arabia, Poland, Hong Kong, Thailand, Peru, Hungary, Russia, Israel, Korea, Czech republic, Turkey	Philippines, Colombia, India, Indonesia

³ The central bank of Peru however emphasises that the share of firms in Peru that have access to international markets is small, and hence regulatory arbitrage of this form is not feasible for them.

⁴ Exchange rate misalignments triggered by macroprudential measures can also give rise to spillovers. Such measures can – intentionally or unintentionally – steer the exchange rate away from equilibrium, thereby delaying the process of external adjustment and making the eventual adjustment more painful. This is particularly a concern when the currency area, GDP area and the decision-making unit do not coincide (a violation of the “triple coincidence” according to Avdjiev et al (2016)), since in these cases exchange rates can be affected even if the country is not directly involved in any external imbalance from a national perspective.

Recent research on international prudential policy spillovers

Based survey data on cross-country differences in banking regulations and on bank flows from 26 source countries to 120 recipient countries, Houston et al (2012) show how banks are quick to transfer funds to markets with fewer regulations. Aiyar et al (2014), who quantify the aggregate impact of capital regulation, estimate that just under a third of the reduction in credit growth that could be achieved from increases in capital requirements on regulated banks is “undone” by an increase in lending by foreign branches that are not subject to the same requirements.⁵

Increased recourse to prudential and, in particular, macroprudential policy measures in the wake of the financial crisis has fuelled a debate about the transmission mechanisms and cross-border spillovers. A recent BIS paper (Avdjiev et al, 2016) provides a global perspective on the international transmission of prudential measures in the context of a research initiative of the International Banking Research Network (IBRN).⁶ The paper combines the BIS international banking statistics (IBS) with the IBRN prudential instruments database to analyse the effect of various prudential measures on international lending. The focus on home (lending) – destination (borrowing) country pairs allows the authors to simultaneously estimate both the international transmission and the local effects of such measures.

The results suggest that both loan-to-value limits and local currency reserve requirements on banks significantly affect international bank lending, with better capitalised banking systems and those with more liquid assets and less core deposits reacting more. In particular, a tightening of LTV limits in a borrowing country leads to a statistically significant increase in international bank lending to the residents of that country (Table A, column 1). By contrast, tighter LTV requirements in the country where banks are headquartered does not affect international lending. But not all banking systems react in the same way. Systems with better capitalised, more liquid and smaller (in terms of the balance sheet size) banks react more strongly.

A tightening of local currency reserve requirements is associated with increases in international bank lending, regardless of whether it is implemented by the country of the borrower or the home country of the lending bank (column 2). The international transmission of changes in home country local currency reserve requirements is affected by bank business models: banking systems that are better capitalised or less reliant on core deposits tend to respond with a greater expansion in their international claims.

The BIS study complements a number of country-specific studies using bank-level data. A meta-analysis of the country-specific findings (Buch and Goldberg (2016)) highlights three main findings. First, prudential instruments often produce cross-border spillovers through bank lending. Second, such spillovers vary across prudential instruments and banks. Bank-specific factors like balance sheet conditions (including capitalisation and liquid asset shares) and business models drive the amplitude and direction of spillovers on lending. In particular, balance sheet factors matter most consistently for cross-border effects, even though they cannot always explain cross-sectional differences in domestic lending by banks. Third, international spillovers of prudential measures to loan growth have not been large on average. Nevertheless, the studies may be understating the impact by considering a sample period in which relatively few countries implemented country-specific measures.

⁵ A recent study by Forbes et al (2015) analysing the cross-border impact of changes in Brazil’s tax on capital inflows between 2006 and 2013 shows that fund managers were quick to react by shifting funds away from both Brazilian bonds and equities, and into countries viewed less likely to alter their regulations.

⁶ The IBRN brings together researchers from central banks and international organisations to analyse issues pertaining to global banks. The first initiative was launched in 2013 and the results published in the *IMF Economic Review*. Contributions from national central banks explored how funding shocks to parent banks were transmitted to foreign countries through cross-border banking, while an umbrella paper performed a meta-analysis. This second initiative seeks to understand how lending, risk-taking and funding respond to prudential measures implemented in home and foreign markets. It will be published in the *International Journal of Central Banking* in 2017.

Impact of regulatory changes on international claims		Table A
	Loan-to-value limits	local reserve requirements
DestP	4.39***	1.13*
HomeP	-0.45	3.10**
Log Total Assets*HomeP	-15.56***	-0.91
Capital Ratio*HomeP	7.20***	3.56***
Illiquid Assets Ratio*HomeP	-0.67***	0.00
International Activity*HomeP	0.07	-0.03
Net Intragroup Liabilities*HomeP	-1.06	1.45
Core Deposits Ratio*HomeP	-0.37*	-0.52**

2. Scope for international cooperation of macroprudential measures

While the literature correctly cautions that not all forms of cross-border spillovers call for policy intervention,⁷ macroprudential measures provide a clear example of a case in which they often do. The global financial system is characterised by deep cross-border linkages dominated by a handful of global entities whose operations span multiple jurisdictions. Since their operations usually do not fall under the oversight of one national regulator, this is one instance in which the need and scope for coordination arises naturally, as evidenced by the process put in place to identify Globally Systematically Important Banks (G-SIBs) under the Basel committee on banking supervision (BCBS). On the other hand, some macroprudential risks and instruments may be more localised and provide limited rationale for coordination. For instance, as pointed out by the Monetary Authority of Singapore in their note submitted for this meeting, LTV limits on car loans to limit concerns over households taking on too much leverage to buy cars had the desired effect of limiting such borrowing in Singapore, but both the problem and the solution were domestic in scope and cross-border coordination in the form of similar measures taken by other jurisdictions would not have been appropriate.

In general, international negotiations involving sovereign entities face two prominent challenges. First, international negotiations are bound to be lengthy and repeatedly fall victim to political hurdles. Secondly, public goods such as financial stability tend to be underprovided, since the costs are borne privately but benefits

⁷ Formalising this notion in an open economy model, Korinek (2016) shows that international coordination will lead to better outcomes only if (i) national policy makers have market power (ie their actions affect international prices), (ii) they do not have a sufficient set of external policy instruments, or (iii) international financial markets are inefficient. These conditions are clearly not satisfied in the modern global financial architecture characterised by a few prominent financial centres and large entities that operate across multiple jurisdictions.

are shared with other countries.⁸ As pointed out by the Bank of Mexico, this problem is particularly pronounced in the case of co-ordination on macroprudential measures, because financial stability is a special kind of public good, for which the benefits are uncertain and are realised over a longer horizon but the costs are immediate and tangible.

Countries may choose to deal with these challenges in different ways. One alternative is to identify key partners with whom coordination will have high benefits and work with them *bilaterally*.⁹ A trend in this direction has been evident in international trade agreements, where the WTO and other large multilateral discussions are marred by political disagreements and delays.

The alternative is to rely on international organisations to broker agreements.¹⁰ If this works, it can secure the greater benefits that, in theory, multilateral initiatives can bring. As argued in the note by the Bank of Mexico, The approach is most beneficial if the benefits from cooperation, ie lower systemic risk, accrue more rapidly as the number of parties involved in the coordination process increases than the costs of coordination. This appears to be the case for macroprudential efforts, as suggested by the fact that multilateral initiatives in this area (eg the Basel Committee) seem to be more prevalent than bilateral ones. One reason might be that such coordination tends to be done by technocratic institutions such as central banks or regulators, which operate at an arm's length from the political process.¹¹

The feasibility of coordination to a large extent depends on the distribution of costs and benefits across countries. In some cases the handful of countries that host global banks and act as financial centers are those who obtain most of the benefits from coordination and bear most of the costs. In this case, one template for a multilateral coordination effort would be to start with these central jurisdictions, and progressively involve other members for which the benefits are relatively small and may outweigh the costs only if the existing group is of sufficient size. This in fact parallels the evolution of the Basel Committee which started with 10 members in 1974 and has since expanded its membership to include 45 institutions from 28 jurisdictions.

Designing cooperation arrangements is much more challenging when the costs and benefits are not aligned across countries. For example, EMEs subject to spillover effects from capital flows from financial centres stand to gain a lot if the latter decide to cooperate by internalising these spillover effects. Reciprocity may not be feasible in this case, as financial centers have little to gain and may even risk violating their mandates that are essentially domestically oriented.

The Basel agreement on reciprocity in the implementation of the Basel III countercyclical capital buffer (CCB) provides an important example of coordination

⁸ See Olson (1965) for a seminal contribution showing how coordination is harder to achieve as the size of the group increases.

⁹ Several recent studies provide guidance to identify the right partners to engage in coordinating macroprudential actions-see for instance Morrisson and White (2009) and Giordani et al (2014).

¹⁰ The note by the People's Bank of China endorses this view.

¹¹ The note of the National Bank of Poland however notes that arbitration by international bodies is not without problems. It does not eliminate all hurdles associated with negotiations. And a centralised approach may create frictions and constrain powers of national authorities, which may not be desirable, particularly from the perspective of a small country that may not be viewed as systemically important.

on macroprudential regulation. Designed to overcome the problems associated with global banks bypassing national regulation on capital requirements, this agreement stipulates that when the CCB is activated in any given country, all countries are meant to apply the same buffer to exposures to that country.

This, however, is the only example of multilateral reciprocity for macroprudential tools. Moreover, even for the CCB the effectiveness of implementation remains untested given the relatively short history, and in the European Union, there is an explicit 2.5 per cent cap.

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Macroprudential policy framework, implementation and relationships with other policies

Central Bank of Argentina

Abstract

Sources of systemic financial risk change across countries and over time. Multiple features need to be considered when making macroprudential policy choices, such as the depth of the financial system, the institutional background, the existing governance framework, and the links between macroprudential, monetary and capital flow policies. Such policy choices should be flexible enough to suit such heterogeneity, especially in emerging market economies.

The case of Argentina, as presented in this note, provides an example of a policy framework in which specific circumstances have strongly influenced the cost/benefit analysis of policy, and the timing and sequence of reforms.

Against this backdrop, international standard setters play an important role in promoting a better understanding of macroprudential policy issues as well as of the type of analysis that should guide policy choices prior to standardising a specific macroprudential policy toolkit.

Keywords: macroprudential policy, systemic risks, policy interaction, financial deepening

JEL classification: E44, E58, F42, G28

Introduction

Argentina provides an interesting example of a jurisdiction where the application of international standards and rules has been complemented by other policy elements. An all-encompassing approach that considers all systemic financial risks was adopted against a backdrop of structural reform and renewed growth. Moreover, the effective implementation of institutional changes has taken into account their potential impact on the reputation of the Central Bank of Argentina (BCRA).

While traditional measures of systemic risk rank the domestic banking sector favourably, financial institutions are not free from vulnerabilities. At present, one of the most significant sources of risk to banks' financial health is the possibility that the current context of disinflation (a result of the BCRA's monetary policy) has an impact on their levels of profitability and solvency. In this framework, financial institutions face a major challenge in terms of adapting their business models and achieving a greater scale. The BCRA is implementing measures aimed at promoting the proper functioning of the financial system under the new macroeconomic scenario.

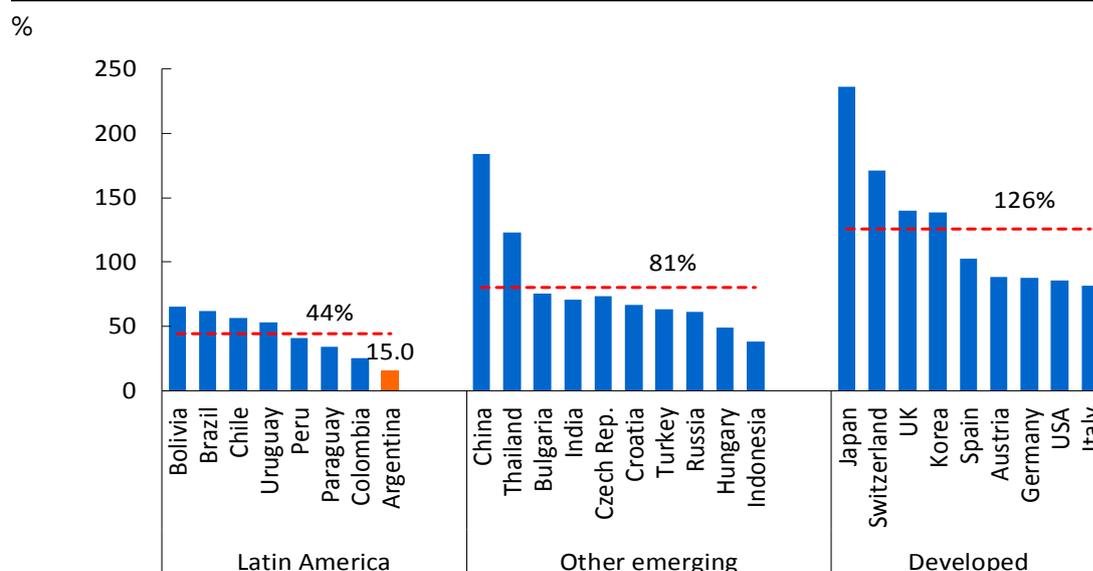
Risk assessment of the local financial system

The traditional analytical framework pertaining to systemic risk raises little concern when applied to Argentina's financial system. To begin with, the financial system is small compared with that of other economies. Total private sector deposits are only 15% of GDP, compared with 57% in Chile, 62% in Brazil, 140% in the United Kingdom and 236% in Japan (Graph 1).

Private sector deposits

As a percentage of GDP

Graph 1



Note: As of 2015 (except Argentina (as of September 2016)).

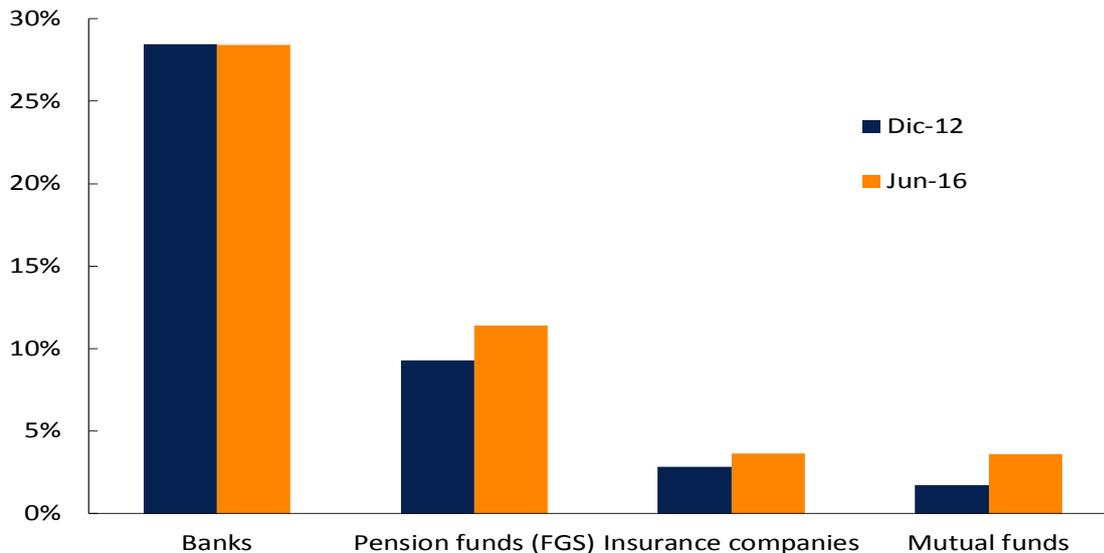
Source: IMF, International Financial Statistics (IFS); BCRA.

The financial system is also heavily bank-based. Deposit-taking institutions' assets account for 28% of GDP, followed by those of pension funds, at 11%, and those of insurance companies and mutual funds, at less than 5%. These major financial intermediaries comprise jointly about 50% of GDP (Graph 2).

Argentine financial system – asset ownership structure

Assets as a percentage of GDP – 2016

Graph 2



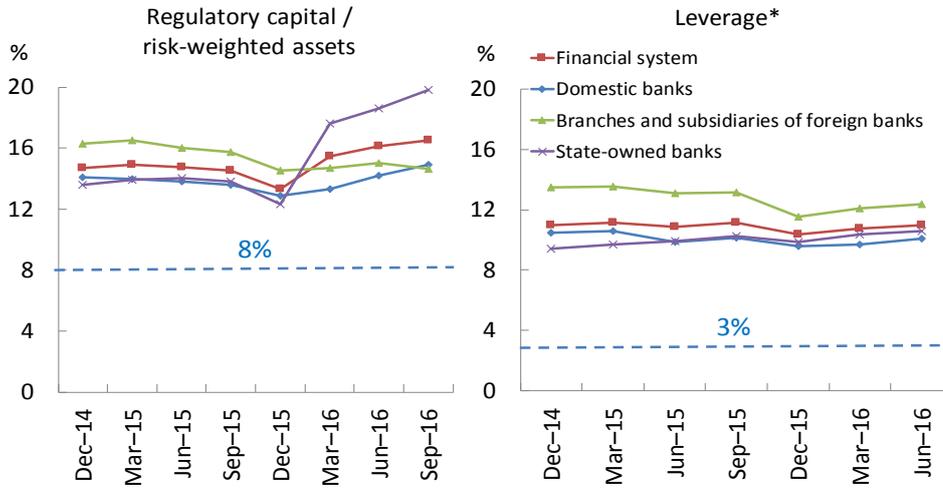
Source: BCRA based on ANSES-FGS, SSN and CAFCI.

Banks and other regulated financial institutions concentrate their business on non-complex products (such as deposits and plain loans) and transactional operations. Deposits represent around 74% of assets, while wholesale funding and foreign credit lines are of little significance. Around 50% of deposits are sight deposits derived from households' transactional needs and corporations' operational needs. As a result, while their residual maturity is extremely short, their effective term is somewhat longer. In fact, they constitute one of the most stable sources of funding. To illustrate the point, the residual maturity of 80% of banks' funding sources is less than one month and the residual maturity of assets is also quite low. Maturity transformation is virtually absent.

Liquidity and solvency indicators for the banking system are strong. In September 2016, regulatory capital amounted to 16.5% of risk-weighted assets (RWAs), considerably above international standards (Graph 4). Of that figure, 15.5% of RWAs corresponded to Core Tier 1 capital. The Basel III leverage ratio (Tier 1 capital relative to total exposures) stood at around 10.8% for the aggregate of banks, significantly above the 3% minimum recommended (initially) at the international level (Graph 3).

Solvency indicators by type of bank

Graph 3



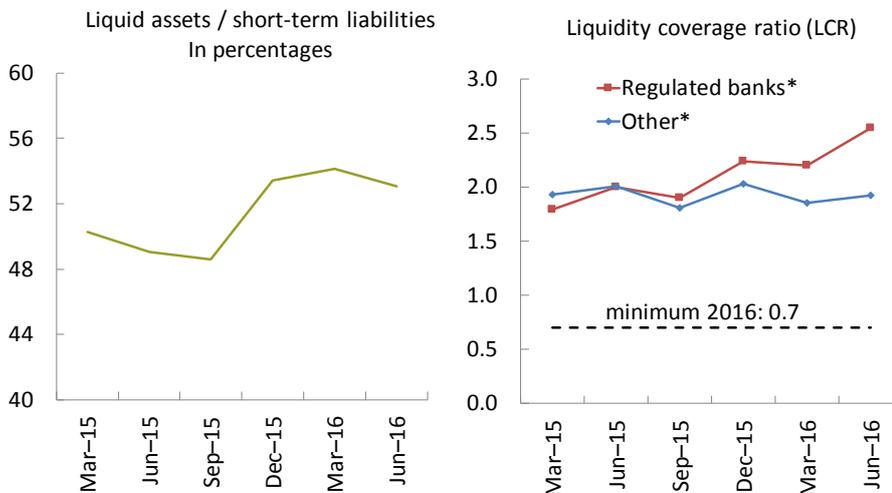
* As in Basel III, Tier 1 capital / (Total assets + off-balance sheet exposures).

Source: BCRA.

The stock of liquid assets is high and of good quality. It accounted for 47% of deposits in September 2016 and consisted of holdings of BCRA bonds (37%) and cash and cash equivalents in pesos (33%) – mainly deposits at the BCRA – cash and cash equivalents in foreign currency (25%) and reverse repos with the BCRA. The Basel III liquidity coverage ratio (LCR) averaged 250% for institutions required to comply (representing 88% of the banking system in terms of assets), well above the internationally agreed minimum of 70% for 2016 (Graph 4).

Liquidity risk coverage

Graph 4



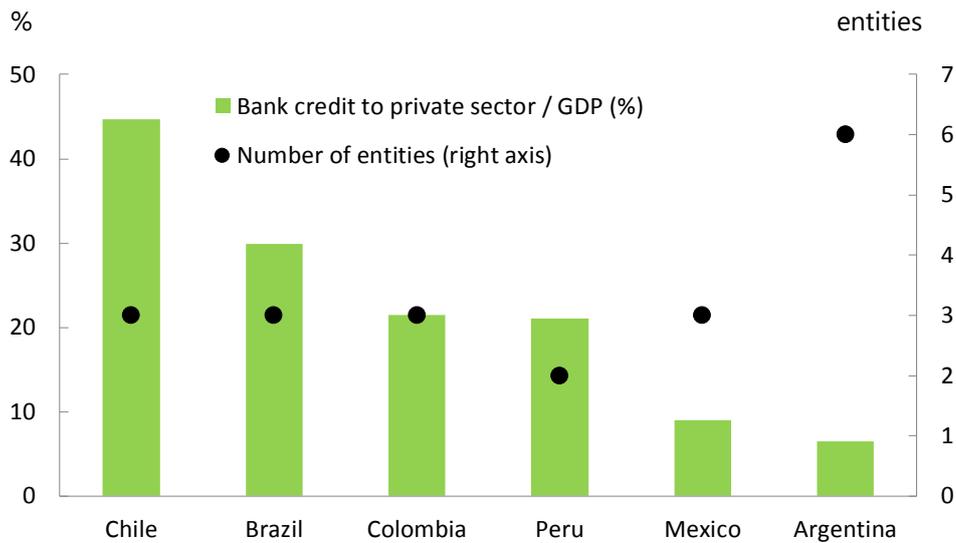
* Regulated institutions represented 88% of assets as of June 2016.

Source: BCRA.

The degree of concentration in the local banking sector is low. Half of the volume of aggregate credit to the private sector is provided by the six largest banks (accounting for only 7% of GDP). By contrast, in other Latin American economies a smaller number of large banks account for the same volume of aggregate credit. Moreover, this volume is much more relevant in terms of GDP (Graph 5).

Number and relative importance of the largest financial institutions - those explaining half of bank credit to private sector

Graph 5

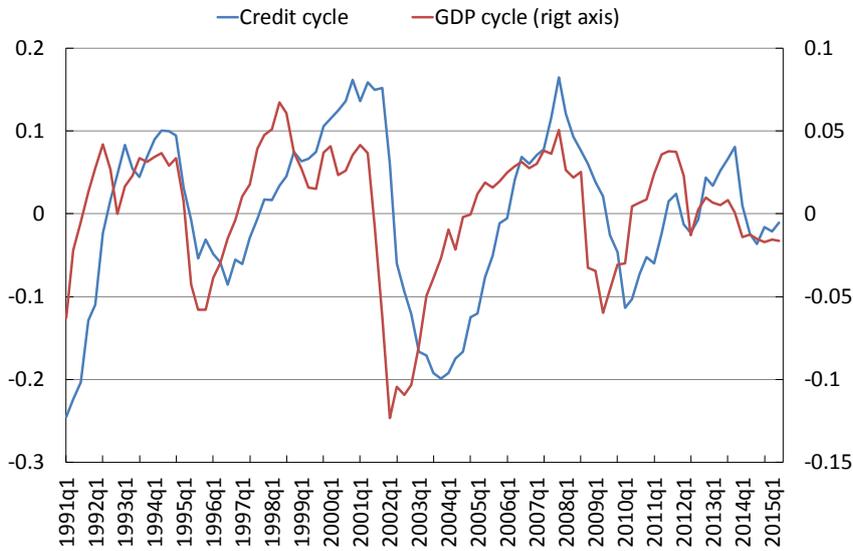


Note: As of 2016, except Peru (2015).

Source: Central Banks and Superintendencies of Financial Institutions.

Cross-border activities remain very limited. Claims on foreign counterparties represent less than 2% of total assets and consist mainly of cash equivalents in correspondent accounts or in foreign branches of local banks. Banks' liabilities to non-residents represent less than 3% of total liabilities and are related mainly with foreign banks' financing and the issuance of bonds in international capital markets.

Turning to cyclicity, by contrast to what is observed in the most advanced economies, the domestic business cycle seems to be synchronised with the financial cycle. Moreover, variations in economic activity seem to lead to variations in credit levels (rather than the other way around), weakening the argument that excessive credit growth is a driver of financial booms and busts (Graph 6).



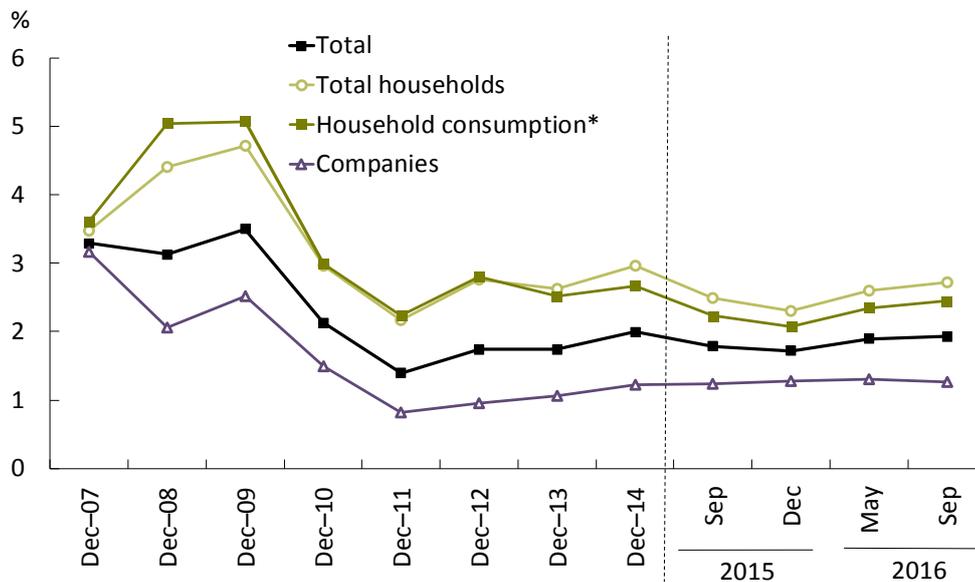
Note: The graph shows cycles in private sector credit and GDP. The cycle is defined as the difference between the corresponding series (in real terms transformed into logarithms) and its trend. The latter is calculated from the Hodrick and Prescott filter.

Source: National Institute of Statistics and Census of Argentina (INDEC), BCRA.

Risks related to loan defaults appear limited. The ratio of non-performing credit to total credit is below 2%, which is very low, both historically and internationally (Graph 7). This level has remained low in spite of the country's ongoing recession from mid-2015 and weak labour markets.

Non-performing credit in the private sector

As a percentage of total credit

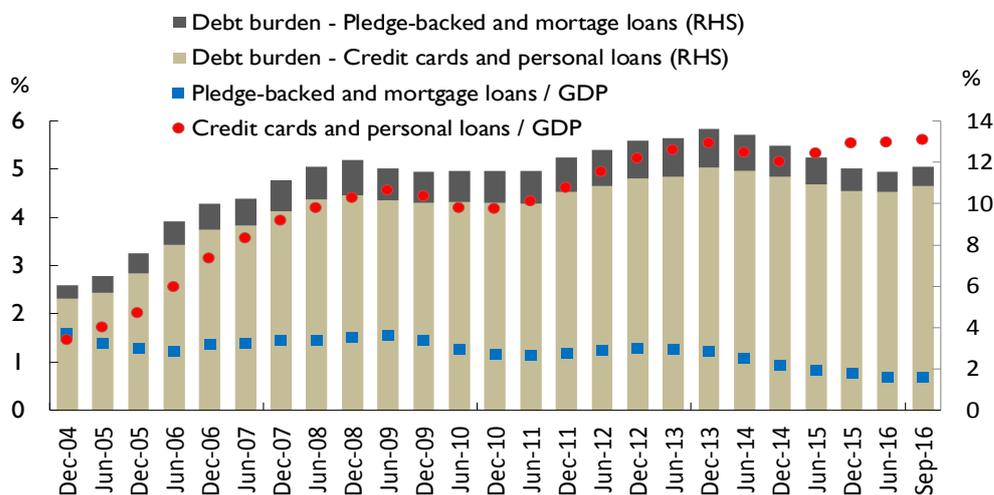


Source: BCRA.

Both the debt service burden of households and corporates in terms of GDP remain contained and low by international standards (Graph 8 and Graph 9).

Debt and debt financial burden of households*

Graph 8



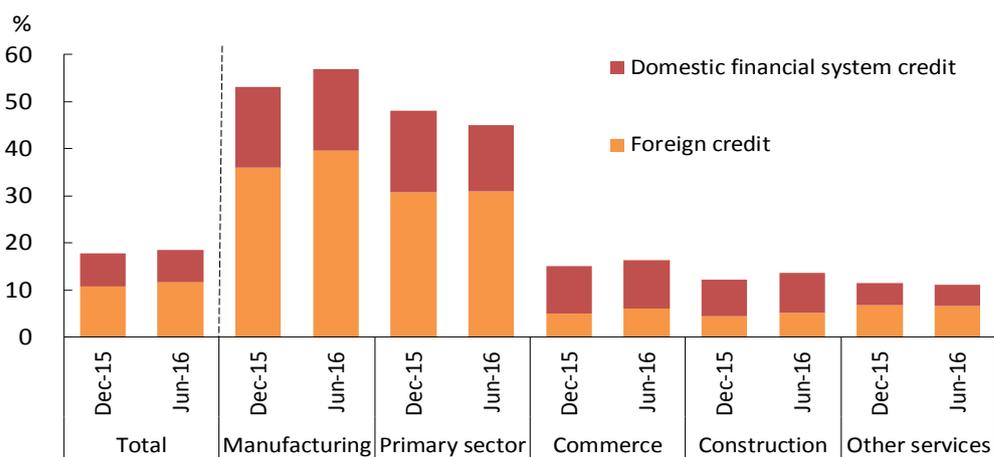
* Loan payments from regulated financial institutions, securitisations and credit cards/income.

Source: BCRA, INDEC.

Corporate sector debt

As a percentage of GDP (four-quarter moving average)

Graph 9



Source: BCRA, INDEC.

In order to have a more adequate assessment of the sources of vulnerabilities in the local financial system, the previous approach –based on indicators related to exposures and risk hedging– needs to be complemented by a slightly more forward-looking analysis. In particular, in the current context of disinflation, banks have begun to experience downward pressure on profitability, as exceptional profits stemming from the high inflation environment have begun to dissipate. Indeed, the progressive success in tackling inflation has revealed structural weaknesses in profitability and operating efficiencies. The aggregate financial margin –though increasing from 11.8% of assets in 2015 to 12.1% in Q1 2016 – has since declined. It stood at 12.0%, 11.2% and 10.6% in the second, third and fourth quarters of 2016, respectively (annualised figures; estimate for the fourth). High financial margins have been the result of high nominal rates charged on loans (in the context of annual inflation rates between 20% and 40% in the last few years), whereas these loans have been largely funded with sight deposits (funds with relatively very low financial cost). Moreover, the high inflation environment has affected not only interest margins but also other sources of income (Table 1 shows an international comparison and Graph 10 highlights a profitability breakdown for the last 10 years).

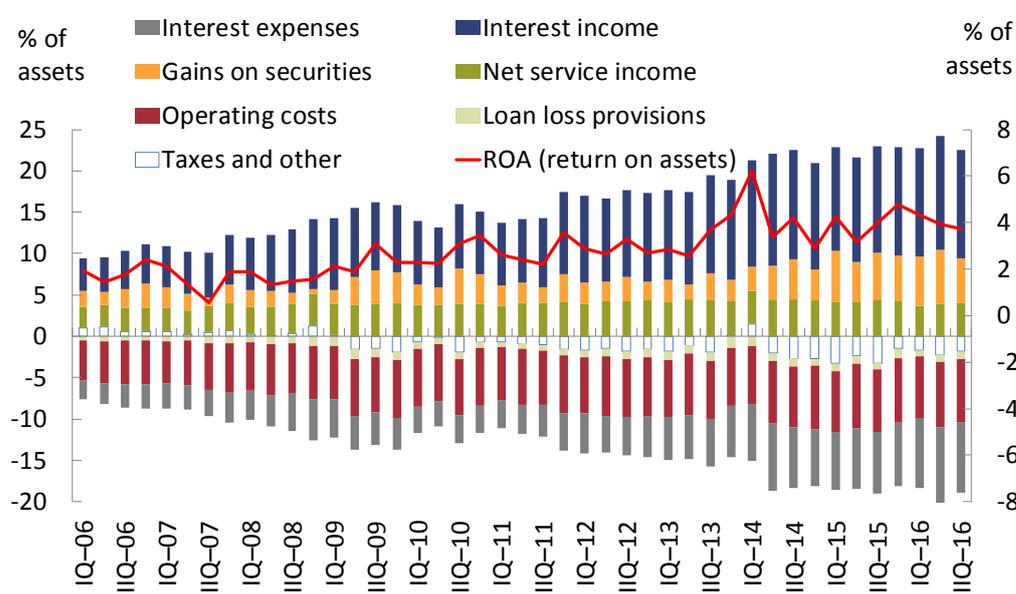
Indicators of profit and loss							Table 1
2015	ROA	Net interest income	Loan provisions	Net services income	Operating costs	Taxes and other	
% of Assets							
Latam ⁽¹⁾	1.4%	4.7%	-1.3%	0.8%	-2.7%	-0.1%	
USA	1.0%	2.7%	-0.2%	0.1%	-1.5%	0.0%	
Euro zone	0.2%	2.1%	-1.1%	0.5%	-1.0%	-0.2%	
Argentina	4.1%	11.8%	-0.9%	4.2%	-7.7%	-3.3%	

Note: As of 2015.

Source: Central Banks and Superintendencies of Financial Institutions.

⁽¹⁾ Equally weighted average of Chile, Colombia, Mexico, Peru and Uruguay.

While lowering inflation is an overarching macroeconomic goal, the impact that this is having on financial stability needs to be addressed. To that aim, the BCRA is promoting improvements in efficiency through the incorporation of technology, reduced bureaucracy, and improved transparency and competition. The projected expansion of financial intermediation is also expected to help counterbalance the reduction in financial margins by bringing about economies of scale. The BCRA's recent policies have supported financial deepening by generating a context of positive real interest rates, introducing new inflation-indexed instruments (deposits and loans) and implementing other financial development measures.



Source: BCRA.

From an overall perspective, local banks will have to adapt their business models to the significant economic and financial policy reorientation, that has been implemented by the new government since late 2015, and which aims at reversing macroeconomic imbalances, correcting microeconomic distortions and strengthening the institutional framework. Measures introduced include a removal of capital controls and restrictions on foreign currency, a unification and normalisation of the foreign exchange market, a lowering of barriers to trade, and a reduction of the significant uncertainty surrounding fiscal and monetary imbalances (an inflation targeting scheme has been introduced). Argentina has regained access to international financial markets as a result of the settlement of the dispute with the so-called “holdout” creditors (who had rejected renegotiations involving the country’s debt in 2005 and 2010). Important relative prices, such as energy prices, have been allowed to move progressively closer to their production costs. Other important planned policy measures are focusing on developing and deepening local capital markets (a capital market amendment bill is under review), including a peso yield curve and reducing local vulnerabilities to external shocks (peso-denominated financial instruments are progressively being introduced).

The complex array of controls –that have been recently lifted— had bedevilled the economy and led to a decade of stagnant factor productivity. This contributed to poor local economic performance, based upon evidence that differences in income per capita across countries can be attributed, to a large extent, to differences in total factor productivity. The financial sector has an important role to play in making improvements in this respect. First, it is crucial to have a dynamic and deeper financial system to channel domestic saving towards investment. Second, this allocation of funds should be efficient in order to improve total factor productivity.

As a result of the above reforms, going forward it will be difficult to distinguish between cyclical and structural credit growth, and of striking a prudent balance

between risk-taking and financial deepening. There are important welfare gains to be obtained from financial deepening –including those resulting from efficiency in investment allocation, risk-sharing and liquidity insurance– and other policies such as tackling disinflation, improving productivity, and sustaining growth and welfare.

In such a context, the following developments are expected to take place domestically:

- Household and corporate debt levels are highly likely to trend upward. Although bank lending will remain the predominant source of financing for a while, capital market activity should increase. So-called “shadow banking” may also expand. The BCRA and other relevant authorities should monitor such trends in financial intermediation, as they have implications for financial stability. They should also ensure that households, corporations and intermediaries remain financially strong.
- Products and operations are likely to become more complex. While hedging contracts should become more widely available, they could also generate new or higher risks that should be monitored.
- Cross-border and foreign currency financial intermediation should increase. Such operations are more sensitive to global liquidity conditions. Risk levels should therefore be monitored on an ongoing basis and policies should be evaluated to reduce this sensitivity.
- Finally, the BCRA’s growing credibility, acquired in the course of consistent monetary policy implementation, should strengthen prospects for financial stability. In this sense, the current administration has launched an inflation targeting regime that is bringing inflation down and building up the BCRA’s reputation and autonomy. Such institutional changes should pave the way towards a more mature macroprudential policy framework.

Additionally, all the macroprudential regulations established in Basel III have already been implemented locally, in some cases with no phase-in period. The BCRA has also had ample experience in using domestically-defined macroprudential tools.

Two examples highlight the local use of macroprudential policies. First, BCRA regulation mandates that banks’ resources in foreign currency can only be applied to the provision of loans in the same currency to individuals whose income is directly or indirectly linked to international trade. This regulation results from one of the lessons of the 2001–2002 crisis, when banks were hit hard by banks clients’ currency mismatches. Second, the BCRA has also ample experience in managing reserve requirements to ease or tighten liquidity following events of financial instability.

Macroprudential regulations already in place include conservation, domestic systemically important banks (D-SIBs) and countercyclical capital buffers; the LCR for large institutions; capital requirements for financial institutions that act as a compensating member of a qualifying central clearing counterparty (QCCP); limits on credit concentration; and loan-to-value limits on residential mortgages as a requirement for the beneficial treatment of RWAs.

Conclusion

The multifaceted nature of systemic risks and specific circumstances call for a flexible approach, especially in emerging market economies, as Argentina's case shows. While such flexibility is desirable, it could open the door to inaction. Often, corrective actions end up being abandoned because they are costly or do not have popular support.

A strong governance framework can counteract the bias towards inaction. Mechanisms to increase the interaction among macroprudential, microprudential and monetary policy authorities should be developed. In addition, when such authorities are under the same institution, such as in the BCRA's case, it is crucial to manage potentially competing goals through a responsible designation of authority and mechanisms that make such conflicts transparent.

To conclude, although monetary and supervisory authorities have learned much about macroprudential policies, questions remain. To refine our knowledge about the most effective use of these tools and the most beneficial organisational set up, more policy research and discussion is required. In the meantime, international guidelines should remain flexible and focus on the kind of analysis and framework that is needed, rather than on prescribing a fixed set of tools.

Macroprudential policy in Brazil

Maurício Costa de Moura¹ and Fernanda Martins Bandeira²

Abstract

This note discusses recent developments relating to Brazil's financial stability policy framework, including efforts to enhance its ability to anticipate vulnerabilities and prevent financial distress. The main sections are as follows: (i) institutional arrangements; (ii) the experience with macroprudential instruments; and (iii) ongoing initiatives to enhance the framework.

Keywords: financial stability, macroprudential policy, institutional framework, communication

JEL classification: E58, G18, G28

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Institutional arrangements

Over the past decades, the world has experienced a number of financial crises that highlighted the complexity and, at times, the fragility of the financial system. In response, Brazil has developed a comprehensive policy framework that combines financial stability policies and tools aimed at mitigating vulnerabilities and maintaining the soundness of the financial system. The framework includes microprudential supervision, macroprudential policy, crisis management, and resolution mechanisms.

The Central Bank of Brazil (BCB) and the National Monetary Council (CMN) play a prominent role in shaping macroprudential policies, given the bank-centric structure of the Brazilian financial system. The CMN is in charge of formulating monetary and credit policies, including regulations that are relevant to financial stability, while the BCB has executive power over the implementation of policies.

Other regulators involved in the formulation of proposals to the CMN are the Ministry of Finance (MoF), the Securities and Exchange Commission of Brazil (CVM), the Superintendence of Private Insurance (SUSEP) and the National Superintendence of Complementary Pension (PREVIC).

The Governor of the BCB is a member of the CMN and also Chairman of the Technical Commission for Money and Credit (COMOC), an interagency forum that debates policy proposals before tabling them to the CMN. Four Deputy Governors from the BCB also maintain a presence in COMOC.³

The BCB heavily influences the design and structure of macroprudential policy. Most policy instruments are designed by the BCB, which as Secretariat to the CMN, can set the Council's agenda. The BCB and CMN are jointly responsible for the management of macroprudential instruments including, among others: countercyclical capital buffers; sectoral and countercyclical capital requirements; margins and haircuts; loan-to-value (LTV) ratios; debt-to-income ratios; limits on currency mismatches; limits on short spot FX positions; and reserve requirement ratios.

Although the legal framework does not assign explicit responsibilities for financial stability to any specific agency, the BCB – acting on a de facto mandate – fulfills a supervisory role in overseeing and safeguarding, when necessary, the financial system.⁴ Thus, it has developed robust mechanisms to monitor systemic risk and design macroprudential measures used to date (see section ii).

In 2011, the central bank set up a new Financial Stability Committee (COMEF) within the BCB to define strategies and guidelines to maintain financial stability, mitigate systemic risk, and serve as a focal point for discussions related to macroprudential policies. The BCB's Board of Governors convenes at COMEF

³ The President of the CVM; the Executive Secretary of the Ministry of Planning, Budget and Management; the Executive Secretary; the Treasury Secretary; and the Economic Policy Secretary of the MoF are also part of COMOC's composition.

⁴ Since the legal framework does not assign explicit responsibility for financial stability to any institution, policy coordination is essential. In this sense, BCB, CVM, SUSEP and PREVIC are members of the Committee for the Regulation and Supervision of Financial, Securities, Insurance, and Complementary Pension (COREMEC) within the Ministry of Finance, with an advisory role and aims at promoting coordination among the four regulators.

meetings, held quarterly, to discuss the outlook for systemic risk and financial stability and to establish a timetable for the future course of action. During these meetings, a number of micro- and macroprudential issues are taken into account, including: overall domestic economic conditions; the international financial and economic outlook; the soundness of the Brazilian financial system from individual and aggregate standpoints; new research and surveys relating to credit conditions; regulatory issues that might impact financial stability; and other relevant, timely topics. This combination of inputs allows for a system-wide view of emerging vulnerabilities and, as required, the adoption of well-considered prudential measures.

COMEF's Secretariat is responsible for preparing the committee's agenda. Prior to each COMEF meeting, strategic and technical staff from teams with micro- and macroprudential responsibilities debate extensively to ensure a consistent and holistic diagnosis of the Brazilian financial system.

These preparatory meetings are intended to summarise the current and prospective state of financial stability, and establish policy recommendations and themes to be discussed during COMEF meetings. Micro- and macroprudential policies benefit greatly from the high degree of granularity and quality of data sets made available to the BCB, particularly with respect to identifying emerging vulnerabilities and formulating appropriate responses.

Coordination

In 2006, a new committee was created to facilitate coordination among national financial regulators. The Committee for the Regulation and Supervision of Financial, Securities, Insurance and Complementary Pension Markets (COREMEC) is composed of the BCB, CVM, SUSEP, and PREVIC, under a rotating presidency. It is a consultative committee, responsible for information-sharing and advising on multi-agency regulatory and supervisory actions.

In addition, the BCB has signed agreements with 15 Brazilian authorities, with the goals of exchanging information and coordinating actions. Several memoranda of understanding are in place for information-sharing between the BCB and other regulatory and supervisory agencies.

These arrangements improved coordination among national regulators' actions and have been important in shaping policy implementation. A comprehensive collection of data, strong analytical capabilities and the collaborative mechanisms in place enable the BCB to identify systemic risks that emerge in and outside its regulatory perimeter, and act accordingly.

However, as the system becomes more complex, and systemic risks more intricate and difficult to monitor, effective coordination and formal leadership become even more crucial elements of the institutional framework. Thus, a formal assignment of responsibilities for financial stability and macroprudential policy would reduce uncertainty, and enhance coordination and accountability.

Communication

At present, the BCB communicates COMEF's current and forward-looking assessment of risks to financial stability through its semi-annual *Financial Stability Report* (FSR) and at a press conference thereafter. The BCB Governor also attends quarterly

hearings of the Senate Committee on Economic Affairs and semi-annual sessions of the Joint Budget Committee. The BCB's Deputy Governors are frequently invited to speak about financial stability issues during congressional committee meetings. BCB Board members also make public speeches to address relevant issues.

In January 2017, COMEF took over the primary responsibility for setting the countercyclical capital buffer level, which is disclosed to the markets after every quarterly COMEF meeting. This move consolidates COMEF's position as the principal forum for financial stability oversight and macroprudential policy decisions. It also helps guarantee regular and consistent communication throughout the credit cycle, avoiding surprises and helping to better manage expectations. In this regard, communication is itself increasingly functioning as a macroprudential policy tool (see section iii).

Interaction with other policies

Brazil's existing institutional framework weaves together microprudential, macroprudential, fiscal, and monetary policies. Cases where potential conflicts arise as a result of interconnected policies (particularly between fiscal and monetary policies), are resolved within the CMN. However, some fiscal policy-related issues are resolved within a broader forum (that goes beyond the CMN mandate).

The BCB has adopted a separation principle whereby monetary policy targets price stability and prudential policies focus on financial stability. In addition to COMEF (which takes into account its interactions with other public policies, when necessary), the BCB has established the Monetary Policy Committee (COPOM). The two committees have separate mandates but the same composition. The BCB's Board of Governors convenes separately and periodically in COPOM meetings when the Board has to decide on the target for the basic interest rate. This arrangement allows for the smooth coordination of policy actions and issues. In addition, monetary policy is taken into consideration by COMEF when discussing financial stability issues, proposing action plans and calibrating macroprudential instruments.

Microprudential supervision, when implemented effectively, can help prevent the need for macroprudential policy actions. In this respect, high standards of risk management and adequate transparency within financial institutions are essential. Tensions may arise when the conduct of prudential supervision lacks a macroprudential perspective, given that the soundness of individual institutions does not necessarily guarantee the soundness of the system as a whole. A natural tension occurs along the cycle. For example, from a macroprudential point of view, countercyclical buffers may need to be activated during periods of strong credit growth and relaxed during periods of weaker growth, which is not necessarily consistent with microprudential supervision. Another example is the intertwining of prudential supervision and macroprudential policy during the resolution of financial institutions. Early resolution is less consequential in macroprudential terms but microprudential supervisors – even when strong – may have incentives to engage in forbearance.

These challenges can be mitigated by coordination among the authorities involved in prudential supervision, macroprudential policy, and crisis monitoring and resolution. An integrated governance framework that allows for information-sharing, strong dialogue, and joint analysis and decision-making among authorities can be useful.

As mentioned earlier, COPOM and COMEF have distinct objectives, and separate processes and deliverables. On the one hand, COPOM establishes the basic interest rate, communicates its decision and releases the minutes of its meetings. On the other hand, COMEF has a more medium- to long-term perspective due to the nature of prudential issues and the longer window of time involved in seeing the effects of prudential actions. Since the BCB's Governor and Deputy Governors are members of both committees, consensus formation is less complicated. The membership overlap between the committees provides an effective conflict avoidance mechanism⁵.

During COMEF meetings, the primary focus is on macroprudential themes. However, microprudential policies are occasionally addressed, including those related to vulnerabilities arising from the credit exposures or business models of specific institutions.

Micro- and macroprudential supervisors participate in the process of elaborating key messages pertaining to the domestic financial system. This process considers recent financial developments and prospective analyses about sector/system-wide developments in earnings, balance sheet trends, credit, liquidity and market risks, and threats that might stem from the real sector or the global economy. The combined scope of micro- and macroprudential developments allows for a system-wide view of nascent vulnerabilities. COMEF also receives presentations from BCB internal staff on potential vulnerabilities to financial stability, for example, from external shocks or from the real estate sector.

Macroprudential policy in practice

Banking supervision at the BCB is well regarded and, having adopted international standards, the BCB applies a full range of microprudential instruments to achieve its supervisory goals.

Brazil is also an early adopter of macroprudential instruments, having used them at the level of the BCB, the CMN and the MoF.

As noticeable in advanced and emerging economies alike (Claessens, 2014), the BCB actively uses prudential or monetary instruments with macroprudential purposes, either directly or through CMN policymaking. These instruments – aimed at addressing conjunctural risks and bolstering the resilience of the financial system – include the use of capital and reserve requirements, as well as maturity and position limits applied to the banking system under the BCB's supervision.

Selected macroprudential instruments used in Brazil

Auto loans

The BCB's handling of rapid growth in the auto loan market during 2009-2010 is one example of how proper monitoring can help detecting the buildup of vulnerabilities and prompt subsequent policy action (Afanasiyev et al 2015).

⁵ On the downside, overlapping membership may favour groupthink.

The steep expansion of car credit was accompanied by an increase in loan maturities and LTV, and a simultaneous reduction of interest rate spreads. This raised concerns about the soundness of those assets. Supervisory monitoring suggested that the risk of such an unbalanced expansion could lead to an increase in the delinquency rate and cause bank losses; thus the BCB opted to raise the regulatory capital requirement for auto loans with certain combinations of long maturities and high LTVs. After that, the ratio of total credit to targeted loans decreased sharply to sounder levels, while the ratio of total credit to untargeted auto loans increased moderately. On review, BCB analysis confirmed that the quality of the targeted assets was low. There was a significant expansion of the share of non-performing loans in the targeted loans contracted before the prudential measures came into force. Thus, the measure prevented further bank losses.

The BCB has adopted measures to prevent the build-up of vulnerabilities in other targeted areas as well. Increases in capital requirements on consumer credit and on minimum payment limits on credit cards were successful in changing the composition of consumer credit and in fostering a more prudent handling of credit card debts by households. The measures were extended to personal credit and payroll-deducted loan portfolios.

Reserve requirements

Immediately following the disruption resulting from the Great Financial Crisis (GFC), the BCB took action to ease liquidity conditions in the financial system.

The GFC's first impact was detected in the FX market. Carry trade transactions were interrupted and the Brazilian real depreciated swiftly despite the high interest rate differentials relative to the main funding currencies. The higher volatility of the exchange rate led many participants to face increased margin calls, worsening their liquidity positions. Some liquidity indicators showed that smaller banks specialising in export financing were suddenly facing shortfalls in foreign currency liquidity. Offshore funding became more expensive. As confidence deteriorated, the BCB also focused on withdrawals made by institutional investors in those banks.

To foster a better distribution of liquidity among banks, the BCB reduced or even eliminated reserve requirements for the entities most affected by liquidity shortages, with larger reductions for banks that provided liquidity to illiquid small- and medium-size banks.

Reserve requirements were also reduced for large banks that chose to pay their contributions to the deposit insurance fund ahead of the due date, increasing its liquid assets. That action, combined with other specific measures, enhanced the fund's role as a liquidity provider to financial institutions. The measure remained in place from March to December 2010 and helped to manage the credit cycle in a countercyclical way.

Finally, reserve requirements were also used to counteract large and abrupt capital inflows. For instance, in 2011, due to concerns that banks or, more broadly, the local currency market, could face disruption following a shock to the exchange rate, the BCB imposed a 60% unremunerated reserve requirement on banks' short FX positions in the spot market exceeding \$3 billion or in their Tier 1 capital level, whichever was lower.

FX swaps

The use of FX swaps in Brazil during challenging economic times for emerging market economies (EMEs) provided market participants with the means to hedge against a sharp depreciation of the real, halting feedback loops. In a currency devaluation scenario, foreign investors and companies would benefit from the possibility of hedging their exposure to exchange rate risk, a better option than buying foreign currency outright.

The BCB decided to supply FX swap contracts to reduce volatility, to offer market agents FX hedges, and to provide more liquidity to the onshore FX market. A long position in such contracts is equivalent to selling USD and investing the proceeds in real-denominated securities. Analogously, a short position corresponds to financing a US dollar position at the cost of real-denominated interest rates. The BCB assumed the long position, effectively providing counterparties with protection in case of a devaluation of the real. This hedge eliminated the risk that foreign investors and Brazilian companies with foreign currency borrowings would have otherwise faced.

Without the BCB's intervention, the devaluation pressure might have resulted in foreign investors fleeing the country, while Brazilian companies with foreign currency borrowings would have had to scale down their operations and pay back their loans in advance. Hence, the devaluation trend would have reinforced itself at the expense of economic output and likely led to financial instability.

The measure was effective in reducing volatility in FX markets. Importantly, the BCB was able to perform interventions without tapping into the country's international reserves, unlike in other EMEs where such interventions ate into reserves.

Leakages and spillover effects

Assessing potential leakages when designing macroprudential measures is not straightforward. Take, as an example, the LTV measure for auto loans: in December 2010, the BCB doubled the risk weight applied on new car loans with long maturities and high LTV ratios (to 150%). The measure was successful in reining in the origination of auto loans and, even after the measure's withdrawal in November 2011, the share of long-maturity and high LTV loans continued to decrease and reached 50% in December 2012.

In this case, all banks in Brazil were automatically subject to the LTV-dependent risk weights and the targeted portfolio was highly concentrated in the banking sector without easy substitutes. Down-streamed restrictions also affected banks operating abroad given the applicable consolidation rules.

Spillover effects are another aspect to take into account, as it influences the convenience and design of macroprudential measures. In May 2013, the so-called taper tantrum event led to a sharp downward pressure on real (as was the case in for many other EME currencies) (Pereira Da Silva and Harris, 2012). The spillover effect from this exchange rate movement caused financial stability concerns and, as mentioned above, the BCB acted accordingly.

FX swap contracts have several advantages relative to other possible FX intervention tools. FX swaps are standardised, exchange-traded contracts, with credit risk mitigated by the use of a central clearing counterparty. In addition, the amount and pricing of swap-related interventions are transparent, because the swaps are market-traded. Finally, unlike FX market intervention instruments in other

jurisdictions, the swaps are settled in local currency. Therefore, they do not require the BCB to dip into its foreign currency reserves.

The main criticisms raised against the use of FX swaps were the BCB's exposure to this instrument (with a notional amount of over \$100 billion at the peak, which declined to \$26 billion by the end of 2016) and the fiscal costs of an eventual devaluation of the real. The notional amount, while seemingly large, was offset by a threefold increase in FX reserves. Thus, while FX swaps could have carried a significant fiscal cost if the real had depreciated, this cost had to be assessed together with: (i) the growth of FX reserves in domestic currency terms; and (ii) the implicit societal cost of a sharp currency depreciation in an occasionally dysfunctional FX market (and the ensuing financial instability).

Ongoing improvements

Responsibilities and coordination

As previously mentioned, the Brazilian legal framework does not assign explicit responsibilities for financial stability to any specific agency. However, the BCB has been playing the lead role in financial stability oversight. In practical terms, the comprehensive data collection, the analytical capabilities in place and the collaborative mechanisms provided by, for instance, COREMEC, allows the BCB to identify systemic risks that emerge in and outside its regulatory perimeter, and act accordingly.

Due to the bank-centric nature of the Brazilian financial system and the leading role of the BCB, no major deficiencies have been identified to date. However, a formal assignment of responsibility for financial stability and macroprudential policy would help reduce uncertainty, and enhance coordination and accountability.

As the complexity of the system grows, and the likelihood of systemic risks emerging elsewhere increases, effective coordination will become an even more crucial element of the institutional framework (International Monetary Fund 2013). For that reason, Brazilian regulators are frequently assessing gaps and opportunities for improvements, be it on mandate, powers, information-sharing, coordination, communication etc.

A prominent characteristic of macroprudential policy is that its systemic perspective requires the macroprudential authorities to have access to a wide range of instruments and to make credible recommendations, depending on the nature of the emerging risks. The authorities in Brazil are attentive to the opportunities available to officially delegate responsibilities, so as to enhance coordination and timely actions, and to improve accountability for the appropriate use of the instruments.

In addition, the BCB and other financial regulators continually work to strengthen the data sharing arrangements in place. These arrangements should be comprehensive – covering all types of existing or potential data – and should include specific procedures for the sharing of access to confidential data to ensure that information deemed essential is effectively shared by the relevant agencies.

Communication strategy on financial stability

Communication strategy, with a focus on addressing financial stability, has two primary purposes: (i) to induce favourable policy responses by effectively disclosing decisions taken and their respective objectives; and (ii) to make policymakers accountable for their actions and for the process by which decisions are taken (IMF, FSB and BIS, 2016). Although necessary, communication is a particularly challenging element of macroprudential frameworks for the following reasons:

- the broad scope of frameworks;
- the long and diverse list of potential instruments;
- the difficulties in defining the relevant objectives (let alone observing how specific actions contribute to attaining them);
- the difficulties in quantifying financial stability, which makes the assessment of macroprudential policy more difficult; and
- the lack of a clear cost/benefit timeframe – i.e. costs are often immediate and visible, while the benefits of macroprudential policies often cannot be identified in real time and may only be apparent in retrospect (and even then with uncertainty).

The communication regarding financial stability presents additional challenges. As a matter of principle, more transparency is generally better than less; but a balance between what should be communicated and what may need to remain undisclosed is necessary. In fact, unsuitable communication can have severe unintended consequences. For instance, communication might be less effective when made prior to already expected financial distress, given that agents tend to stick to their profitability incentives and exacerbate risk perceptions, leading to unfavourable results.

Communication strategy also plays an important role in crises, particularly when public support to banks through macroprudential measures is necessary. As messages conveyed to the public may be misunderstood, it should be made clear that such measures are exceptional, and that preventing banks from collapsing is critical to avoiding systemic problems. Banks should also be convinced that these measures are exceptional to avoid moral hazard.

In this context, having an effective communication strategy is key. This is particularly the case in today's increasingly complex financial system, in which more information needs to be communicated, albeit with clarity and brevity to ensure that the message is effective. Such effective communication requires disclosing regulators' definition of financial stability, policy objectives and stance. If the message is clear and credible, policy actions in good times may be less intense. Simply announcing the concern or the intent to act may induce favourable responses. Engagement with relevant stakeholders affected by potential measures – together with public hearings and briefing sessions – should enhance agents' understanding of the rationale for policies.

With respect to the timing of publicised risk warnings, the communication strategy should carefully analyse the various possible outcomes of statements prior to their release. Risk warnings are typically most beneficial in the early phase of a financial cycle. Unfortunately, it is precisely during that phase – when tangible risks are not yet visible – that such warnings are likely to be ignored, questioned or even

criticised. The authorities also need to be careful about inducing self-fulfilling prophecies that do more harm than good. A warning from the regulatory agency expressing concerns about the fragility of bank funding models, for instance, could lead to a bank run, causing the risk to actually materialise.

On the positive side, communicating at a relatively early stage – i.e. before banks get too reliant on fragile funding – may give them time to shift to more stable funding sources. That said, communicating vulnerabilities at a later stage in the cycle, i.e. just before financial distress sets in, could be counterproductive. To deal with these obstacles, it is important to make communication regular and consistent throughout the entire credit cycle.

The BCB's FSR is a suitable vehicle for such communication, though the strategy should extend to all forms of communication concerning financial stability policies. As the main channel for communication, the FSR is constantly being revised and refined to better fulfill its objective.

In addition, other communication channels that are aligned with the FSR – including letters of intent, press releases that follow the adoption of macroprudential measures, and specific statements and speeches by Board members – are increasingly being used as part of the BCB's overall communication strategy.

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Macroeconomic and financial volatility and macroprudential policies in Chile¹

Rodrigo Cifuentes², Sebastián Claro³ and Alejandro Jara⁴

Abstract

This note discusses the elements of prudential financial policies and supervisory practices in Chile that can be considered macroprudential. While showing similar macroeconomic volatility as that of the median of emerging market economies (EMEs), financial volatility, at least in two of the metrics discussed in this note, is noticeably lower in Chile than in other EMEs. We argue that this is due to the lessons learned from the severe banking crisis of the early 1980s, which resulted in the adoption of regulations and supervision practices incorporating elements highly sensitive to macro factors. From the viewpoint of the central bank, two of its policy elements can be labelled macroprudential: first, a coherent monetary policy framework featuring a flexible exchange rate regime, which has helped to protect the financial sector from external shocks; and second, the monitoring of aggregate systemic financial risks, which are communicated to the Financial Stability Council and to the public at large via the *Financial Stability Report*.

Keywords: financial stability, macroeconomic volatility, macroprudential regulation

JEL classification: E32, E63, F32, G18, G21

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Background: macroeconomic volatility and financial stability

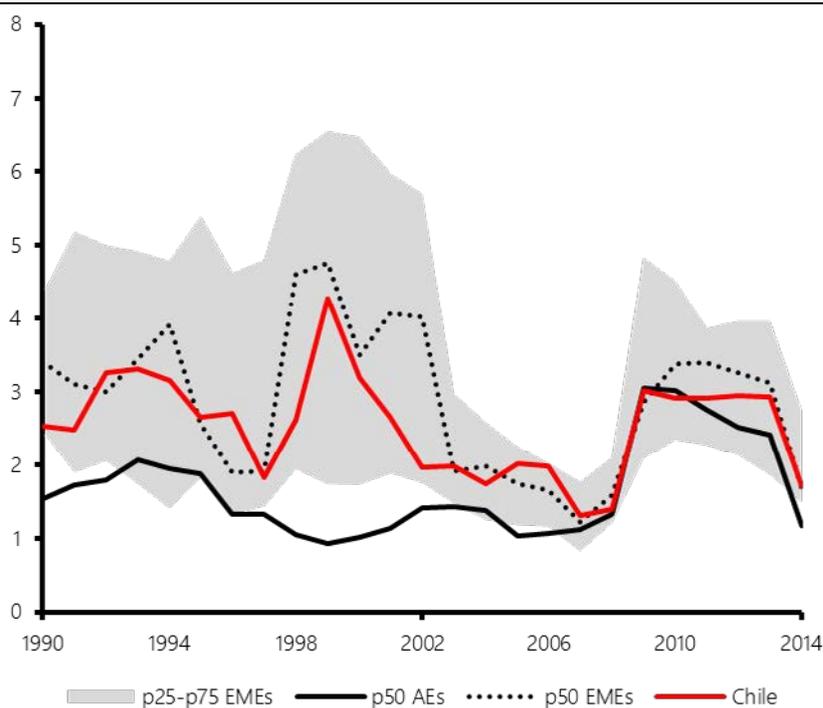
Historically, emerging market economies (EMEs) have endured high macroeconomic volatility. The causes of such volatility have included fluctuations in commodity prices and a loss of access to international financial markets.

Chile has been no different. In fact, over the last few decades its macro volatility⁵ has followed closely the median of EMEs' macroeconomic volatility measures (Graph 1). The evolution of this metric has been highly cyclical, reflecting, for the most part, the impact of global shocks, such as the Mexican and Asian financial crises of the 1990s, and more recently the Global Financial Crisis (GFC) of 2007-2009. Macro volatility in EMEs was clearly higher than in advanced economies (AEs) in the 1990s. During the decade previous to the GFC, the trajectory of macro volatility in EMEs was converging with that of AEs. After the GFC, however, it increased sharply and simultaneously in both AEs and EMEs. In this episode, volatility was transmitted from AEs to EMEs. In the aftermath of the crisis, macroeconomic volatility has remained higher in EMEs than in AEs, but their trajectories have nevertheless been similar.

Volatility of GDP growth

Five-year rolling standard deviation of annual GDP growth

Graph 1



Note: Distribution is based on a sample of 37 countries. Emerging economies include: Argentina, Brazil, Chile, China, Czech Republic, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Poland, Russia, Thailand and Turkey. Advanced economies include: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States.

Source: Own calculations based on data from the World Bank.

⁵ Volatility is defined by Blanchard and Simon (2001) as the standard deviation of annual growth over a rolling window of 20 quarters of GDP for macro volatility and of bank credit for financial volatility.

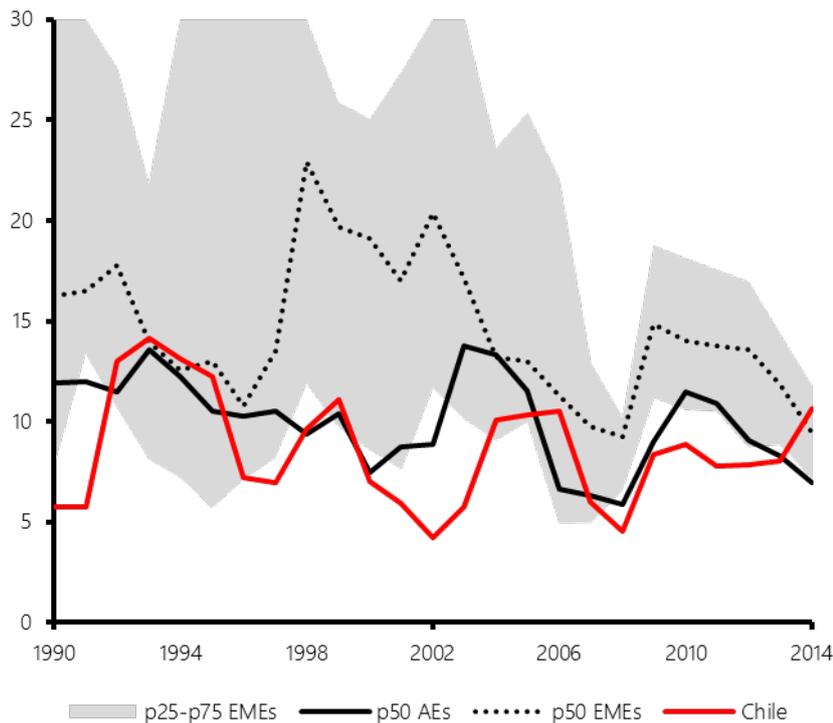
However, in the case of financial volatility the picture is different, particularly with regard to Chile's relative position. While it is true that the median of bank credit growth is more volatile and cyclical in EMEs than in AEs, the behavior of bank credit in Chile shows some idiosyncrasies. First, bank credit volatility is lower than in EMEs and, remarkably, lower than that in AEs for most periods. Second, the impact of global shocks seems to be remarkably milder in Chile than in other EMEs. This does not mean that international shocks had no impact on the Chilean financial system, but it somehow managed to maintain bank credit stable in the economy. Third, the GFC had a milder effect on credit volatility in Chile than in other EMEs and AEs (at least by this metric).

Moreover, it is worth noting that median financial volatility in EMEs generally resembles the median macro volatility of the same group of countries, suggesting a link between both metrics.⁶ In the case of Chile, however, the pattern looks rather different. If we compute the correlation between the macro and the financial volatility for each country during the 1990-2015 period, we find that the median correlation in EMEs is 0.75 while in Chile it is 0.45.

Volatility of bank credit growth

Five-year rolling standard deviation of annual credit growth

Graph 2



Note: Distribution is based on a sample of 37 countries. See note to Graph 1.

Source: Own calculations based on data from the World Bank.

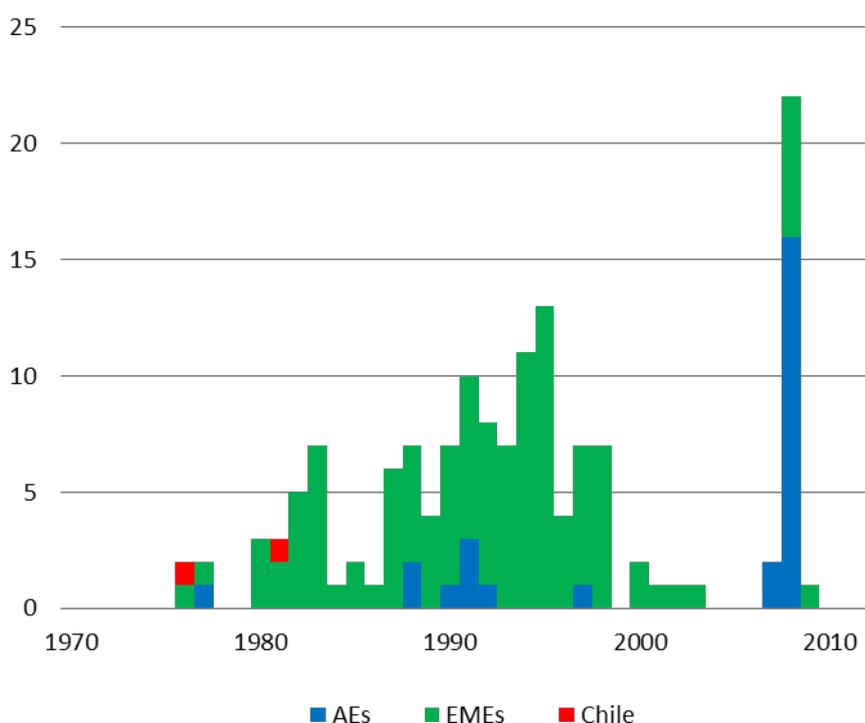
⁶ We do not discuss causality in this note. In principle, causality can go either way.

Another indicator of financial stability in the case of Chile is the absence of systemic banking crises since 1982, as stated by Leaven and Valencia (2012) (Graph 3).

In this note, we discuss a number of dimensions of macroeconomic and macroprudential policies that could explain financial stability in the Chilean economy over this period. We refer, in particular, to two features of the country's macro framework that could have contributed to this favourable performance. First, both the General Banking Act and the supervisory approach to banking have strong macroprudential components. Second, the monetary policy framework currently in place, with a focus on a credible inflation targeting regime and a commitment to foreign exchange flexibility, helps in preventing the accumulation of financial vulnerabilities.

Number of systemic banking crises

Graph 3



Source: Leaven and Valencia (2012).

Pillars of the Chilean (macro-) prudential policy framework

Macroprudential aspects of Chilean banking regulation

At the beginning of the 1980s, Chile suffered a devastating financial crisis. The origins of the crisis were a mix of an unsustainable macro policy framework and a lack of adequate regulation and supervision over a banking system that had been liberalised and privatised not long before. In particular, an open capital account and a fixed exchange rate had resulted in unsustainable capital inflows in the late seventies. As a

result, banks' credit boomed, generating credit of low quality due to poor assessment procedures and a surge of currency mismatches, both in banks and borrowers' balance sheets. These vulnerabilities lead to the collapse of banks after the fixed rate regime was abandoned, and bringing the economy to an abrupt halt. The crisis had a high fiscal cost and led to a considerable loss of output (Leaven and Valencia (2012)).⁷

In response to the crisis, a new banking law was enacted in 1985 that provided for a comprehensive regulatory and supervisory policy framework. Two features of this law are worth highlighting. First, the law set strict limits on what banks could and could not do. Credit allocation was regulated, with limits on concentrated and related lending. Banks' investments in financial instruments were also curtailed.

Second, this regulatory framework included features that nowadays would be considered macroprudential, including limits to interbank lending,⁸ to loan-to-value (LTV) ratios, and to the leverage ratio.⁹ In retrospect, this was to be expected, as the crisis of the early 1980s made clear that macro factors were of primary importance for the boom and bust pattern of the financial system.

Since then, regulators have incorporated the assessment of risks stemming from macroeconomic factors into supervisory approaches, and laws and regulations in an effort to safeguard the stability of the banking system. Currency mismatch limits were also set for banks wishing to access international financing. And in the aftermath of the Asian crisis, this concept was modified so that exposure to the currency risk of a borrower was considered when assessing creditworthiness and determining loan provisions. Similarly, while standardised derivatives are permitted, regulation requires authorisation from banking supervisors for more complex ones. Approval is based on the bank demonstrating that it has the capability to handle the associated risks. In practice, most banks use only simple derivatives (mostly FX forwards) while a few make use of options.

Commercial banks are dominant players in the Chilean financial system, with assets amounting to around 123% of GDP at the end of 2016. Given the restrictions on bank activities, commercial banks concentrate on extending loans. As a result, loans accounts for more than 70% of total assets, mostly commercial loans to the private sector (Table 1). The liability side of the banking sector's balance sheet is dominated by demand and time deposits, which account for more than 50% of total funding. Finally, the strict approach to banking regulation is also reflected in the composition of banks' capital, which mainly consists of Tier I capital (Graph 4).

⁷ In fiscal terms, the Chilean banking crisis of the early 1980s is one of the costliest crises in Laeven and Valencia's data set (which starts in 1970), with a fiscal cost of 43% of GDP and an increase in public debt of 88% of GDP. On the other hand, the output loss amounted to 8.6%.

⁸ Complementary regulation introduced by the Central Bank of Chile sets limits to interbank borrowing.

⁹ This law was enacted before the first Basel accord. When Basel I was introduced into law, the limit to the leverage ratio was kept, alongside capital requirements related to risk-weighted assets.

Asset and liability structure of the banking sector in Chile

In per cent

Table 1

Assets	Dec-2008	Dec-2015	Liabilities	Dec-2008	Dec-2015
Cash	4	6	Demand deposits	13	19
Consumer loans	7	7	Time deposits	47	39
Commercial loans	39	39	Foreign liabilities	7	5
Mortgage loans	16	19	Debt securities	8	18
Foreign trade	8	5	Derivatives	6	6
Securities	11	9	Other liabilities	12	6
Derivatives	7	6	Capital and reserves	8	8
Other assets	9	9			
Total assets	100	100	Total liabilities	100	100

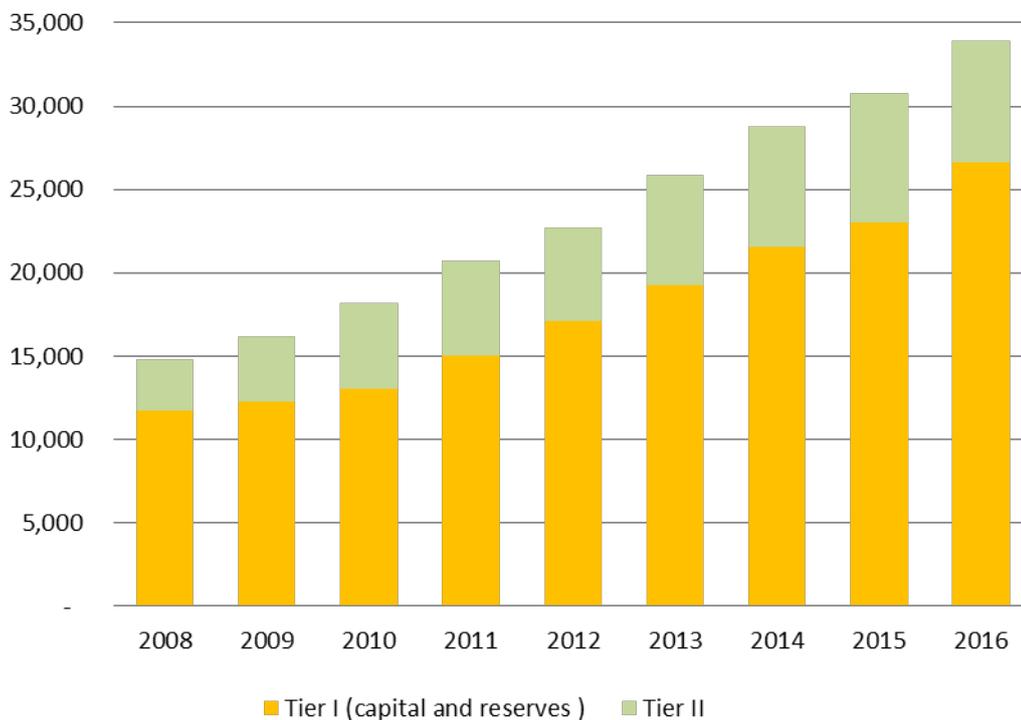
Note: Total assets are netted of provisions.

Source: Own calculations based on information from the Superintendence of Banks and Financial Institutions (SBIF).

Composition of bank capital in Chile

In nominal dollars

Graph 4



Note: Tier II includes subordinated bonds, additional provisions and non-controlling interest.

Source: Central Bank of Chile.

As previously mentioned, the current banking act includes a number of (macro-) prudential instruments as part of the regulatory toolkit. Some of them are

similar to those proposed and adopted more recently by other countries in response to the GFC.

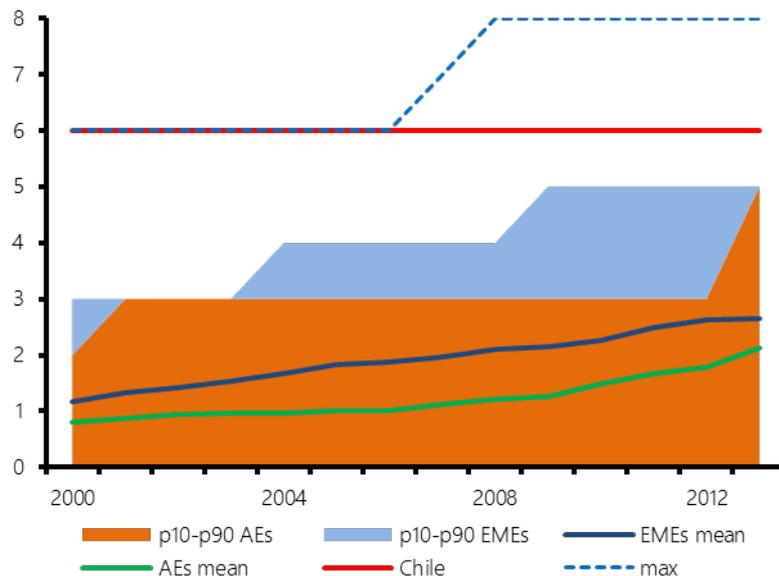
Cerutti et al (2017) survey the existence of 12 macroprudential instruments in a sample of 95 countries.¹⁰ They find that countries have increased the number of instruments they use, with EMEs taking the lead (Graph 5). While the 90th percentile of EMEs increased the number of instruments used from three to five between 2000 and 2013, Chile used six, including limits to the leverage ratio and interbank exposures.

It is important to note that the availability of macroprudential instruments does not necessarily mean that they are or have been used to manage the financial cycle. Moreover, although some of the instruments considered may not vary over time or over the business cycle, this does not make them any less (macro-) prudential. For example, the limit to the leverage ratio has existed in Chile's legislation since 1985. However, other countries have only recently adopted it, creating the impression that they have been more active in the adoption of (macro-) prudential policies.

Number of macroprudential tools in different countries

Set of 12 prudential instruments used between 2000 and 2013

Graph 5



Source: Own calculation based on information from Cerutti et al (2017).

The approach to banking supervision in Chile has been to take into account macro developments in the assessment of credit risk and in the design of loan loss provisions. Supervisors – who are well aware that macroeconomic fluctuations are a

¹⁰ The set of instruments included in Cerutti et al (2017) are: LTV, debt-service-to-income, dynamic loan loss provisions, countercyclical capital buffer, leverage ratio, capital surcharges on systemically important financial institutions, limits to interbank exposure, concentration limits, limits to foreign currency loans, reserve requirements, limits to domestic currency loans, and levy/tax on financial institutions.

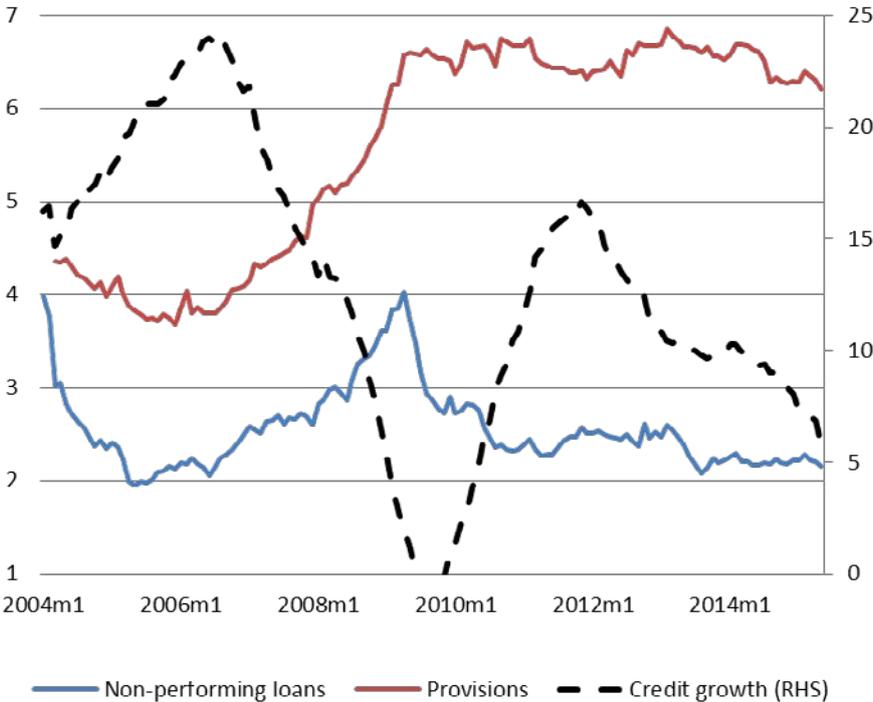
main source of shocks to the banking system – consistently take into consideration economic growth, employment fluctuations and exchange rates movements in assessing banks’ risk profiles. Thus, while there is no prescribed framework aimed at reigning in credit booms and busts in Chile, supervisors take into account macroeconomic developments that might impact banks’ risk profiles when determining loan loss provisions.

The period 2004–2006 offers a good example of such supervision. After a few years of very high real growth rates in consumer lending (which approached 25% annually), supervisors raised the requirements for loan loss provisions. This decision was based on the understanding that the pace of expansion was unsustainable and could lead to a deterioration of the quality of credit, and that it was therefore prudent to curb it. Importantly, this proactive decision occurred before loan portfolios showed signs of deterioration. Consequently, credit growth decreased while total provisions increased, making the banking system more resilient. Graph 6 shows the dynamic of loan growth, non-performing loans and the stock of total provisions for consumer loans. As can be seen, growth started to decelerate in conjunction with the accelerated accumulation of provisions, and that before the actual increase in non-performing loans. It must also be noted that the GFC resulted in further reductions in this type of lending.

Loan loss provisions, non-performing loans and the growth rate of consumer loans

As a percentage of total consumer loans

Graph 6



Source: Own calculations based on information from the SBIF.

The role of the central bank in assessing financial risks

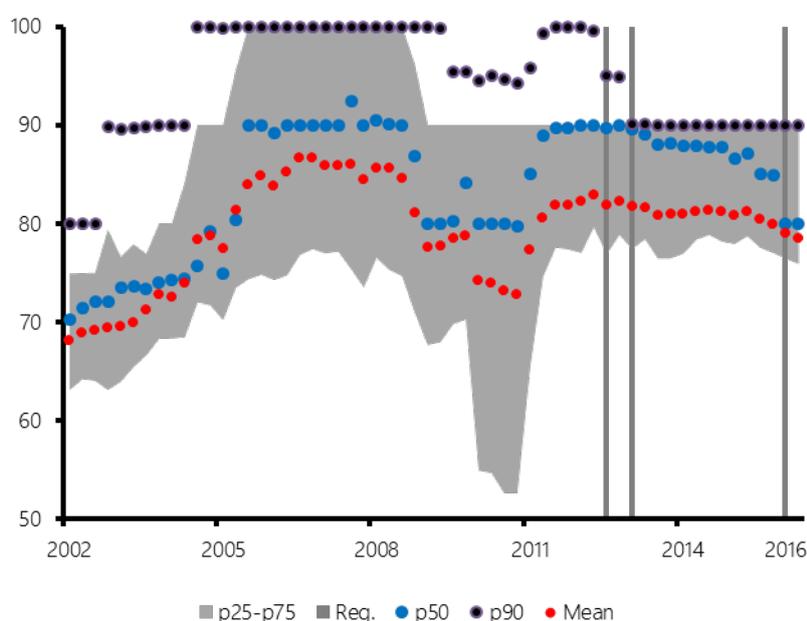
In fulfilling its financial stability mandate, the Central Bank of Chile continuously analyses risks that could affect the financial system. This analysis comprises an in-depth assessment of the banking system, including the conduct of stress tests aimed at uncovering potential systemic risks rather than a focus on the soundness of individual institutions. These risks are communicated by the Central Bank of Chile through its regular participation in the Financial Stability Council (FSC), as well as through its bi-annual publication, the *Financial Stability Report* (FSR). The communication of these risks acts, in some ways, as a distinct macroprudential instrument. On the one hand, it can trigger policy actions by the financial authorities that participate in the FSC. On the other, it may encourage financial decisions by the public in a stabilising direction.

As an example of how the evaluation and communication of systemic risks act as a policy tool in Chile, the central bank assessed at the end of 2012 that the large number of mortgage loans being issued with a high LTV ratio could be undesirable at a time when real estate prices were rising at an unprecedented speed. The issue was discussed in the FSR and brought up at the FSC. As a result, the level of loan loss provisions that banks have to set aside for riskier mortgage loans was reformed by bank supervisors in January 2016. Moreover, the anticipation that provisions would rise reduced the issuance of high LTV mortgages even before the policy was put in place, as shown in Graph 7.

Effective LTV ratios

As percentage of individual mortgage loans

Graph 7



Note: Gray vertical lines represent the central bank discussion in two consecutive *Financial Stability Report* publications. The dotted vertical line indicates when the new regulation on provisions came into effect.

Source: Central Bank of Chile based on information from Asociación Chilena de Factoring (Achef), Superintendencia de Bancos e Instituciones Financieras (SBIF) and Superintendencia de Valores y Seguros (SVS).

Exchange rate flexibility and capital flows

As a small open economy, one of the major sources of financial vulnerability in Chile stems from the volatility of external financial conditions and capital flows. Sudden stops of capital flows to EMEs have been largely documented, and are typically associated with fall in output, stressful adjustment of the real exchange rate, and negative consequences for financial stability.

In the past, several policy instruments have been used to deal with this issue, including reserve requirements on short-term capital inflows, limits on capital outflows, reserve requirements on foreign currency demand deposits, limits on banks' currency mismatches, and loan loss provisions on bank borrowers with currency mismatches in their balance sheets. Some of these instruments may be considered macroprudential. The introduction of unremunerated reserve requirements on capital inflows implemented in the early 1990, which is of particular relevance, and has been studied extensively. While only one out of five studies found that controls reduced capital inflows,¹¹ three out of four found that controls had a significant impact in lengthening the average maturity of debt.¹²

In contrast, regulations aimed at reducing the exposure of banks and their borrowers to exchange rate fluctuations have been deemed successful and are an essential policy tool in the current regulatory framework. The regulations comprise both currency mismatch limits at the bank level as well as an assessment of a borrower's foreign currency risk when considering its credit risk and loan loss provisions. In addition to these policies, the central bank significantly changed its policy framework after the Asian crisis of the late 1990s, moving towards an inflation targeting regime and a fully flexible exchange rate regime.¹³ In the remainder of this section, we argue that a credible flexible exchange rate framework may be considered itself a macroprudential policy.

There are different channels through which a flexible exchange rate regime can contribute to financial stability. One tries to discourage both speculative capital flows and leveraged positions built on the perception of misaligned asset prices. A credible policy of flexibility implies that the exchange rate can adjust quickly to what the market deems to be its fundamental value. Therefore, the room for speculation is limited. In addition, an important consequence of this is that it allows for an independent monetary policy.

A second channel is discussed in Cifuentes and Jara (2014). According to these authors, a flexible exchange rate, combined with the build-up of holdings of foreign assets by the private and public sector, may reduce the impact of sudden changes in gross inflows (ie stops and surges) by increasing the probability of offsetting changes in gross outflows (ie retrenchments and flights). This channel emphasises the role played by domestic agents, who may adjust their positions in foreign assets in response to observed exchange rate movements brought about by the changes in gross inflows. Flexibility of the exchange rate is key for this channel to operate.

¹¹ Only Gallego et al (2002) find a positive effect, while Valdés-Prieto and Soto (1996), Larraín et al (2000), De Gregorio et al (2000), Cowan and De Gregorio (2007) do not.

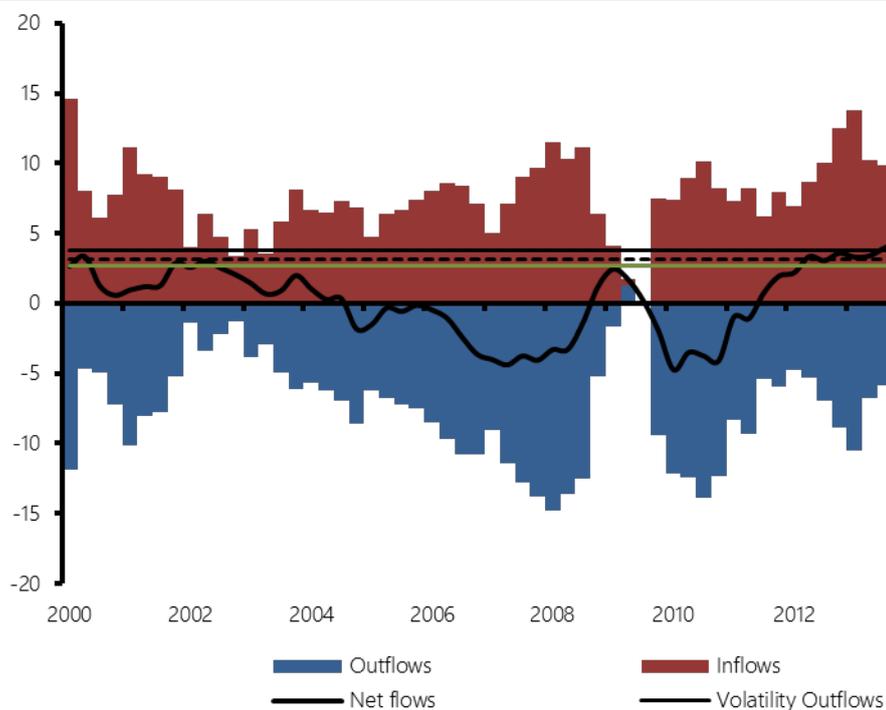
¹² Larraín et al (2000), De Gregorio et al (2000), Gallego et al (2002) find a positive effect, while Valdés-Prieto and Soto (1998) do not.

¹³ See Claro and Soto (2013) for a description of the change in the FX framework in the early 2000s.

Capital inflows, outflows and net flows in Chile

Assets (gross outflows) and liabilities (gross inflows) measured as a percentage of GDP

Graph 8



Note: Assets include international reserves. Volatilities represent the standard deviation from 1997–2015.

Source: Central Bank of Chile.

Cifuentes and Jara (2014) find, in a panel of EMEs and AEs, that the flexibility of the exchange rate and the free movement of funds by residents are significant in producing countervailing movements in outflows when a shock to inflows occurs. They also find that these offsetting movements are more likely to happen when sudden changes in gross inflows are related to global rather than local factors. This seemed to be the case in Chile during the GFC when, despite the sudden decrease in gross inflows faced by the economy in 2008–2009, net capital inflows ended up being positive because residents repatriated part of their assets held abroad. A corollary of this, as shown in Graph 8, is that net inflows are less volatile than gross inflows.

Summary

In this note, we outlined the presence of macroprudential elements in Chile's prudential and supervisory framework. In addition, we highlighted the macroprudential role of the flexible exchange rate policy, which has successfully insulated the financial sector from external macroeconomic shocks.

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Macroprudential goals, implementation and cross-border communication

The People's Bank of China

Abstract

The People's Bank of China (PBOC) plays a critical role in the country's macroprudential regulation. In recent years, the PBOC has put in place a series of macroprudential tools and developed its macroprudential assessment (MPA) system. During implementation, the ex ante and ex post appraisal of macroprudential tools are essential and such tools, targeting both the overall financial system and specific markets, play critical roles in the macroprudential framework. Although challenging, effective communication helps policy implementation. In the context of globalisation, national macroprudential policy implementation can create spillovers, which implies the need for international coordination.

Keywords: macroprudential policy, the People's Bank of China, policy communication, cross-border effects

JEL classification: E61

I. Macroprudential goals and frameworks

Macroprudential policy aims to counter and relieve systemic financial risks in an overall and countercyclical context. To be specific, the three concrete goals include improving the ability of financial system to deal with shocks through the timely establishment and release of buffers; reducing the procyclical response between asset prices and credit to curb excessive growth in leverage, debt and unstable financing and to prevent the accumulation of systemic risks; and limiting the structural vulnerability arising from financial system interrelationships with a view to preventing important financial institutions from becoming “too big to fail”.

Central banks all play critical roles here, even though macroprudential frameworks vary between countries. Currently, China’s joint conference on financial regulation and coordination is led by the PBOC and includes as participants the China Banking Regulatory Commission (CBRC), the China Securities Regulatory Commission (CSRC), the China Insurance Regulatory Commission (CIRC) and the State Administration of Foreign Exchange (SAFE). The conference is the main channel for financial research that strengthens the coordination of financial regulation policy, instruments and implementation across markets to help improve financial stability and ease systemic financial risks.

The PBOC has been exploring the innovation of macroprudential tools for some time. Since the crisis broke, the PBOC has studied the example of the advanced economies, and it started to strengthen its macroprudential measures in 2009. In 2011, the PBOC introduced dynamic provisioning and started to link commercial banks’ credit supply with their capital, systemic importance, and the stage of macroeconomic cycle. As the economy develops, the PBOC continues to improve its dynamic provisioning system and, in 2015, upgraded it into a more general macroprudential assessment system (MPA), including indicators for capital and leverage, asset and debt, liquidity, pricing, asset quality, risk of cross-border financing and the implementation of credit policy. Since 2015, the PBOC has strengthened its macroprudential management of cross-border capital flows, introducing measures such as provisions for the forward sale of foreign exchange, increased commission charges for speculative yuan trades, and the imposition of deposit reserves for offshore RMB deposited onshore. In May 2016, PBOC extended the scope of macroprudential management for cross-border financing to all financial institutions and companies across the country. The PBOC has also instituted loan-to-value (LTV) ratios on residential property lending.

On the one hand, macroprudential policy interacts closely with monetary policy, microprudential policy and fiscal policy, and is coordinated with them. On the other hand, these policies focus on different areas. Both macroprudential policy and monetary policy are based on macro and countercyclical adjustments. However, the former focuses on the stability of financial system, for example, by curbing leverage in the financial system, or in a specific segment, while the latter mainly emphasises the overall economy, aiming at stabilising prices and stimulating economic growth. As macroprudential policy complements monetary policy and affects its transmission, these policies should be coordinated.

Macroeconomic policy is closely connected with microeconomic policy in its tools and target, which is to prevent risks, but policy features obviously differ. As a result, information-sharing is necessary in the process of policy implementation. Microprudential policy aims to regulate a single institution with a view to ensuring

stability, compliance and transparency, while macroprudential policy usually opts for countercyclical measures based on the analysis of macroeconomic situation by smoothing the procyclical fluctuations of financial system and preventing risk contagion across markets.

II. Implementation of macroprudential frameworks: Strategy, actions and tactics

According to the IMF and BIS, the process of implementing countercyclical macroprudential measures consists of six steps: research on macroeconomics and financial cycles; dynamic appraisal of systemic financial risks; countercyclical adjustment and intervention by choosing and implementing the appropriate macroprudential tools, as well as appraisal and calibration of policy tools; valid communication with public and markets; dynamic supervision of market indicator bias; and improvement of data quality and completeness.

The ex ante and ex post appraisal of macroprudential tools is important in macroprudential frameworks. The ex ante appraisal, carried out before the implementation of tools, aims to choose the appropriate tools and timing, while the ex post appraisal, carried out after implementation, aims at assessing the tools' effectiveness. The two phases target, respectively, macroeconomic and microeconomic variables. Structural macroeconomic models, simplified macroeconomic models and indicators analysis are commonly used to assess macroeconomic variables, but the choice of economic variables and the question of how best to quantify default risk are still debated. By contrast, microeconomic variables are based on individual financial institutions, using stress tests, panel data models and network models.

Macroprudential tools play an important role in preventing the accumulation of financial risks and strengthening the financial system's resilience. Some tools set overall countercyclical requirements, for instance, to counter systemic risks arising from the excessive expansion or contraction of credit in the banking system. Introduced for this purpose in the Basel III Accord, the countercyclical capital buffer has already been activated in some jurisdictions. China's authorities are also reviewing the related regulation. Other tools target specific markets, for example, in addressing the excessive expansion or contraction of housing credit. Some jurisdictions have used LTV and debt-to-income (DTI) ratios to dampen the mutually reinforcing dynamics of housing credit and prices, thus improving the stability of the housing market. According to an IMF study of 46 jurisdictions in 2013, LTV and DTI ratios have been applied in a respective 24 and 14 jurisdictions. Practical experience shows that these tools can successfully curb the procyclical risk build-up in housing markets, but it is still worth mentioning that market participants may evade regulation in specific areas by means of financial innovation. Central banks should therefore take the overall financial system into consideration when establishing macroprudential frameworks.

III. Communication and cross-border issues

It is important to strengthen public communication and guide market expectations. Improving the transparency of macroeconomic measures helps to gain public support and reinforce public regulation. Announcements by central banks help to focus the attention and discussions of market participants, but some challenges still exist. First, regulators may have no comparative advantage in terms of information over the market, raising a question over how effective their guidance of market activities may be. Second, the analysis framework of regulators may not be advanced enough to guide market participants. Third, regulators should pay attention to the effectiveness of their communication. If market participants do not receive credible information, the reputation of the central bank may suffer.

In an era of globalisation, macroprudential policy has far-reaching effects. On the one hand, effective macroeconomic policy helps to keep domestic financial risks in check, creating positive externalities. On the other hand, individual countries may be able to reduce any negative cross-border effects in trade and finance by strengthening macroprudential frameworks, so as to lessen the probability of a financial crisis. Macroprudential management also affects cross-border financing activities in that financial institutions may shift financial activities abroad and hence evade national regulations. Policymakers should accordingly take the international environment into account. If macroprudential policy is not coordinated internationally, financial risks may become concentrated in economies with laxer regulation. To address this issue, international authorities coordinate and formulate minimum standards, supplementary agreements and guidance. The Basel III Accord has introduced countercyclical capital buffer requirements and additional capital requirements for systemically important financial institutions. The next step is to utilise international platforms such as the IMF and BIS for international coordination.

Cross-border capital flows are a new factor in the global economy and some emerging market economies, including China, have begun to explore and strengthen macroprudential management, targeting foreign capital flows. The PBOC included foreign capital liquidity and cross-border capital flows in its macroprudential management from 2015, by targeting short-term speculation. Its countercyclical adjustments include charging risk provisions for the forward sale of foreign currency, applying the normal deposit provisions rate both to offshore and onshore financial institutions, and extending the scope of the programme for cross-border financing macroprudential management nationwide, which includes increasing the effective supply of foreign currency and curbing leverage and currency mismatch risk. The PBOC has focused its macroprudential management mainly on the foreign currency market and foreign debt, using public and transparent measures, with a view to improving the stability of financial markets.

The macroprudential policy framework in Colombia

Hernando Vargas, Pamela Cardozo and Andrés Murcia¹

Abstract

Macroprudential policy in Colombia is described along with a discussion of the main challenges faced by the authorities in implementing it and a review of episodes in which macroprudential measures were taken. An overview and some estimates of their effectiveness in preventing the buildup of imbalances, increasing buffers and cushioning downswings are presented.

Keywords: macroprudential policy, financial stability, financial regulation, financial safety net, central banking, Colombia

JEL classification: E51, E58, F32, F38, G18, G28

¹ Technical Deputy Governor, Vice-President of Monetary Affairs and International Investments, and Advisor at Banco de la República, respectively. The opinions contained herein are the sole responsibility of the authors and do not necessarily reflect those of Banco de la República or its Board of Directors. All errors and omissions remain the authors' own. The authors are grateful to Yanneth R Betancourt, Esteban Gómez and the staff of the Financial Stability Department at Banco de la República for useful comments and contributions.

1. Introduction

Macroprudential policy in Colombia has been implemented on an occasional basis in a context of decentralised financial regulation. Financial stability has been successfully preserved after a crisis at the end of the twentieth century. This note describes the Colombian macroprudential policy framework, reviewing the various episodes in which macroprudential measures were implemented and discussing the main challenges faced by the authorities. In addition, an overview and some estimates of the effectiveness of macroprudential policies in preventing the buildup of imbalances, increasing buffers and cushioning downswings in Colombia are presented.

2. The macroprudential policy framework

a. Institutional setting

There is no explicit macroprudential policy framework in Colombia. Financial regulation, supervision and resolution were assigned by law to different state institutions decades ago. The bulk of financial regulation is directly in the hands of the Ministry of Finance (MoF), including capital requirements for financial institutions, the definition of operations that different financial intermediaries are allowed to conduct, and controls on portfolio and foreign direct investment. Financial intermediaries' liquidity and market risk regulations are within the purview of the Financial Superintendency, which is part of the executive branch of government. Foreign exchange regulations, controls on foreign indebtedness and reserve requirements are set by the Banco de la República (Bank of the Republic), an independent Central Bank. Congress has established limits on loan-to-value (LTV) and debt service-to-income (DSI) ratios for mortgage credit.

The Financial Superintendency is in charge of the supervision of all intermediaries, with the exception of non-financial cooperatives. Resolution is a responsibility of the Financial Superintendency and the Deposit Guarantee Fund (DGF). The former determines whether an intermediary is to be liquidated, merged or subject to administration. The latter performs the liquidation process. The central bank acts as lender of last resort to credit establishments deemed to be solvent by the Financial Superintendency.

There are two mechanisms for policy coordination between the different financial authorities. One is provided by the presence of the Finance Minister on the Board of Directors of the central bank which allows for a degree of coordination between monetary policy and overall economic policy. Another is ensured by the presence of the Finance Minister, the Governor of the central bank and the Financial Superintendent on the Board of Directors of the DGF.

In the late 1990s, this setting went through a difficult test, as the country underwent a financial crisis concentrated in the cooperative, mortgage and publicly-owned bank sectors. In this case, the pre-emptive functioning of the framework performed poorly. Inadequate capital and liquidity regulations of key intermediaries, as well as insufficient supervision of others, left the system vulnerable to the cycle of large inflows and outflows of capital that the country experienced throughout the decade. As a result, a surge of credit with low underwriting standards increased the

indebtedness of households and produced a real estate bubble. At the same time, firms incurred currency mismatches, partly because of the implicit guarantee provided by the existing exchange rate target zone regime. Government indebtedness grew throughout the decade and exhibited a currency mismatch as well. When capital flowed out of the country by the end of the decade, these fragilities led to a financial crisis and the deepest recession of the Colombian economy since the beginning of the twentieth century.

By contrast, the resolution of the crisis was conducted adequately along orthodox lines. The central bank only intervened as lender of last resort. The government absorbed the losses on its balance sheet and funded them with public debt. The liquidation process was performed efficiently.

As a result of this experience, Congress established a Coordinating Committee for the Monitoring of the Financial System (CCMFS) in 2003. This Committee has to meet at least quarterly and is chaired by the Finance Minister. It includes the Governor of the Central Bank, the Financial Superintendent and the Director of the DGF. The main purpose of the committee is to share information and analysis pertaining to the financial system. It does not make any policy decision, as legally each institution retains its original functions. Recently, the Committee established its own internal regulations. The main one states that every semester its members must present, from their own perspective, their risk analysis of the financial system. This provides a setting for the discussion of macroprudential measures.

In addition, as a consequence of the crisis, the central bank created its own Financial Stability Department with the purpose of enhancing its monitoring of systemic and macroeconomic risks. The Department publishes two Financial Stability Reports per year, prepares the central bank's input for the CCMFS discussions and offers risk analysis to the Board regarding specific issues that may influence policy (eg quantification of currency mismatches in the real sector and their effect on the financial system, exposure of the financial system to the oil industry etc). It has also been in charge of calibrating changes in reserve requirements when such tools have been used.

b. Some Interesting Episodes

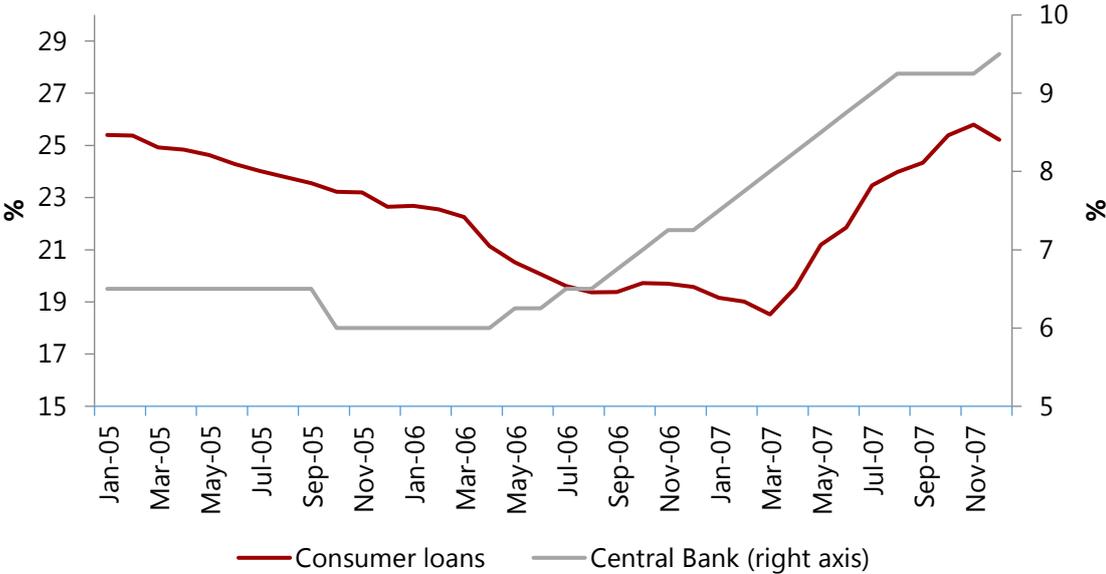
After the financial crisis of the end of the 20th century, there have been two episodes in which macroprudential challenges have emerged and macroprudential policy actions have been taken. The **first one** occurred between 2006 and the first half of 2008, during which strong credit growth followed a sharp recomposition of commercial bank assets. After the financial crisis of 1998–2000, the financial and real sectors were in a process of deleveraging and balance sheet clean-up. Consequently, credit growth was weak and banks invested heavily in local currency, fixed-rate government bonds, whose supply was abundant as the government was reducing its currency mismatch.

By 2005, banks had made a profit from such investments as sovereign risk premia declined in the wake of a structural adjustment of public finances and improved security conditions. Simultaneously, inflation came down steadily, leading to a substantial appreciation of the value of bond holdings. Moreover, firm and household balance sheets had been repaired by then. In 2006 there was no clear perspective of further appreciation of the value of public bond holdings, as the economy was heating up and policy rates increased (and were expected to rise further). At the same

time, sovereign risk premia continued on a declining trend, so that the incentives to invest abroad were subdued. Therefore, depositors kept their savings in local banks, while the latter shifted their portfolios away from government bonds and into loans. In particular, the supply of consumer loans grew very fast (close to 45% in real terms in the second half of 2006). This effect was so strong, that the pass-through of policy rate hikes to consumer loan rates was reversed (Graph 1).

This situation was a cause for concern for policymakers. For one, the transmission of monetary policy was being partially hindered. Aggregate expenditure growth was turning excessive, the current account deficit was widening fast and the quality of new loans was decreasing, according to the vintage analysis performed at the time. The memories of the credit excesses of the 1990s and their painful consequences prompted the authorities to search for new tools to contain expenditure and credit growth. Monetary policy was implemented based on a fully-fledged inflation targeting (IT) regime, so “old-fashioned” tools such as reserve requirements were no longer being used.

Policy and consumer loan nominal interest rates Graph 1



Source: Financial Superintendency, Banco de la República.

However, in view of the risk build-up, a consensus grew among policymakers at the Central Bank and the Government on the need to contain it. Hence, reserve requirements were recast as a tool to moderate credit growth rather than as monetary control instrument (as in the past). In fact, in an IT regime, changes in reserve requirements would amount to shifts to short-term money demand that would be smoothed by an interest rate-stabilising policy. Nevertheless, as long as central bank funding is an imperfect substitute for other sources of financing for banks, credit supply would be negatively affected by an increase in reserve requirements.

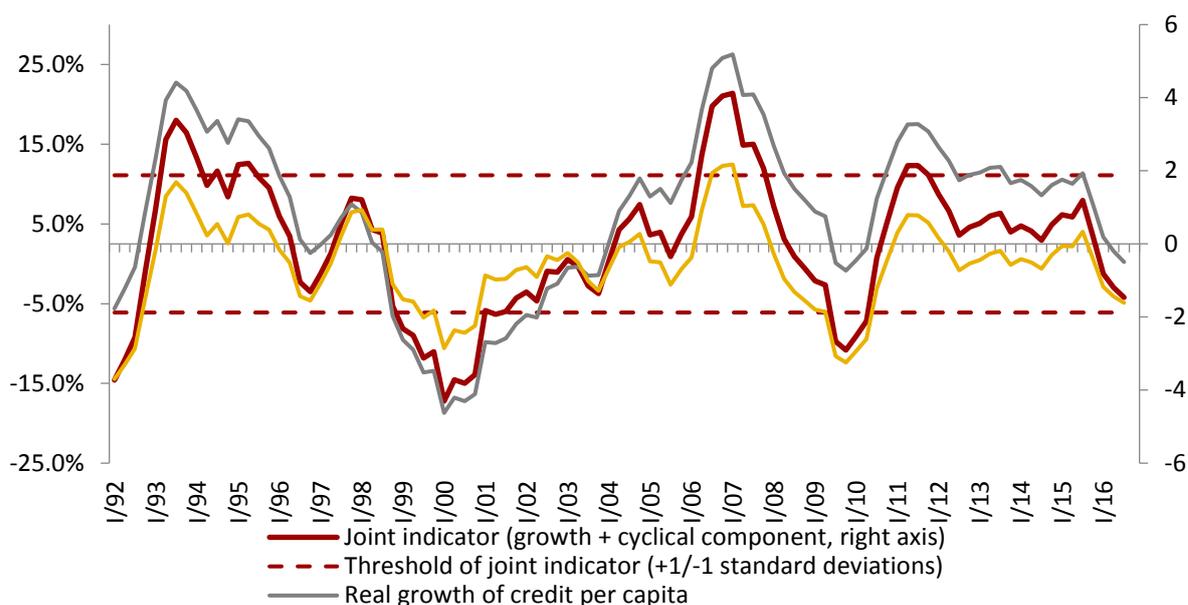
With this idea in mind, in May 2007 the central bank established marginal reserve requirements on domestic bank deposits. Aware of the substitution of local for external credit that this might induce, it imposed an unremunerated reserve

requirement on all foreign indebtedness. Besides containing leverage, this measure was also aimed at avoiding potential currency mismatches. Shortly after the central bank took these actions, the MoF imposed an unremunerated reserve requirement on foreign portfolio investment inflows as a way of complementing central bank policies. These policy responses strengthened an ongoing hiking cycle of policy rates. Later on, the Financial Superintendency brought earlier the operation of new permanent provisioning requirements for commercial and consumer loans. The timing of this measure helped moderate credit and expenditure growth.

By the second semester of 2008, credit growth had been reduced and the economy was cooling. Although part of this phenomenon was due to the effects of the Global Financial Crisis (GFC), several studies have documented the contribution made by the macroprudential policy response. Vargas et al (2010) find positive long-term effects of reserve requirements on commercial, prime and treasury lending rates, as well as on average term deposit rates (and on term deposits rates longer than one year). Using data from 2003 to 2011, Tovar et al (2012) report that reserve requirements in Latin America (Colombia included) had some transitory effects on credit growth and played a complementary role to monetary policy. Based on Colombian microlevel loan data, Gómez et al (2017) estimate a significantly negative effect of a variable summarising macroprudential policies on commercial loan growth in this episode, controlling for shifts in monetary policy, macroeconomic conditions, bank characteristics and risk indicators at the bank and firm level. Finally, using a general equilibrium model with heterogeneous agents and risk-averse financial intermediaries calibrated to Colombian data, Bustamante (2011) concludes that reserve requirements reinforce the effects of the policy rate and that this complementary effect is most important when commercial bank risk aversion is high. The results also show that when both instruments are used jointly, business cycles are dampened. Moreover, an increase in reserve requirements diminishes consumption (*ceteris paribus*).

After the Lehman Brothers crisis, macroeconomic and financial conditions changed dramatically. There was, in particular, concern about liquidity in the domestic financial system, as risk aversion skyrocketed worldwide. In response, in December 2008 the central bank reduced reserve requirements and began a rapid cycle of interest rate cuts (it was the first central bank to do so among the largest Latin American economies). Simultaneously, unremunerated reserve requirements on foreign indebtedness and portfolio investment were set to zero. This was the first time Colombian monetary authority had undertaken a timely accommodative countercyclical reaction.

A **second noteworthy episode** occurred during 2011. Then, consumer credit accelerated from an already high level (Graph 2). Although this time around policy rate hikes were transmitted to consumer credit rates, authorities were concerned by the rise in household leverage. Several macroprudential measures were discussed, among them reserve requirement increases. However, since reserve requirements have a broad impact on total credit, a more focused tool was ultimately used. The Financial Superintendency decided to increase consumer loan provisions within an arrangement that imposed higher requirements on banks that exhibited historically larger rises in non-performing loans. This provisioning mechanism is still in place.



Source: Financial Superintendency, Banco de la República's calculations.

c. Features of the macroprudential policy framework in Colombia

As it transpires from the above description of the institutional setting and the main events since 2000, there is no formal macroprudential policy framework in Colombia, in the same way as Inflation Targeting or the Fiscal Rule may be for monetary and fiscal policy. There is neither a clear objective variable to target nor a set of pre-defined tools that could be adjusted to reach financial stability. The responsibility and the potential tools to ensure financial stability are disseminated across different authorities.

Therefore, macroprudential policy tools have not been used systematically but rather occasionally in response to episodes of excessive build-up of systemic risk. In addition, macroprudential policies have drawbacks that make the authorities reluctant to use them more widely or frequently. A significant drawback is uncertainty about their effects on the economy, which makes it difficult to calibrate them. Their use may lead to unintended consequences. Macroprudential policies may also create incentives to circumvent them (when narrowly applied), which may obscure the information required to monitor risks adequately.

Aside from microprudential regulations with a macroprudential scope (LCR, limits on currency mismatches etc), the measures that could be called macroprudential – and are permanently in place in Colombia – include limits on LTV and DSI ratios for mortgage credit established by Congress in 1999 as well as the countercyclical component of the provisioning regime.

The Financial Superintendency established countercyclical provisions for commercial and consumer credit in 2007 and 2008, respectively. Under such schemes, banks increase or decrease provisions depending on whether they are in a “good” or a “bad” phase. Individual bank indicators, such as credit growth and loan portfolio deterioration, determine the bad phase. This allows an institution facing difficulties,

even under a generally favorable economic scenario, to diminish its provisioning expenses. So far, some banks have met the requirements for being in a bad phase but have decided not to reduce their provisions. Looking at the impact of this macroprudential tool, López et al (2014) find a negative relationship between the amplitude of credit cycles and the provisioning scheme, while Gómez et al (2017) report that countercyclical provisions had a negative effect on credit growth.

d. Challenges ahead

The use of macroprudential measures has been successful in Colombia hitherto. Episodes of excessive systemic risk build-up have been timely identified and dealt with, despite the prevailing decentralised institutional setting. However, this success cannot be taken for granted in the future and the country faces challenges in this respect.

To begin, the structure of the economy has implied the absence of conflicts between the policy actions aimed at containing risks on inflation, spending pressures, and excessive credit creation and loan misallocation. Increases in inflation above target have coincided with high growth of credit and aggregate expenditure. Inflation has been driven more by demand pressures than by the appreciation of the currency in episodes of large capital inflows or high terms of trade. This is in part explained by the fact that the economy is still relatively closed and non-tradable sectors are important in the determination of inflation and output² According to Garcia et al (2014), despite the initial opening efforts of the 1990s, Colombia's foreign trade regime has remained strongly restrictive (with high tariff and non-tariff barriers).

In addition, capital mobility in Colombia is high but there are still frictions and a home bias that partially separate internal and external financial conditions. This means that improvements in the latter do not simultaneously produce a substantial risk to financial stability and a fall in inflation (due to currency appreciation).

Nevertheless, these conditions are changing and may further do so in the future. For example, since 2014 foreign participation in the local bond market has risen to 24% in 2016 (from 7% in 2013). This was due to the reduction of the withholding tax on portfolio investment returns and the increase of Colombia's weight in JPMorgan's emerging market bond indices. In addition, the central bank further liberalised the capital account by changing its foreign exchange regulations (and will probably continue to do so). For instance, in 2014 the central bank allowed banks to issue external bonds denominated in Colombian pesos. It also permitted banks to obtain funding in foreign currency to conduct peso lending, as long as the foreign exchange rate risk was hedged with a derivative contract. In 2016, regulations relating to foreigners' peso deposits in domestic banks became less restrictive. Regarding the current account, the government has continued to enhance its opening, by signing free trade agreements, for example.

In recent years, external events had a stronger influence on local financial conditions. In 2014, the increased participation of foreigners in the domestic public bond market not only reduced the yields on these bonds, but also affected lending

² In 2015, total trade represented 39% of GDP in Colombia, compared with 73% in Mexico, 45% in Peru and 60% in Chile. Brazil is less open than Colombia at 27%.

and deposit rates, as banks sold their bond holdings, raised credit supply and reduced their demand for deposits. This coincided with a hiking cycle of policy interest rates and partially hindered its transmission.

Hence, in the future a “divine coincidence” of favourable responses to different risks in the economy may not occur and difficult trade-offs may arise.³ The effects of policy actions aimed at controlling some risks may exacerbate other risks and complicate the overall policy response. For example, large capital inflows may loosen financial conditions, while appreciating the currency and reducing inflation. A monetary policy response targeting inflation may exacerbate risks to financial stability. In this context, a more active use of macroprudential measures may be necessary, but the wider openness of the capital account may hamper the effectiveness of some macroprudential measures used in the past. Thus, a deeper understanding of the working of these policies and a better coordination between institutions may be required. This is an important challenge for Colombian financial and monetary authorities.

More specifically, Colombia’s decentralised institutional setting has worked well so far in the presence of risks requiring coinciding responses. However, frictions and difficulties in coordination may appear when conflicting policy effects and trade-offs emerge.

Other challenges regarding the institutional setting result from the legal separation of functions and the transformation of financial intermediation. The legal allocation of responsibilities among authorities was set decades ago, based on the structure of financial intermediation prevailing at the time. In particular, intermediation was concentrated in credit establishments. This means that central bank lender of last resort facilities and lending support from the DGF are only allowed for this type of institutions. In time, however, there has been significant growth of non-credit financial intermediaries, like broker-dealers, pension funds and investment funds. Consequently, the central bank has given them access to other liquidity facilities but they still lack the possibility of having support from the DGF.

Another dimension of the challenges implied by the legal separation of functions between financial authorities is the resolution of possible conflicts or redundancy of regulation issued by different authorities. For example, many years ago the central bank, acting as regulator to the foreign exchange market, established a limit on the net foreign exposure of financial intermediaries. This means that foreign assets are roughly matched by foreign liabilities and that, therefore, the solvency ratio is negatively impacted by a depreciation of the local currency. This became evident with the sharp depreciation of the COP between mid-2014 and 2015 which constituted a source of concern for Colombian conglomerates with large investments in Central and South America. There is a discussion on whether currency risk is adequately captured by the market risk component of the solvency ratio or whether protection of net worth in the face of strong currency movements is required separately. Such a discussion needs coordination because market risk regulation is under the responsibility of Financial Superintendency and the overall solvency ratio regulation is set by the MoF.

³ The Appendix shows examples of a small open economy with a credit channel of monetary policy in which trade and capital account opening may generate or deepen financial stability/price stability trade-offs in the face of temporary shifts in external financial conditions.

An example of redundancy is provided by liquidity regulations. In 2009, the Financial Superintendency issued such regulations along the lines of the LCR comprised in the Basel III framework. Recently, the central bank, acting as regulator to the foreign exchange market, established stronger liquidity requirements aimed at minimising the foreign currency liquidity risk of financial intermediaries. Revision of this redundancy is made difficult by the existence of different authorities dealing with similar risks.

Financial innovation (eg fintech, the emergence and expansion of new financial products etc.) constitutes another challenge facing financial authorities. The law establishes precisely the activities that supervised financial intermediaries are allowed to conduct, subjecting financial innovation to an examination and approval process. A possible outcome of this framework is that part of the innovation could take place outside the perimeter of traditional financial regulation and supervision. In particular, unlike deposit-taking, lending activities are not restricted to conventional financial institutions. Consequently, non-financial entities may develop non-deposit based financial intermediation without proper control and regulation. A timely assessment of these new risks would require better coordination among financial authorities and would require additional resources.

A recent example in this regard is the wave of failures of payroll loans that had been made by non-financial cooperatives and then sold on to non-financial firms for final distribution to the public. High yields were offered to investors but ultimately could not be delivered, as borrowers defaulted. The non-financial intermediaries then resorted to illegal practices to keep themselves afloat. Eventually many went broke and the whole scheme fell apart. This situation did not have any systemic impact since financial institutions were not exposed to those firms and their own payroll loans were made with adequate standards. A law is being discussed to restrict the sale of payroll loans to entities monitored by the Financial Superintendency. This episode illustrates the risks and challenges that may arise in the future, as financial innovation proceeds outside the current regulatory and supervisory perimeter.

3. Effectiveness and interactions of macroprudential policies in Colombia

The ultimate objective of macroprudential policy is to reduce systemic risk. Along that line, the evaluation of their effectiveness should consider its impact on: i) credit dynamics, since it should help reduce the amplitude of credit cycles; and ii) the resilience of the financial sector, since its instruments should help avoid scenarios of banking distress. In other words, macroprudential policy should help authorities to deal with two dimensions of systemic risk: i) the time dimension, namely, the buildup of systemic risk during credit booms and asset prices bubbles, and related ex-post negative externalities from the financial to the real sector during busts; and ii) the cross-sectional dimension, namely, the contribution to systemic risk of negative externalities associated with spillover and contagion effects (Freixas et al (2015)).

The results of a joint research project coordinated by the Bank for International Settlements (BIS)⁴ suggest that macroprudential policies in the Americas region have been effective in stabilising credit growth. In addition, researchers found evidence that policies affecting prudential buffers (provisions and capital requirements) were particularly effective in limiting risks to the banking sector. That project used credit registry data (information at loan level) to evaluate different policies for eight countries.

The Banco de la República participated in this cooperative project. Using information for the first episode mentioned above (2006-09), Gomez et al (2017) found that dynamic provisions and marginal reserve requirements had a negative effect on loan growth. Additionally, they found that an increase in an aggregate measure of the macroprudential policy stance (MPP index) was related to a reduction in credit growth, suggesting that a tightening of the macroprudential policy stance helped dampen credit cycles. They also hinted at differential effects of macroprudential policies (which depended on bank and debtor characteristics). Specifically, firms and banks with a higher risk profile were associated with weaker loan growth when macroprudential policies were in place. In other words, access to credit by riskier debtors was reduced when macroprudential policies were tightened (risk-taking channel). In the same line, credit supply from less stable financial institutions was more severely affected when macroprudential tools were implemented (lending channel).

A relevant question on the effectiveness of macroprudential tools has to do with the interaction of these instruments with monetary policy. In this regard, Gomez et al (2017) found that restrictive monetary and macroprudential policies both have negative effects on credit growth. They also report weaker evidence suggesting that both policies reinforce each other.

To complement these results, it is important to examine the effects of macroprudential policies on the resilience of the banking sector. In this note, microlevel bank data were used to evaluate whether these policies affected two relevant dimensions of banking resilience: i) the solvency; and ii) liquidity of banking institutions. In addition, some estimations using credit registry data are reported to evaluate the effects of macroprudential tools on an ex post bank risk indicator.

To evaluate the effects of different macroprudential policies on banking resilience, an equation for solvency and another one for liquidity of banking institutions were estimated using quarterly data over the period 2005–09. The explanatory variables included a proxy for two macroprudential tools and some controls for bank characteristics and macroeconomic variables. The following specification was used:

$$\begin{aligned} \Delta Bank\ indicator_{bt} &= \delta_b + \sum_{j=1}^3 a_j Macrotool_{1,b,t-j} + \sum_{j=1}^3 \beta_j Macrotool_{2,b,t-j} + \gamma BC_{bt} + \theta MC_t \\ &+ \varepsilon_{bt} \end{aligned}$$

where $\Delta Bank\ indicator_{bt}$ is the change in the measure of liquidity or solvency of bank b at time t , and δ_b are bank fixed effects. The liquidity measure is calculated per bank

⁴ Working group of the BIS CCA Consultative Group of Directors of Financial Stability on the impact of macroprudential policies using credit registry data. The main findings of this network are summarised in Gambacorta and Murcia (2017).

as the ratio of liquid assets (cash reserves and bond holdings) to total assets in each quarter. The solvency measure is the capital adequacy ratio per bank.

The evaluated macroprudential tool variables $Macrotool_{i,b,t-j}$ correspond to two instruments employed in 2007 in response to the exuberance described previously: the new provisioning regime and the marginal reserve requirements. These variables are defined as: i) the ratio of dynamic provisions to commercial loans (*DP*); and ii) the ratio of effective marginal reserve requirements to total liabilities (*MRR*). The individual macroprudential policies are calculated for each bank from quarter $t-3$ to quarter $t-1$, thus accounting for their differential impact given the balance sheet structure of each institution. Importantly, unlike other studies, this work uses a policy variable that accounts for the intensity of each policy tool and not a simply a dichotomous variable reflecting the existence or absence of the tool. The reported coefficient in Table 1 for each policy variable corresponds to the sum of the coefficients for the respective lags. This specification is particularly convenient, since the effects of macroprudential policy on different bank dimensions may take some time.

The vector *BC* comprises a set of bank-specific characteristics as control variables, including the log of total assets (*Assets*) and a measure of profitability (*ROA*).

The model controls for changes in reserves that are related to shifts in the structure of deposits and the remuneration of reserve requirements during the sample period. The control variable (*ORR*) is defined as the ratio of ordinary reserve requirements (excluding the remuneration by the central bank) to deposits. Another control is a dummy variable that takes a value of 1 when the unremunerated external reserve requirement was in use (*DURR*). As mentioned, this policy was implemented in tandem with the marginal reserve requirement on domestic deposits to reduce the possibilities of substitution of internal liabilities for external loans.

The vector *MC* includes a set of macroeconomic variables to control for changes in the economy that might impact the banks. In particular, this vector includes a measure for the monetary policy stance denoted by *MP* (annual change of interbank rate), a measure of the output gap (calculated using a Hodrick-Prescott filter) as a proxy of the business cycle (*Outputgap*), the change in the VIX index of US stock market volatility as an indicator of international risk aversion in global financial markets (*VIX*) and the annual percentage variation of the exchange rate (*ER*).

The results are presented in Table 1. Each column represents one of the banking resilience attributes evaluated (solvency and liquidity). In general, macroprudential tools introduced during a period of financial exuberance had a significant impact on the resilience of Colombian banking institutions through higher levels of bank solvency and liquidity. In particular, the introduction of the new provisioning framework had a positive and significant effect on the solvency ratio of banking institutions. As expected, an increase in the level of provisions tends to reduce the level of risk-weighted assets, thus increasing bank solvency. There is no evidence of a significant effect of marginal reserve requirements on that attribute, even though Gómez et al (2017) found a negative impact on loan growth.

The impact of macroprudential policies on different bank dimensions¹

Dep variable: First difference in solvency ratio (column I) and liquidity (II),

Table 1

	I (SOLV)	II (LIQ)
$\sum_{i=1}^3 \text{Prov}_{b,t-i}$	0.5998** (0.2931)	1.007* (0.5671)
$\sum_{i=1}^3 \text{MRR}_{b,t-i}$	0.5625 (0.9573)	3.6908** (1.9012)
$\text{DURR}_{b,t-1}$	0.00425 (0.0131)	0.0073 (0.02244)
$\text{ORR}_{b,t-1}$	0.27664 (0.2699)	0.2555* (0.1122)
MP_t	0.3756 (0.5200)	-0.7238 (0.89663)
EXR_t	-0.03743 (0.0669)	-0.00763 (0.11443)
VIX_t	0.00046 (0.00027)	-0.00102* (0.00049)
Outputgap_t	0.093 (0.3820)	1.3252* (0.7810)
$\text{Assets}_{b,t}$	0.0151* (0.00676)	0.03999* (0.02252)
$\text{ROA}_{b,t}$	2.6520*** (0.3023)	2.3358*** (0.5143)
Bank effects	Yes	Yes
Number of banks	15	15
Number of obs.	86	86
R-squared (percent)	62.88	41.9
F test (overall sign.)	10.3***	3.54***

¹ System estimation using fixed effects panel estimation. Standard errors are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively.

The evaluation above can be complemented using loan-level information to estimate the effect of macroprudential policy on ex post credit risk indicators based on non-performing loan data. Following some proposals of the BIS network,

estimates of the probability of a loan becoming non-performing using granular information was produced. A modification of the equation proposed is presented here. In particular, the estimated loan-level equation using the same period of reference and quarterly information is the following:⁵

$$\begin{aligned} \text{Prob}(NPL_{bft} = 1) & \\ &= \delta_{bf} + \alpha \Delta \text{Macro tool}_{1,t-j} + \beta \Delta \text{Macro tool}_{2,t-j} + \gamma BC_{bt-1} + \theta MC_{t-1} \\ &+ \mu \text{Collateral}_{bft} + \varepsilon_{bft} \end{aligned}$$

NPL_{bft} is a dummy variable that takes the value of 1 if the firm f is in default on a specific loan. Macro tool_{t-j} corresponds to the macroprudential policy variables used in the previously presented estimated model. To account for the time these measures may take to influence credit risk, four lags are used. The variable δ_{bf} corresponds to fixed effects at the banking relationship level. There are also some controls at the bank and macro levels.

In particular, the macroeconomic controls include the change in the policy rate (MP) and the exchange rate (ER), defined as before. A dummy variable to control for the international financial crisis is also included ($Globalcrisis$). The bank-specific controls include a proxy for the profitability (ROA), the log of total assets ($Assets$) and the ratio of liabilities different from deposits as a proportion of total liabilities, as a measure of funding taken into account non-core liabilities ($Noncoreliab$). A dummy variable that identifies loans with eligible collateral is also included ($Collateral$).

The results are presented in Table 2. They suggest that both macroprudential policies considered did have a significant effect in reducing future default probability. Higher levels of provisions and marginal reserve requirements helped reduce the future level of ex post loan-level bank risk.

The controls included also shed some light on the determinants of bank risk. In particular, differences among bank-specific characteristics appear as relevant determinants of ex post credit risk. Loans granted by larger banks tend to exhibit lower default probabilities. By contrast, banks that are more profitable tend to present higher levels of risk realisation. Additionally, the ex post probability of default tends to be lower for collateralised loans.

It is also found that increases in short-term interest rates and ordinary reserve requirements are associated with higher ex post default probabilities. A tightening of credit conditions tends to affect negatively the financial capability of riskier borrowers, increasing the realisation of credit risk.

The results presented here are in line with Altunbas et al (2017) who evaluate the effects of macroprudential tools on bank risk indicators for a large set of countries. They found evidence suggesting that macroprudential tools have a significant impact on bank risk, especially those that are specifically designed to enhance banks' resilience.

⁵ The information is sourced from the Financial Superintendency and includes 1.9 million of exclusively commercial bank-firm relationships.

The impact of macroprudential policies on bank risk¹

Dep variable: dummy variable that takes the value of 1 if the loan is in default and 0 otherwise

Table 2

Prov _{b,t-4}	-1.2499*** (0.02779)
MRR _{b,t-4}	-0.6084*** (0.05025)
ORR _{b,t-1}	0.2657*** (0.01909)
DURR _{b,t-1}	0.0053 (0.0065)
ΔMP _{t-1}	0.01204*** (0.03875)
ΔExchrate _{t-1}	0.0021 (0.0025)
Globalcrisis _t	0.01623*** (0.001633)
VIX _t	0.0011 (0.00356)
OutputGap _{t-1}	-0.8423*** (0.0265)
Assets _{b,t-1}	0.1311*** (0.0016)
ROA _{b,t-1}	0.6626*** (0.05438)
Collateral _{bf,t}	-0.01491*** (0.00071)
Noncoreliab _{b,t-1}	0.0508*** (0.00629)
Debtor effects	Yes
Number of banks	23
Number of obs (million)	1.95
Number of debtors	268700
R-squared (percent)	55

¹ System estimation using fixed effects panel estimation. Standard errors are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively.

4. Conclusions

Macroprudential policy tools have been used occasionally in Colombia to deal with systemic risk in a context of decentralised financial regulation. This institutional feature has not prevented the adoption of successful policy responses to episodes of excessive build-up of systemic risk since the beginning of the 2000s. These episodes have been timely identified and dealt with. In particular, the experience of 2006–08, when a credit boom emerged, represented a big test for the Colombian macroprudential framework.

There is evidence that macroprudential policies have been effective in preventing the build-up of financial risks. They seem to soften credit cycles by reducing credit growth in boom periods. In addition, they have added to the resilience of banks through increases in solvency and liquidity buffers. Moreover, there is some evidence that those policies helped decrease ex post bank credit risk. They may have also helped cushion the financial downswing in the aftermath of the global financial crisis. Despite a marked deceleration, a credit crunch did not occur and economic growth remained in positive territory.

However, future success cannot be taken for granted and the country could face challenges in this respect. The exposure of the domestic financial system to international factors has increased and risks are continuously changing. The presence of foreign agents in local markets has significantly increased, Colombian banks have expanded abroad, and variants of financial intermediation have emerged, posing challenges to the various authorities entrusted with financial stability objectives. Also, a more open economy increases the probability of policy trade-offs and may reduce the effectiveness of some macroprudential policy tools used successfully in the past. In this context, better knowledge on the effects of macroprudential policies and enhanced coordination among financial authorities may be necessary.

Appendix

This appendix provides an example of the inflation/financial stability policy trade-offs that may arise in the face of changing financial external conditions, particularly when trade and capital account openness deepens in a small economy characterised by some degree of nominal price rigidity and a credit channel of monetary policy. The short-term equilibrium of this economy is described by the following equations:

Equilibrium in the goods market (IS):

$$y = A(i, i_l, y) + nx(q, y)$$

Balance of Payments (BP):

$$nx(q, y) = -F(i, i^* + e^e - e) q$$

Equilibrium in the credit market (CM):

$$\begin{aligned} P_s &= \lambda(i, i_l) D(i, i^* + e^e - e, y) && \text{(Loan supply)} \\ P_d &= P_d(i_l, y) && \text{(Loan demand)} \end{aligned}$$

$$P_s = P_d$$

Phillips curve (PC):

$$\pi = \pi^e + \beta (y - y^n) + \gamma (e - e_{-1})$$

Aggregate demand (IS) is made up of domestic absorption and net exports. Domestic absorption depends not only on the policy rate, i , but also on the loan rate, i_l , reflecting the existence of a credit channel of monetary policy. Net exports depend on the real exchange rate, q , and GDP, y . The real exchange rate is defined as $q \equiv E/P$, where E is the nominal exchange rate (local currency per unit of foreign currency) and P is the domestic price level (the foreign price level is normalised to 1).

The balance of payments (BoP) equates net exports, nx , to the real value of net capital outflows $-F q$. The latter are determined by the local policy rate and the foreign interest rate adjusted for expectations of nominal depreciation of the domestic currency.⁶ It is assumed that foreign and local financial assets are imperfect substitutes, so that UIP does not hold, but net capital outflows are affected by the interest rate differential. For simplicity, the BoP abstracts from transfers and factor income flows.

Since the loan rate affects domestic absorption, equilibrium in the lending market is modelled explicitly (CM). Following a variant of Bernanke and Blinder (1988), loan supply is a fraction of total deposits that depends on policy and loan rates. Deposits are demand-driven and, therefore, a function of local and foreign interest rates, and GDP. As a reflection of imperfect capital mobility, the response of deposits to shifts in local or foreign interest rates is potentially different. Loan demand is

⁶ The variable e is defined as the natural logarithm of the nominal exchange rate E . Likewise, e^e corresponds to the natural logarithm of the expected exchange rate.

standard and determined by output as a scale variable and the loan rate. Note that loan demand is not affected by foreign interest rates. Thus, capital mobility is assumed to take place through movements in bonds and bank deposits.

Price formation is summarised by an open-economy Phillips curve, in which inflation depends on inflation expectations, the output gap and nominal depreciation. For simplicity, it is assumed that expectations of inflation and the exchange rate are static and pre-determined.

The idea of the exercise is to examine the response of the endogenous macroeconomic variables (y , i_l , P , e and π) to a temporary shift in the external interest rate, i^* , under different degrees of capital and trade openness. This is done to explore the resulting changes in the monetary/financial stability trade-offs confronting policymakers. To do so, a comparative statics exercise is undertaken on the basis of the system of equations (IS), (BP), (CM) and (PC). Differentiating these equations with respect to i^* , the following system of simultaneous equations is obtained:

$$dy/di^* (1 - nx_y - A_y) - di_l/di^* A_{il} - de/di^* nx_q q + d\pi/di^* (nx_q q/(1+\pi)) = 0 \quad (\text{A.1})$$

$$dy/di^* (Pd_y - \lambda D_y) + di_l/di^* (Pd_{il} - \lambda_{il} D) + de/di^* \lambda D_{i^*} = \lambda D_{i^*} \quad (\text{A.2})$$

$$dy/di^* nx_y/q + de/di^* (nx_q + F - F_{i^*}) - d\pi/di^* ((nx_q + F)/(1+\pi)) = -F_{i^*} \quad (\text{A.3})$$

$$dy/di^* \beta + de/di^* Y - d\pi/di^* = 0 \quad (\text{A.4})$$

To build the examples, values for dy/di^* , di_l/di^* , de/di^* and $d\pi/di^*$ are calculated assuming linear functions for A , nx , F , D , λ and Pd , the following initial values: $q = 1$, $F = 0$, $\pi = 0$, $D = 0.3$, and $\lambda = 0.7$ and a set of parameter values.⁷

As trade openness increases, the importance of foreign goods and inputs in local consumption and production must increase. Hence, the pass-through parameter in the Phillips curve, Y , should be higher. Likewise, as capital account openness rises, capital flows become more responsive to risk premia and interest rate differentials (higher F_{i^*}). Consequently, the above derivatives are calculated for different values of the pass-through parameter, Y , and the sensitivity of net capital inflows to the foreign interest rate, F_{i^*} .⁸

Note that the system of equations (A.1)–(A.4) assumes a constant policy rate, i . Therefore, the derivatives must be understood as the expected movements of the endogenous variables after a temporary shift in the foreign interest rate without a response of the monetary authority.

As a reference, Graphs A.1 to A.6 show the derivatives calculated without a credit channel of monetary policy ($A_{il} = 0$). The responses of the exchange rate, output and inflation to an increase in the foreign interest rate are all positive, in accordance with the predictions of a simple, small open economy Mundell-Fleming model. As the pass-through coefficient, Y , rises, so do the positive effects on the exchange rate and inflation (Graphs A.1 and A.3). By contrast, the positive impact on output decreases

⁷ $A_{il} = -0.05$, $A_y = 0.7$, $nx_q = 0.01$, $nx_y = -0.15$, $\lambda_{il} = 0.01$, $D_{i^*} = -0.01$, $D_y = 1$, $Pd_{il} = -0.01$, $Pd_y = 1$, $\beta = 4$.

⁸ To compute the derivatives for different values of parameter Y , F_{i^*} is set to -0.01 . To compute the derivatives for different values of F_{i^*} , Y is set to 0.1 and D_{i^*} is set equal to F_{i^*} .

due to the lower real depreciation of the currency implied by a higher pass-through coefficient (Graph A.2). Increased capital account openness enhances the positive effects of higher foreign interest rates on the exchange rate, inflation and output (Graphs A.4 to A.6).

The introduction of a credit channel of monetary policy significantly changes the above results (Graphs A.7 to A.14). Although the currency depreciates in the face of an increase in the foreign interest rate and capital outflows (Graph A.7), local deposits are reduced in the process and loan supply is restrained. As a result, lending rates rise (Graph A.8), driving output down (Graph A.9). Thus, there are conflicting effects on inflation. On the one hand, the depreciation of the currency pushes it up. On the other, the contraction of output exerts a downward pressure on it. The net impact depends on the size of the pass-through coefficient, Y , among other things. Graph A.10 shows that for low values of Y , inflation falls with the increase in the foreign interest rate, since the impact of output contraction prevails. In this case, there is no policy dilemma. Monetary policy should be unambiguously relaxed to deal with both too low inflation and subdued credit supply and economic activity.

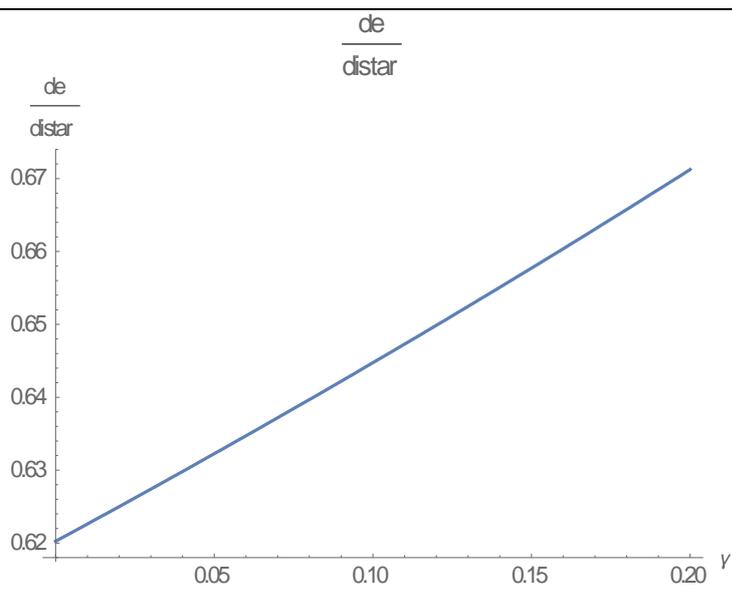
As Y increases, however, the sign of the derivative shifts due to the relatively greater effect of the depreciation on local prices. At this point, a dilemma arises for the monetary policymaker. The increase in the foreign interest rate depresses credit and output but increases inflation. The appropriate monetary policy response is not apparent.

Something similar happens when capital inflows become more responsive to the foreign interest rate. As the parameter F_{i^*} increases, a hike in the foreign interest rate produces a larger depreciation of the currency and a greater jump in inflation. However, the reduction in deposits, loan supply and output is also larger. Hence the policy dilemma is heightened under greater capital account openness (Graphs A.11 to A.14).

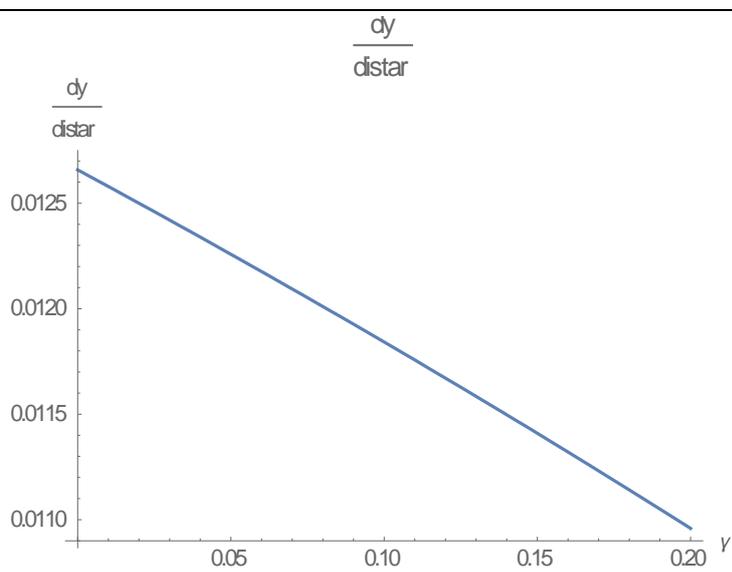
On the basis of the above results, it is possible to appreciate the effects of an increased opening of the economy on the policy trade-offs when external financial conditions improve. In a relatively closed economy (low pass-through and low sensitivity of capital flows to the foreign interest rate), decreasing costs of external funds lead to fast credit growth and higher output and inflation. No policy dilemma arises, since tightening monetary policy simultaneously moderates both financial and price stability risks.

By contrast, in a more open economy a decrease in the costs of foreign borrowing produces a spike in credit supply and aggregate demand while inflation falls with the appreciation of the currency. In this case, a trade-off between price and financial stability risks emerges.

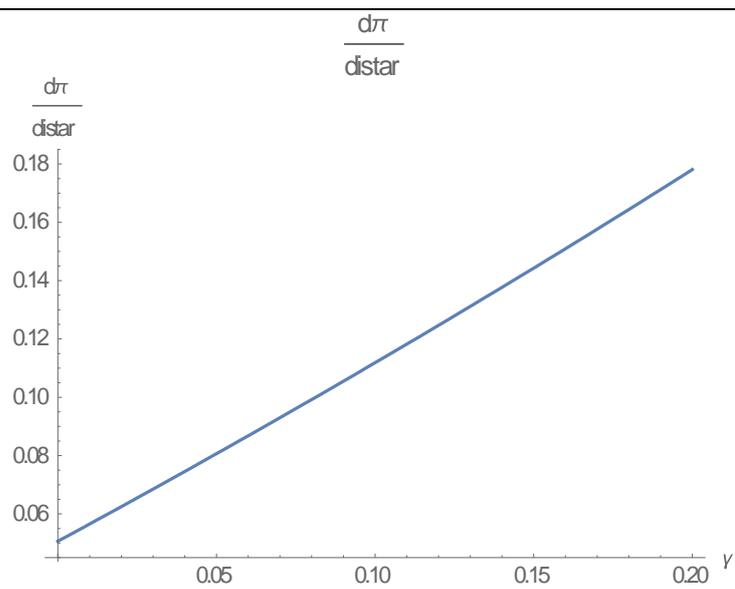
Graph A.1



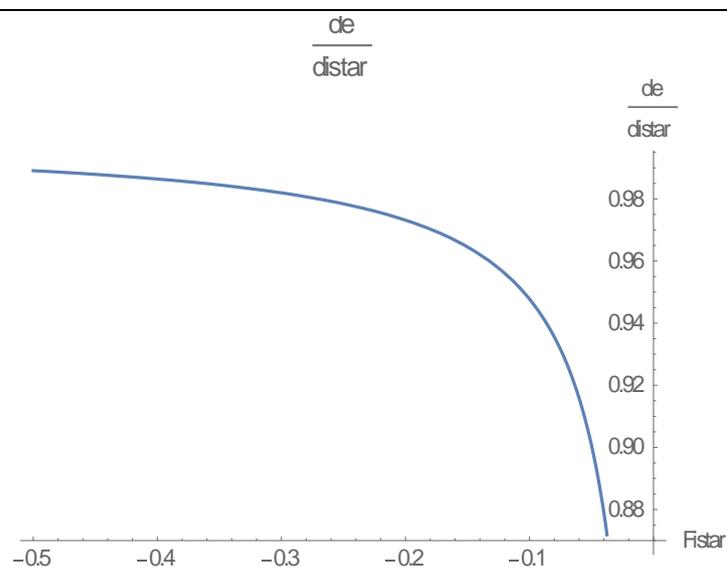
Graph A.2



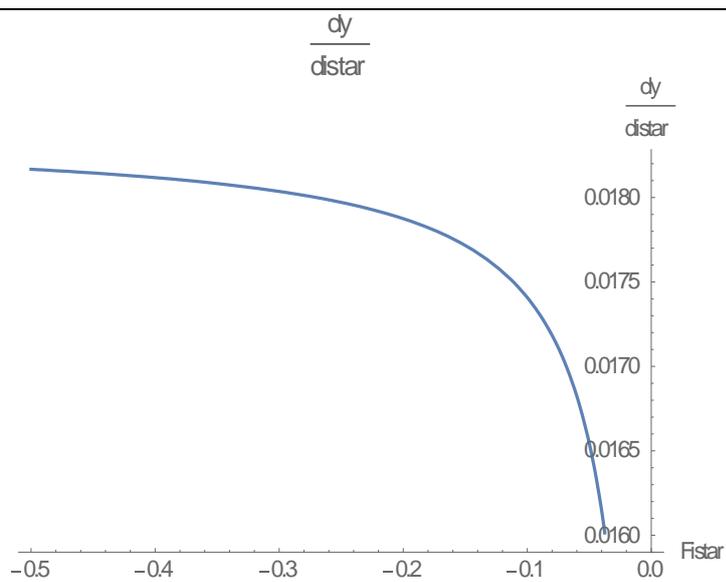
Graph A.3



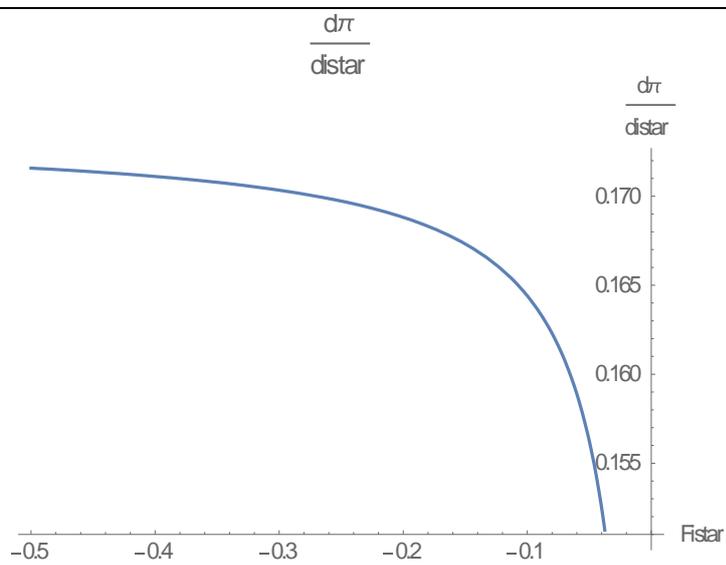
Graph A.4



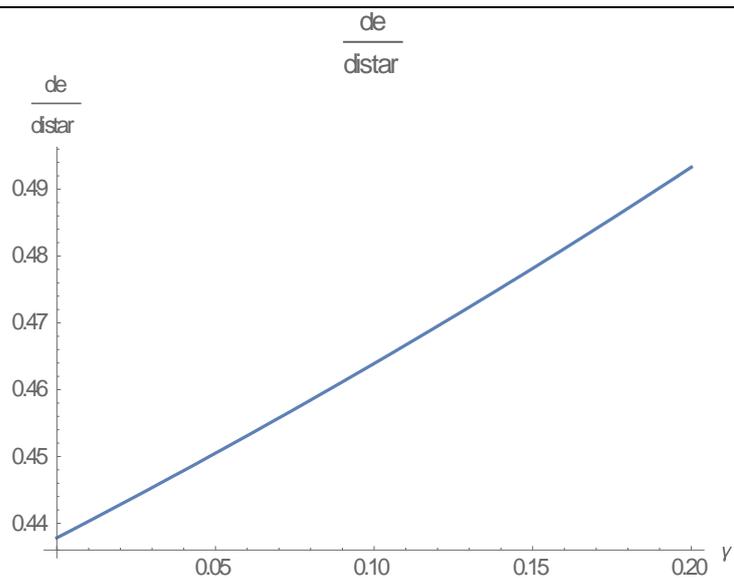
Graph A.5



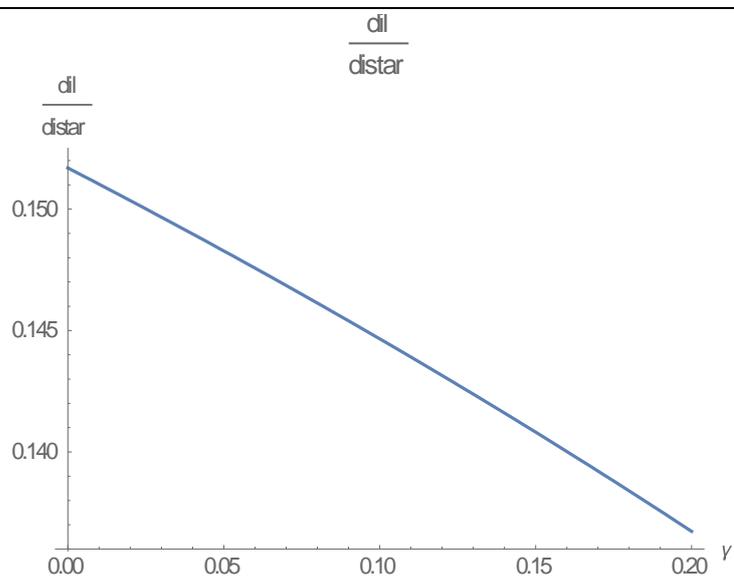
Graph A.6



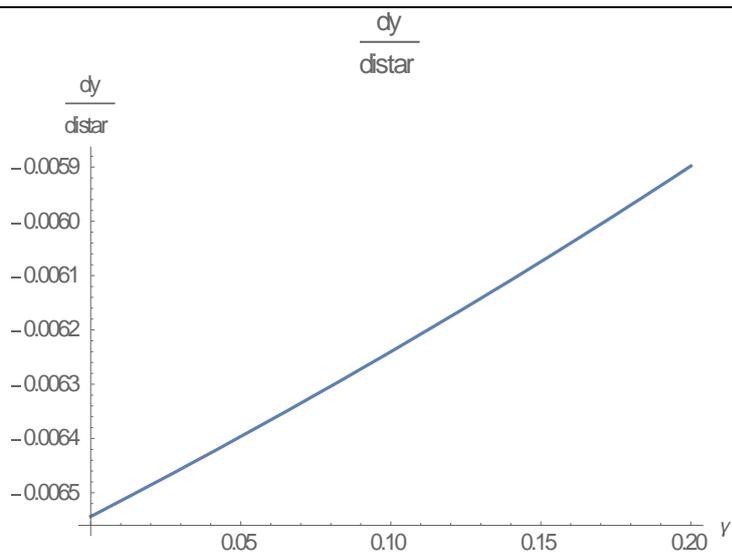
Graph A.7



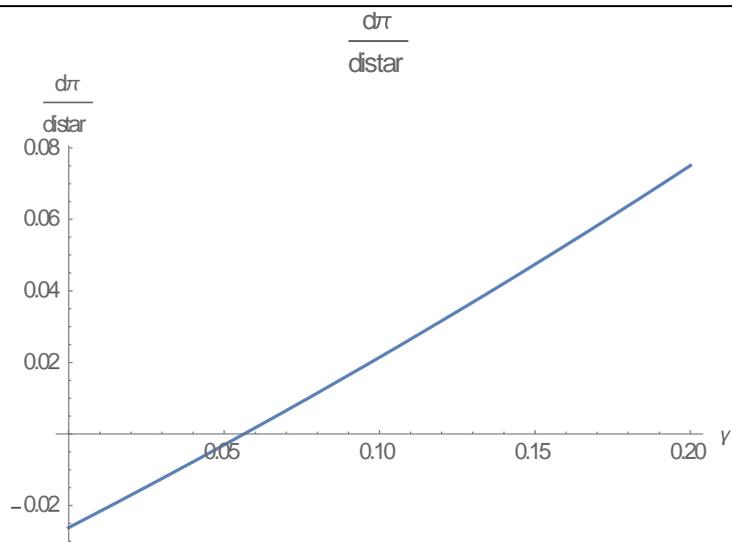
Graph A.8



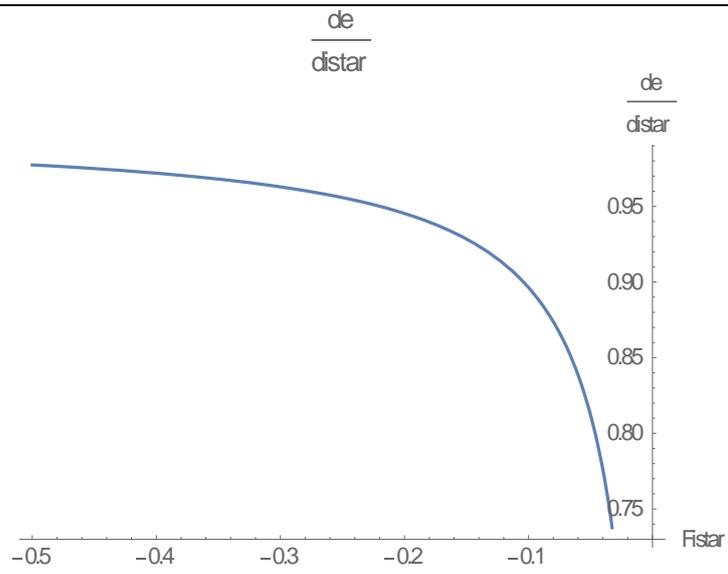
Graph A.9



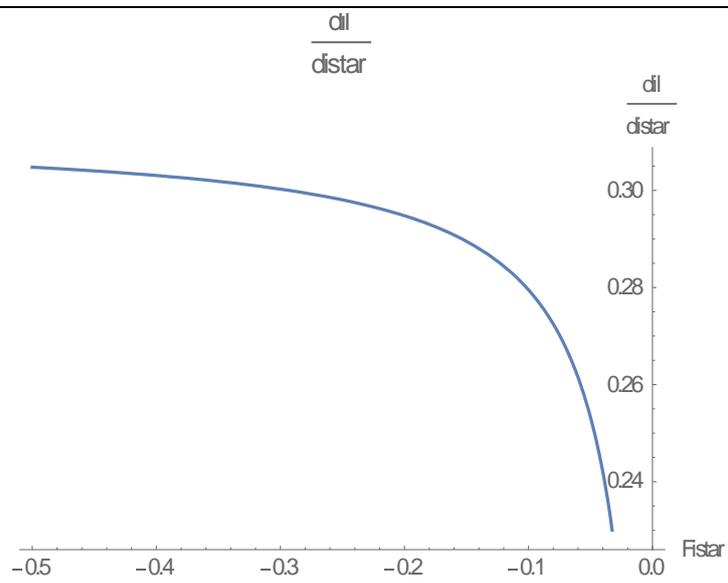
Graph A.10



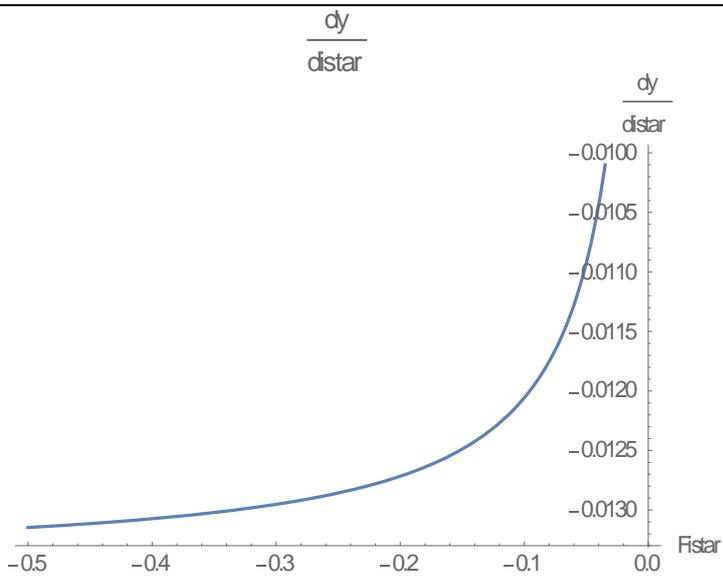
Graph A.11



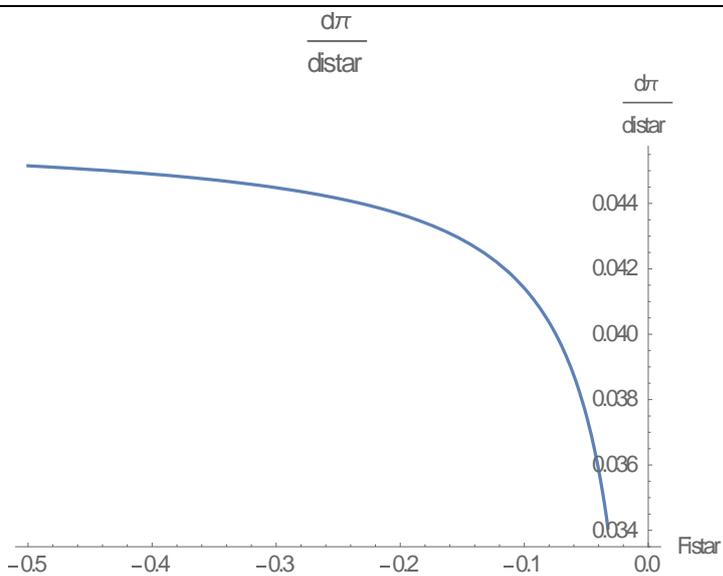
Graph A.12



Graph A.13



Graph A.14



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Should monetary policy pay attention to house prices? The Czech National Bank's approach

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Abstract

Monetary and macroprudential policies are interconnected parts of the twin mandate of many central banks. We describe the Czech National Bank's approach to one aspect of integrating these two policies, namely the use of a broader inflation measure that includes house prices and enters monetary policy considerations along with headline consumer price index (CPI) inflation. We further argue that, in terms of theory, the broader inflation gauge is at least as suitable as headline CPI for measuring the value of money, but we also acknowledge the practical problems that arise from the use of the broader index.

Keywords: macroprudential policy, monetary policy, financial stability, consumer price index, house prices, owner-occupied housing

JEL classification: E31, E44, E50, R30

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Introduction

The Czech Republic is among the few countries where headline consumer price index (CPI) inflation directly includes house prices. This inclusiveness is, however, mostly symbolic because house prices account for just 16% of the CPI's owner-occupied housing component, which in turn represents only 9% of the CPI. This approach gives house prices a 1.4% weight in headline inflation (for comparison, tobacco has a 5% weight). Moreover, the data on house prices only cover purchases of dwellings that are new to the household sector. As a result, all transactions between households are excluded from the CPI, even though 90% of real estate deals occur on the secondary market. There are practical reasons for such treatment, and the Czech Statistical Office – the agency responsible for computing the CPI – is at the forefront of efforts to measure owner-occupied housing (its current approach is very close to the one Eurostat will probably incorporate into the harmonised index of consumer prices, HICP, in 2019). Nevertheless, house prices not only play a prominent role for macroprudential policy, but also reflect an important item expenditure that a typical household must make at least once and that influences its consumption behaviour vis-à-vis other CPI segments.

We argue that it is important to integrate the macroprudential and monetary policy views and not set the tools for each policy independently. That said, this does not diminish the importance of purely macroprudential tools, which have also been implemented by the Czech National Bank (such as a non-zero countercyclical capital buffer, a capital buffer for systemically important banks, and a limit on the loan-to-value ratio for mortgages). But these fairly new tools have their limits; for example, while they seem to work well in tightening the financial cycle, we have scarce evidence on the functioning of purely macroprudential tools when it comes to the need to ease financial market conditions. Paying more attention to house prices when conducting monetary policy allows us to utilise the interest rate, the main and well tested tool of the central bank, which also has a strong effect on house prices (Williams, 2015). Thus, we call for a syncretic approach: leaning against the wind not solely by using the interest rate, but in tandem with macroprudential measures and keeping in mind the symmetry inherent in the inflation target.

The remainder of the paper is structured as follows. In Section 2, we discuss why it makes sense, from a macroprudential point of view, to consider a broader measure of inflation that also includes house prices. In Section 3, we argue that there are strong reasons to pay attention to house prices purely from a monetary policy perspective, too. In Section 4, we outline how statistical bureaus measure inflation related to owner-occupied housing. In Section 5, we describe the experience of the Czech National Bank in this field. Section 6 concludes.

Macroprudential reasons for incorporating house prices into the CPI

In the aftermath of the late 2000s' financial crisis, many economists have constructed early warning systems in which house prices play a prominent role (see, among others, Babecký et al (2011), Reimers (2012), Babecký et al (2013), Antunes et al (2014), Laina et al (2015) and Tölö (2015)). The importance of house prices is also

emphasized in the classical books on financial crises by Kindleberger and Aliber (2015) and Reinhart and Rogoff (2009). Especially in developed countries and during recent decades, house prices have tended to increase fast before a crisis, slump markedly during the crisis, and rise only gradually when the first signs of recovery kick in. The prominence of house prices among the large number of potential early warning indicators has led many commentators to stress the interaction between this variable and the monetary policy stance. As with many other issues in the recent discussion on macroprudential policy, however, it is perhaps not surprising that no clear consensus on the matter has yet been reached.

One stream of thought, represented, for example, by Assenmacher-Wesche and Gerlach (2010) and Svensson (2014), puts forward the notion that using monetary policy as a tool to stem an increase in house prices is too costly and detrimental to the welfare of the country. Williams (2015) conducts a meta-analysis of the empirical estimates reported in this literature and finds that a typical result implies a 1% loss in GDP associated with a 4% reduction in house prices delivered by monetary policy contraction. Often missing from the discussion, however, are the positive effects of such a policy on GDP and employment during the downturn, when traditional CPI targeting implies less easing than what would otherwise be optimal if house prices were also taken into account. In other words, it is important to highlight the symmetrical nature of inflation targeting, even if the definition of the targeted inflation series changes.

Several studies have demonstrated the usefulness of incorporating financial stability considerations (including, most prominently, house prices) into monetary policy rules under inflation targeting. Because our focus is on the Czech Republic, we are mostly interested in evidence for small open economies. Aydin and Volkan (2011) provide such evidence using a structural model calibrated for the case of Korea; they find that paying attention to house prices pays off for monetary policy in terms of smoother business cycle fluctuations, as compared with conventional inflation targeting. Tentative evidence for the Czech Republic is presented by Žáček (2016), who uses a similar structural model and finds that incorporating financial variables (including house prices) into the monetary policy rule helps macroeconomic stability in terms of the implied volatility of inflation and output. Therefore, we cannot discard the merit of Czech monetary policy potentially leaning against the wind of change in house prices.

Conceptual reasons for incorporating house prices into the CPI

As Goodhart (2001, p. F335) eloquently puts it: “My dictionary (Longman) defines inflation as a fall in the value of money, not as a rise in the consumer price index. If I spend my money now on obtaining a claim on future housing services by buying a house, or on future dividends by buying an equity, and the price of that claim on housing services or on dividends goes up, why is that not just as much inflation as when the price of current goods and services rises?”

Why indeed? House prices are typically excluded from official inflation measures, although other goods that also provide a flow of future services (durables such as motor vehicles and washing machines) are included. There is no clear

theoretical reason for such treatment; rather, it is a convention that arises from intuition and convenience, as we will discuss in the next section. The argument supporting the conventional exclusion of house prices goes as follows: for houses, the investment component relative to the consumption component is larger than for other durables such as cars. Moreover, a portion of the house value does not depreciate (such as land) and is therefore often considered a good store of value. In spite of that, anecdotal evidence suggests that many households treat at least their first home purchase more as consumption than investment. Furthermore, it can be shown on theoretical grounds that the prices of all assets, including houses, stocks and bonds, should in principle be included in inflation if we are to measure the current cost of the expected lifetime consumption (in the Fisherian tradition of a proper definition of intertemporal substitution) instead of merely the current consumption (see Alchian and Klein (1973)).

Put simply, every investment translates into future consumption. Just as we pay for the insurance of our property (such insurance is typically included in inflation measures), we pay for life insurance to protect our family against tragedies (life insurance is typically not included in CPI inflation). We invest in houses, stocks and bonds to ensure a good standard of living after we retire and provide for the education of our children and, potentially, their own housing needs. Across the developed world, the importance of private allowances for retirement has increased in the wake of great demographic changes, which unfortunately ensures that less money will be available for retirees from the government under pay-as-you-go pension systems. In the Czech Republic, the stock market is relatively small and houses represent the main investment item for the majority of the population. Thus, for our purposes, there is little reason to consider indices of asset price inflation other than house prices.

Aside from Alchian and Klein (1973) and Goodhart (2001), many other authors have argued for the inclusion of house prices in the consumer price index. For example, Bryan et al (2002) show that, for the case of the United States, the omission of house prices introduces an excluded goods bias and results in an underestimation of the CPI by about 0.25 percentage points annually. Diewert and Nakamura (2009) also point to the need for a more direct measure of house price inflation in the official CPI index. They suggest that the recent period of low official inflation may result from mismeasured underlying consumer prices.

Approaches to measuring owner-occupied housing

It is widely known that house prices were included with a substantial weight in the official measure of inflation in the United States prior to 1983. Other components of owner-occupied housing used in the computation of the CPI at that time were mortgage interest rates, property taxes, insurance rates and maintenance costs. It is less widely known, however, that the intention to separate the investment from the consumption part of home purchases was not the main reason for the change in the treatment of owner-occupied housing.

The paper accompanying the change and published by the Bureau of Labor Statistics (the agency responsible for computing the CPI in the United States), Gillingham and Lane (1982), features a section entitled: "Why the CPI must be changed". In that section, the need to focus on shelter services instead of

investment in housing is mentioned only in passing; instead, the following problems are stressed: (i) serious difficulties in obtaining data on house purchases not financed by mortgages insured by the Federal Housing Administration; (ii) financial innovations that make it harder to collect reliable data on mortgage rates; (iii) changes in tax laws that complicate the use of house prices in inflation measures; and (iv) public distrust in the current measure of the CPI, given, among other things, the substantial volatility of house prices.

That is, the principal reason why house prices are typically excluded from the main inflation measure is empirical rather than theoretical: it is difficult to collect reliable data on house prices, especially at monthly frequency and without a significant delay, and the series tends to be more volatile than the other components of the CPI. Still, it is hard to entirely ignore home ownership and the associated costs in inflation measures (owner-occupied housing is missing entirely from the HICP gauge published by Eurostat, although it is planned to be included in the future). In most countries, a large proportion of households live in their own homes, which means that the costs associated with housing are not directly observable in terms of market rents. There are four main approaches to measuring owner-occupied housing: the acquisitions, rental equivalence, user cost, and payments methods. We outline these approaches in Table 1, while Table 2 provides a few examples of countries that use different approaches.

The acquisitions approach, formulated almost exclusively in “net” form, covers all expenses of households connected with home purchases, but only household purchases from other sectors are considered (therefore, only the prices of new houses are typically captured by this approach; prices on the secondary market are irrelevant). Other aspects taken into account are costs associated with reconstruction, repairs and maintenance, as well as insurance and property charges. More details about this method are available, for example, in Eurostat (2012) and Eurostat (2013). The method is currently employed by Australia and New Zealand for their quarterly measures of inflation, which means that the headline CPI inflation numbers of these countries directly include the prices of (new) houses, although commonly with a negligible weight.

Components of owner-occupied housing

Table 1

Component	Acquisitions	Rental equivalence	User cost	Payments
House purchase	x			
Property rates and charges	x		x	x
Owner-occupied rents		x		
Owner-occupied user costs			x	
Mortgage interest charges				x

Note: Adapted from Woolford (2010).

The rental equivalence approach uses the concept of imputed rent, in which the statistical bureau in charge of computing the CPI constructs the hypothetical rent paid by home owners to themselves, typically by using the market rents observed for homes with similar characteristics. This method is problematic for countries where the rental market is not well developed. In any case, to the best of our

knowledge, it is the most widespread approach used by countries including the United States, Germany, Switzerland and Norway. More details about the method, and especially its US incarnation, are provided by McCarthy et al (2015).

The user cost approach is probably the most technically sophisticated one and is computed as the costs of acquiring the house at the start of the period, plus all fees, taxes, mortgage payments, and repairs during the period, minus the price of the house at the end of the period (the price for which the house could be sold, thus reducing the user cost). Because of the complexity of the method, many variants exist, some of them used by Canada, Ireland and Sweden. In the case of Sweden, the inclusion of mortgage rates in the official CPI measure delivers the price puzzle: an increase in the monetary policy rate leads to inflation in the short run by definition (see Rusnák et al (2013) for a survey). In consequence, Sveriges Riksbank has to use an alternative measure of inflation with fixed mortgage rates and is not pleased with it (Jansson (2015); Johansson (2015)).

Finally, the rarely used payments approach (also called the cash-flow approach) focuses on actual expenses associated with home ownership, such as property taxes, reconstruction and repairs, insurance and mortgage payments, which, among other things, means that the price puzzle problem occurs here as well. The payments approach is used, for example, in Austria. Many other countries, such as Belgium, France, Italy, Spain and the United Kingdom, do not account for owner-occupied housing in their headline CPI inflation figures at all.

Examples of the treatment of owner-occupied housing

Table 2

Approach	Countries
Net acquisitions	Australia, New Zealand
Rental equivalence	Denmark, Germany, Netherlands, Norway, Switzerland; Japan, Mexico, South Africa, the United States
User costs	Iceland, Ireland, Finland, Sweden; Canada
Payments	Austria
Headline CPI inflation measure excludes owner-occupied housing	Belgium, Estonia, euro area, France, Greece, Italy, Luxembourg, Poland, Portugal, Spain, the United Kingdom; Argentina, Brazil, China, India, Indonesia, Korea, Russia, Saudi Arabia, Turkey

Sources: Boldsen (2011); Eurostat (2012); OECD (2015a, 2015b); national statistical bureaus.

The Czech experience

According to the latest available Eurostat statistics, close to 80% of Czechs live in their own houses and apartments, which is substantially above the EU average. Moreover, Czechs typically spend 26% of their disposable income on expenses associated with housing, the highest percentage among all the OECD countries. These two facts underline the importance of accounting in the CPI for costs associated with owner-occupied housing. The Czech Statistical Office has been attempting to do so for two decades. The changes in the definition of owner-occupied housing in the Czech CPI are described in Table 3.

The method of the Czech Statistical Office has traditionally been based on rental equivalence, though not on the typical hedonic approach that approximates housing costs by using the market rent of a dwelling with similar characteristics. Prior to 2007, owner-occupied housing was defined as payments in dwellings of housing cooperatives. Since 2007, the Czech Statistical Office has assigned non-zero weights to construction work including materials and inputs in residential buildings. A major change in the philosophy of Czech owner-occupied housing came in 2015, when the figure started to cover purchases of new dwellings as well, albeit with a small weight (8%). The weight of the latter item doubled in 2017 (and more than tripled for inflation measured in the capital city of Prague). Because house prices are only available at quarterly frequency, monthly figures need to be interpolated.

The treatment of owner-occupied housing by the Czech Statistical Office

Table 3

Period	Component of owner-occupied housing	Weight
until 2006	Payments in dwellings of housing cooperatives	100%
2007–11	Construction work, including materials	77%
	Payments in dwellings of housing cooperatives	23%
2012–14	Price of construction work, including materials	41.5%
	Inputs in residential buildings	41.5%
	Payments in dwellings of housing cooperatives	17%
2015–16	Construction work, including materials	38.2%
	Inputs in residential buildings	38.2%
	Payments in dwellings of housing cooperatives	15.6%
	Purchases of new dwellings	8%
since 2017	Self-repair and overhaul	25%
	Maintenance, reconstruction, and renovation	52.7%
	Real estate brokerage	6%
	Purchases of new dwellings	16.3%

Note: In the future the Czech Statistical Office intends to further reduce the difference between its definition of owner-occupied housing and the definition used by Eurostat.

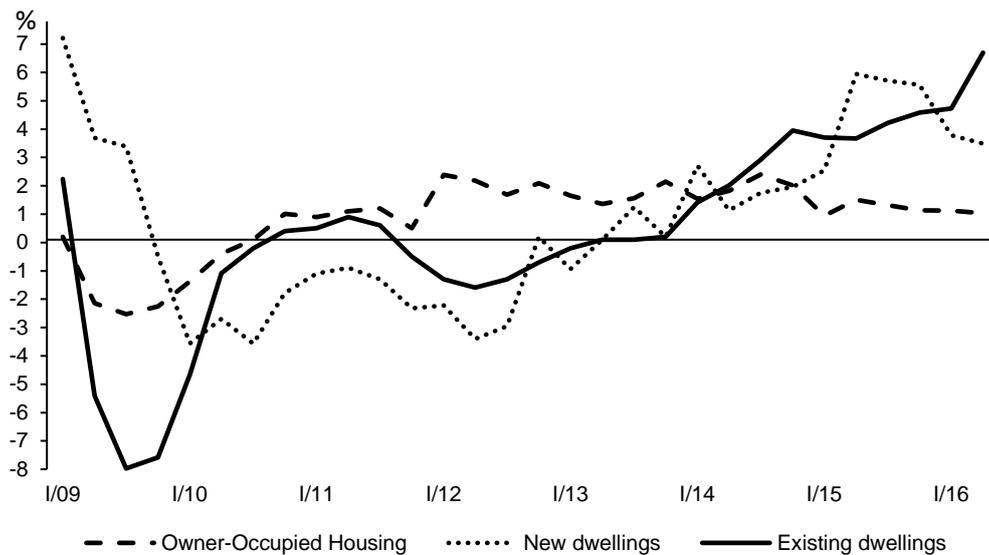
Although the owner-occupied housing item in the Czech CPI is still described as being computed by the rental equivalence approach (Czech Statistical Office 2016), in the terminology introduced in the previous section, we perceive it as being closer to the definition of the net acquisitions approach. The intention of the Czech Statistical Office is to gradually converge with the definition of owner-occupied housing as prepared by Eurostat, which also employs the net acquisitions approach. A side effect of this definition is the relatively small weight of the entire item in the Czech CPI: owner-occupied housing accounts for about 9% of the index, compared with 24% in the United States, 15.6% in Japan and 12.2% in the United Kingdom (an alternative index with owner-occupied housing; headline CPI inflation in the United Kingdom excludes home ownership costs). As discussed in ECB (2016), the weight of housing indices based on net acquisitions is typically much smaller than the weight of imputed rentals, because the latter cover not only new but all owner-occupied dwellings.

Graph 1 shows that the index of owner-occupied housing for the Czech Republic (computed according to the Eurostat definition, which is nevertheless very close to the 2017 definition of the Czech Statistical Office) does not display much cyclical variation and is only mildly correlated with house prices. The index includes prices of dwellings new to the household sector, but only with a small weight; moreover, it excludes prices of dwellings sold from one household to another, which is how most transactions in the housing market take place (in the Czech Republic it is 90% according to the Eurostat). We can also see that prices of new dwellings show considerably less variation than prices of existing dwellings. The index of new dwellings did not capture, for example, the large fall in house prices on the secondary market in 2009. Prices of existing dwellings provide a better early warning signal (see Section 2), because individual households are more sensitive to changes in sentiment than developers, who are more likely to be able to wait and see before selling.

Owner-occupied housing does not capture the cyclical variation of house prices

In per cent

Graph 1



Source: Czech Statistical Office.

For these reasons we believe there is merit in giving a non-zero weight to the prices of existing dwellings. In the first half of 2016, the Czech National Bank started to compute for its internal purposes an experimental index of broader inflation, including house prices along with the traditionally defined owner-occupied housing (CPIH). The weight of existing dwellings was set to 14%, which is a significant share (especially in comparison with owner-occupied housing based on the net acquisitions approach), but still smaller than the weight used in the US CPI prior to 1983. The weight is determined by the share of consumer expenditure on existing dwellings and is consistent with the way the weights for the other components of CPI are computed. Weights for individual categories in Czech CPI and CPIH are shown in Table 4. An important issue that we do not tackle is the regional

differences in the development of house prices, which may have important macroprudential implications. Nevertheless, regional heterogeneity is not a problem specific to house prices, as the development of individual components of CPI differs across regions too.

Components of Czech CPI and CPIH

Table 4

COICOP	Title	Weight in CPI	Weight in CPIH
01.	Food and non-alcoholic beverages	18.1%	15.5%
02.	Alcoholic beverages and tobacco	9.3%	8.0%
03.	Clothing and footwear	3.9%	3.4%
04.1	Actual rentals for housing	3.5%	3.0%
04.2	Owner-occupied housing (including new dwellings)	8.7%	7.5%
04.x	Existing dwellings	0.0%	14.0%
04.y	Other expenses on housing, water, electricity, gas and other fuels	12.9%	11.1%
05.	Furnishings, household equipment and routine maintenance	5.8%	5.0%
06.	Health	2.3%	2.0%
07.	Transport	10.1%	8.7%
08.	Communication	3.1%	2.6%
09.	Recreation and culture	9.0%	7.7%
10.	Education	0.6%	0.5%
11.	Restaurants and hotels	5.8%	5.0%
12.	Miscellaneous goods and services	6.9%	6.0%

Note: CPIH = CPI including the prices of existing dwellings.

Sources: Czech National Bank; Czech Statistical Office.

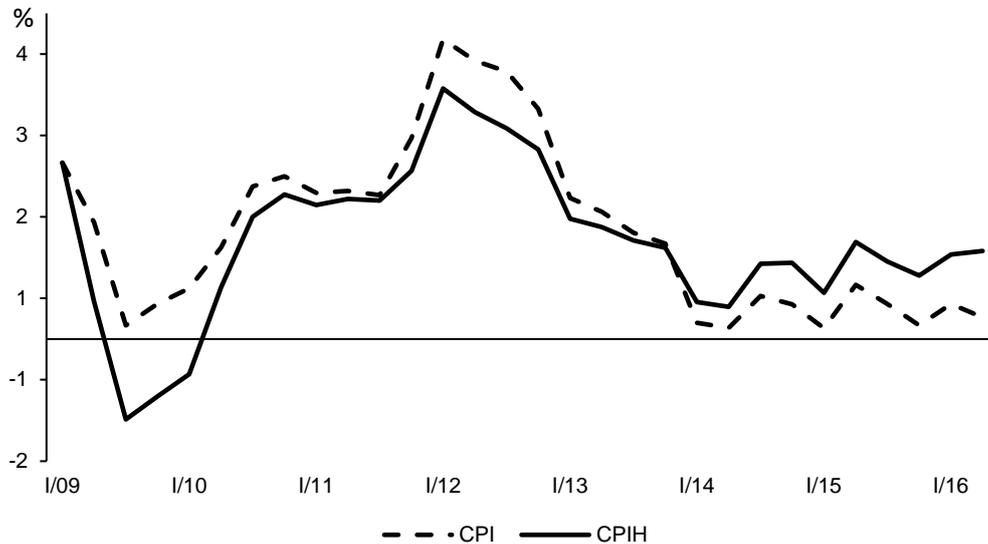
Graph 2 shows that the broader inflation measure would call for significantly more expansionary monetary policy in 2009, 2010 and 2012,² but somewhat tighter monetary conditions in 2015 and 2016 – although in the latter case even broader inflation was safely below the Czech National Bank’s target of 2%. While the difference between the CPI and the CPIH is substantial, it is not dramatic, and CPIH targeting would not radically redefine the conduct of Czech monetary policy. If anything, it would make it more aggressively countercyclical.

² In 2012, the Czech National Bank reached the zero lower bound on the policy rate, and in 2013, as a means of additional monetary easing, it made a commitment to keep the Czech koruna from appreciating beyond CZK 27 per euro. The exchange rate commitment has benefited the Czech economy significantly (Opatrný, 2016). Had the Czech National Bank targeted the CPIH instead of the CPI, the commitment would probably have been introduced earlier.

Accounting for house prices markedly changes the profile of inflation

In per cent

Graph 2



Note: CPIH = CPI including prices of existing dwellings.

Sources: Czech National Bank; Czech Statistical Office.

Conclusion

We do not argue that the time has come to replace the current inflation measures with broader indices that fully incorporate house prices. Rather, we consider such broader measures of inflation to be useful supplementary indicators, similar in this function to core inflation, which, in contrast, constitutes a narrower gauge than headline CPI inflation. The assessment of Goodhart (2001) resonates with our thoughts on the matter: "Continuity, certainty, and simplicity all argue against chopping and changing existing procedures. So in the conclusions, we do not argue for replacing the present measures, but of paying rather more attention to accompanying, alternative measures which *do* give a more appropriate weighting to asset prices." A major technical limitation of the broader index is that, at present, reliable data on house prices are available only at quarterly frequency and with a significant lag (although that will cease to be a problem when the Czech National Bank gains direct access to the land registry, where all price information is available within a few days after property changes hands).

Consequently, the Czech National Bank has not dropped its focus on headline CPI inflation in favour of a broader measure that includes house prices, and does not plan to do so in the near future. But the broader measure, the CPIH, has become one of the important indicators that the Czech National Bank's board considers when it decides on changes in the monetary policy stance. In a well-known and colourfully entitled paper, "Measuring inflation: the core is rotten," the President of the Federal Reserve Bank of St. Louis, James Bullard, criticises the Federal Reserve's focus on core inflation and argues for paying more attention to a broader gauge of inflation. To paraphrase Bullard's (2011) provocative statement,

we can say the following: one immediate benefit of dropping the sole emphasis on an inflation measure that excludes house purchases would be to reconnect central banks and statistical bureaus with households and businesses that know price changes when they see them.

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Hong Kong's property market and macroprudential measures

Hong Kong Monetary Authority

Abstract

As property market bubbles could have huge repercussions on financial and macroeconomic stability, flexible policies to lean against the wind are vital. Hong Kong SAR has long relied on macroprudential measures, particularly caps on loan-to-value (LTV) ratios, to contain banking sector risks that may arise from these bubbles. This note attempts to broaden the understanding of the implementation of macroprudential policies by sharing Hong Kong's experience. In particular, our research shows that macroprudential policies, especially LTV policy, is effective in strengthening banks' resilience to property price shocks through reducing borrowers' leverage. However, decisions on the timing and intensity of LTV tightening and loosening require a considerable degree of judgment and discretion. This calls for property market activities, as well as potential risks to the banking sector, to be frequently and comprehensively monitored.

Keywords: banking, Hong Kong SAR, loan-to-value, macroprudential policy, mortgage, property market

JEL classification: E58, G21, R31

Introduction

As property market bubbles could have huge repercussions on financial and macroeconomic stability, flexible policies to lean against the wind are vital. In the absence of independent monetary policy, Hong Kong SAR has long relied on macroprudential measures, particularly caps on loan-to-value (LTV) ratios, to contain banking sector risks that may arise from real estate bubbles.

The implementation of macroprudential policies is challenging for two reasons. First, unlike monetary policy, the implementation of macroprudential policies is not based on a clear set of rules; on the contrary, it requires an assortment of monitoring and assessment tools to guide the timing and intensity of policy adjustments. Second, the transmission mechanism of macroprudential policies is not yet fully understood.

This note attempts to broaden our understanding of the implementation of macroprudential policies by sharing Hong Kong's experience. Section 1 outlines how macroprudential measures in Hong Kong contributed to a more resilient banking sector in terms of property price risks during and after the 1997–98 Asian financial crisis (AFC). Section 2 summarises the tools adopted by the Hong Kong Monetary Authority (HKMA) to monitor the property market (we focus particularly on this market because of its unmatched role in affecting banking stability in Hong Kong). Section 3 outlines the findings of our recent research in an effort to shed light on the transmission mechanism of LTV policy, a key property-related prudential measure adopted by the HKMA. Section 4 concludes.

The effectiveness of macroprudential policies – evidence from Hong Kong during the AFC

Macroprudential policies are not new to Hong Kong. In 1997, the AFC triggered an unprecedented property market crash in Hong Kong that forced the jurisdiction into a deep recession and saddled it with six consecutive years of deflation. Prior to the start of the crisis, however, the HKMA had tightened macroprudential measures to protect the banking sector from the risks of the property price bubble.¹ Thus, while Hong Kong's banking sector was certainly hard hit by the crises, as was most of East Asia, it did not experience systemic failures.

Data presented in Graph 1 suggest that Hong Kong's economy tends to fare better than other economies in terms of financial stability during real estate crises, particularly when examining mortgage delinquency rates.

Following the start of the AFC, Hong Kong's home prices plunged by nearly 70% between 1997 and 2003. Throughout this same period the mortgage delinquency ratio stayed below 1.5% (panel A). These figures stand in contrast with those of the United States in the aftermath of the collapse of Lehman Brothers (the so-called spark that set off the Great Financial Crisis (GFC)). Between 2007 and 2012, the mortgage delinquency ratio shot up to more than 10% following a 31% drop in property prices (panel B). The experience in Europe was similar. In Ireland, for example, the mortgage

¹ Wong et al (2015).

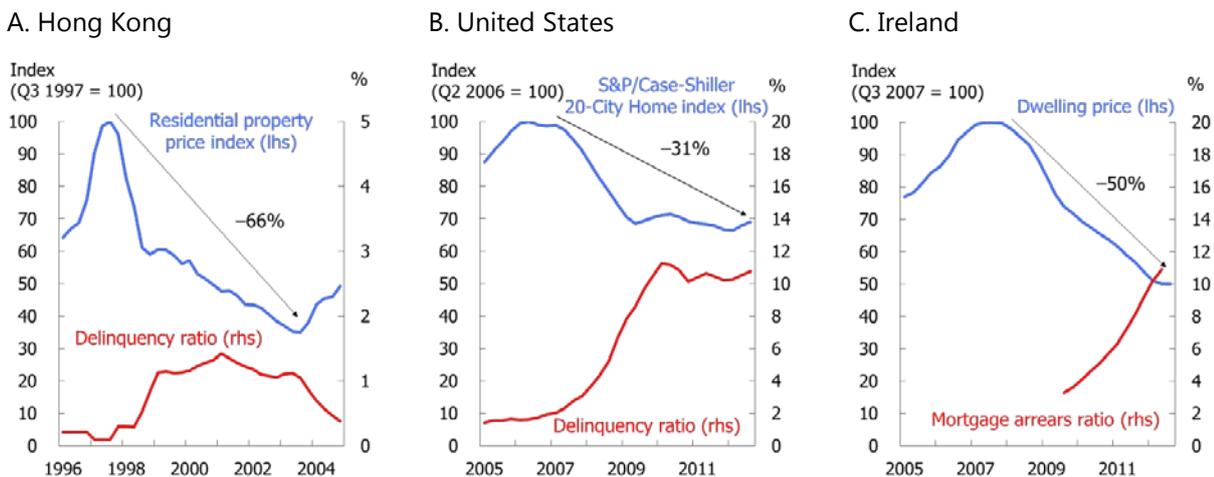
delinquency rate rose to more than 10% when property prices dropped by 50% during the same period (panel C).

The figures show, in short, that the mortgage delinquency rate in Hong Kong rose by much less during the AFC than that of other economies during the GFC, even though its property price drop was much more severe. Hong Kong's experience can be taken as suggestive evidence that macroprudential policies can protect banks from the disruptive effects arising from credit asset price spirals.

Residential property price indices and delinquency ratios²

In per cent

Graph 1



Sources: HKMA; Hong Kong Rating and Valuation Department; US Federal Reserve; Standard & Poor's; BIS; Datastream.

Monitoring the property market

The current state of the property market cycle

Over the past few years, Hong Kong has once again been experiencing a rapid spike in property prices. This latest up-cycle is the longest it has ever experienced; it began around 2003, recovering from the trough that followed the AFC, and continued to rise until the GFC, which caused a short lived six-month blip before it resumed its rapid increase until late 2015.

Panel A in Graph 2 shows official property prices and transactions data. While property prices rose sharply after the GFC until late 2015, a global market sell-off (which saw a turn in market sentiment) in August 2015 led to significant price corrections. However, property prices have rebounded significantly since the second quarter of 2016. Data from real estate agents (panel B), which are timelier in reflecting current market situations due to shorter time lags, show no clear signs that property

² Delinquency ratios are computed based on those loans past due 30 days or more. The mortgage arrears ratio is based on loans past due 90 days or more, but data are only available from Q3 2009 onwards. There remain differences in the definitions from one economy to another, so they are not directly comparable.

prices have stabilised. Property transactions, meanwhile, have declined over the past several years, mainly reflecting the effects of our prudential and tax measures. However, signs of an uptick in the volume of transactions have been appearing since 2016. Given the imbalances in the property market, we have been monitoring the situation closely.

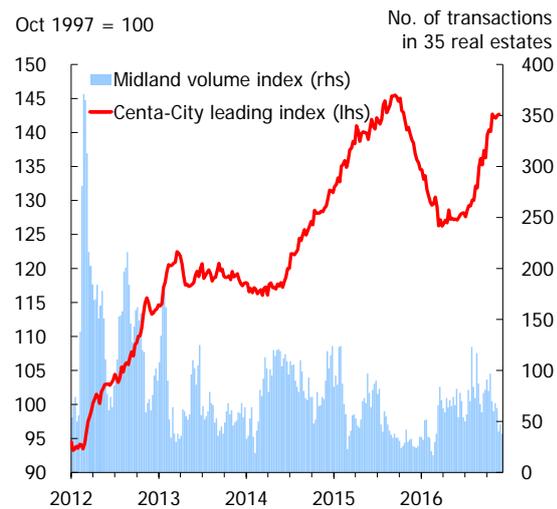
Residential property prices and transactions

Graph 2

A. Official data



B. Agency data



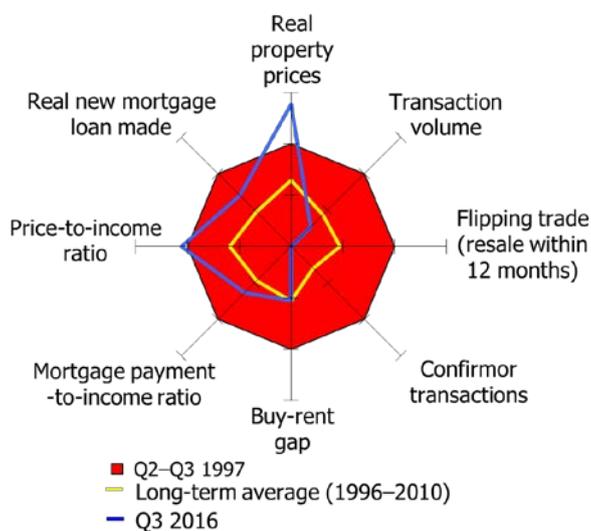
Sources: HK Rating and Valuation Department; HK Land Registry; Centaline Property Agency; Midland Property Agency.

Monitoring tools

The lessons learned from Hong Kong's property bubble burst in 1997 have served as a useful reference in identifying and detecting property market pressures. The HKMA has developed a graphical framework that condenses the most relevant indicators of property market pressures and allows for the continuous assessment and monitoring of risks and vulnerabilities. Indicators (as shown in Graph 3) include those related to property market activities (ie price and transaction volumes and new real mortgage loan made); speculative activities (ie flipping trades and confirmor transactions³); affordability (ie the price-to-income ratio and mortgage payment-to-income ratio); and user-cost measures (ie the buy-rent gap).

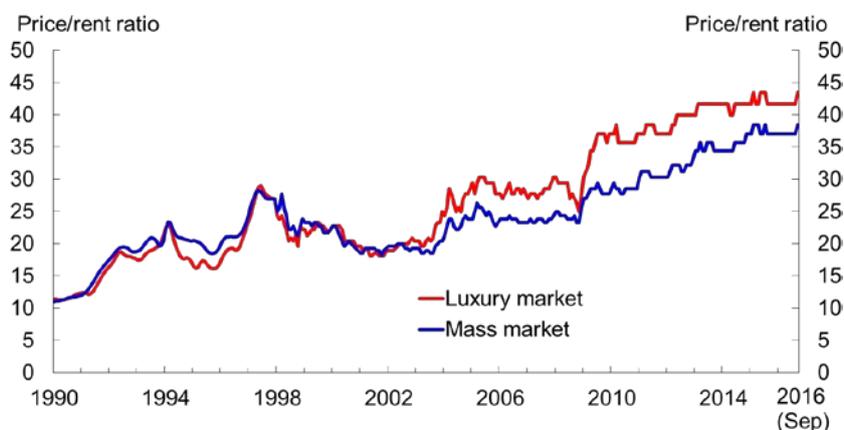
The red area in Graph 3 shows the situation in 1997, when the property market was at its peak. The yellow border highlights the historical average and the blue border the recent situation in Q3 2016. Both real property prices and the price/income ratio have surpassed the 1997 peak. However, the transaction volume is no higher than the long-term average, while speculative activities are almost non-existent, partially reflecting the tax and macroprudential measures in place.

³ Confirmor transaction refers to cases in which the property is resold before the original transaction is completed.



Source: HKMA.

The HKMA has also developed models to assess property price pressures. As detailed in Leung et al (2008), the co-integration method is being used to estimate the long-run equilibrium of property prices, which are based on supply and demand side fundamentals, including real GDP per capita, real interest rates and flat supply. This model helps to detect deviations from fundamental property prices. Meanwhile, a statistical method (Yiu et al (2013)) is also being used to detect housing bubbles through the price-rent ratio. As shown in Graph 4, the price-rent ratio has surged in the past few years and is currently much higher than its previous peak in 1997. This points to an overheating property market.



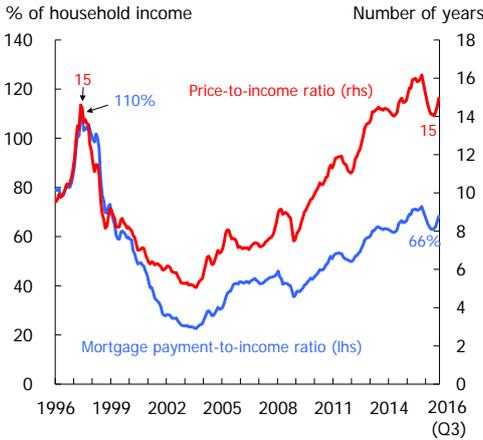
Source: HKMA.

In deploying these tools, we need to be mindful of possible distortions under the ultra-low interest rate environment. The price/income ratio rose rapidly over the past

few years to stay at a high level of 14–15, close to the 1997 peak. Nevertheless, when compared with the price/income ratio, the mortgage repayment/income ratio (blue line in Graph 5) rose at a less rapid pace. This is mainly due to the low prevailing mortgage rate, now at 2% compared with the long-term average of 5%. After the bubble burst in 1997, the mortgage rate actually dropped by some 9 percentage points, which alleviated the mortgage burden and led to lower mortgage delinquency (Graph 6). However, this time around, the current ultra-low interest rate has little room to move further down. Mortgage rates can only go up, which would put borrowers under significant stress.

Price/income ratio and mortgage payment/income ratio

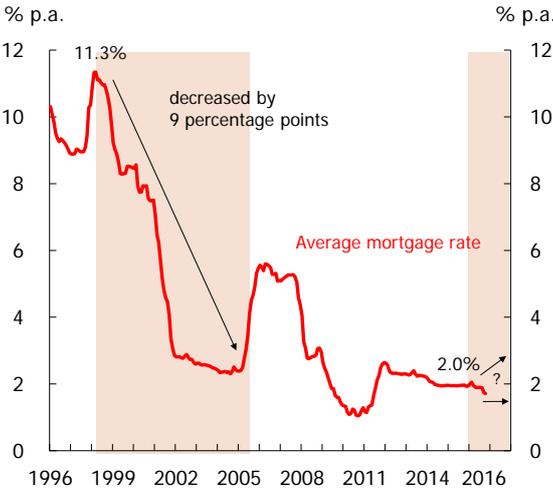
Graph 5



Source: HKMA.

Average effective interest rate of new mortgages approved

Graph 6



Source: HKMA.

Property market measures in Hong Kong

Macroprudential measures

In an effort to contain risks related to property bubbles, the HKMA has introduced countercyclical prudential measures specifically targeting the property market. An important lesson learned from the AFC is that authorities must act early in the cycle, as expectations of price increases are difficult to reverse once they become entrenched. Since October 2009, the HKMA has introduced seven rounds of macroprudential measures, mainly by gradually lowering the caps on the LTV ratio and debt service ratio (DSR) and by extending the prudential target from luxury homes to investment properties, and later to those where borrowers repay their debt with foreign income or have multiple mortgages.⁴

Other property market measures

While the HKMA continues to focus on macroprudential measures to maintain financial and banking stability, there is also a need to coordinate with fiscal and land authorities. As a long-term solution, land authorities have introduced land and housing supply measures to redress property market imbalances.

The fiscal authority has also introduced a number of demand management measures to dampen speculative activities in order to buy time for supply side measures to take effect. For example, in November 2010, the Hong Kong government introduced a special stamp duty (SSD) of 15% for properties resold within two years. In October 2012, it raised the SSD rate to 20% for properties resold within three years. It also introduced a 15% buyer's stamp duty (BSD) on residential properties acquired by companies and non-locals. In February 2013, the government doubled the rates of the existing ad valorem stamp duty (also known as DSD) for transactions of all types of property, except for first-time local resident home buyers. In November 2016, the government increased the stamp duty to 15% for all residential property acquisitions by individuals or companies except for first-time local resident home buyers.

Exit strategies for countercyclical measures

Although current property market conditions may suggest that a tightened stance on macroprudential policies should be maintained, it is important to remain forward-looking in terms of when and how one might exit from countercyclical measures under a systematic framework. This task can be just as difficult as calibrating the measures during the up-cycle. First, we need to be clear that the policy objectives of easing the measures should include:

1. facilitating an orderly adjustment during a downturn;
2. avoiding self-reinforcing, downward spirals arising from negative feedback loops between credit and asset prices; and
3. returning the macroprudential policy stance to neutral.

⁴ For instance, on 27 February 2015, the HKMA announced in its seventh round of prudential measures that it would be lowering the following caps: the LTV cap (from 70% to 60%) for self-use residential properties with a value below HK\$7 million; the DSR caps (from 50% to 40%) for borrowers who buy a second residential property for self-use and mortgage loans on all non-self-use properties; and the respective stressed DSR caps (from 60% to 50%).

When there are signs of a correction in property prices, two key questions must be asked. Is the property market in a down-cycle? And are property prices still overvalued despite the correction? The types of exit strategy to implement must then be evaluated, ie radical or gradual ones. Determining such strategies involves taking into account cycle asymmetry, ie down-cycles tend to be shorter and the window of time for easing is narrower than that for tightening. The adjustments could be temporary, orderly or disruptive. When the adjustment is disruptive, a radical exit strategy is a more straightforward response. However, when authorities see only a mild adjustment, it can be difficult to tell whether it is orderly or only temporary. In these cases, we have to determine whether we should act early using a gradual exit strategy, or wait until a down-cycle is confirmed before implementing a more radical approach. This will involve an evaluation into the costs associated with Type I and Type II policy errors and how to mitigate them.

The transmission mechanism of LTV policy

LTV policy is a major property-related prudential measure that the HKMA uses as a tool to mitigate the amplification of credit asset price spirals and to protect banks from the disruptive effects. Authorities using this tool in pursuit of financial stability need to first determine the optimal targets of LTV policy. Specifically, is the policy targeting household leverage, credit growth and/or property prices? The answer crucially depends on the transmission mechanism of LTV policy – particularly the extent of the policy pass-through on these three variables – and their respective contributions to financial stability.

We have used some empirical models to shed light on this issue. First, we studied the short-term policy impact on property market activities for three selected economies, namely Hong Kong, Korea and Singapore (Wong et al (2015)). The econometric evidence for the dampening effect of tightening LTV caps on property market activities is mixed: for Hong Kong, although we find that the tightening of LTV caps would reduce property price growth marginally, the policy effect on the property price gap and property transactions is statistically insignificant. Statistical evidence for Korea and Singapore also supports the conclusion that LTV caps have a limited impact on property prices.

Instead of affecting property market activities, LTV policies are more effective in strengthening banks' resilience to property price shocks. We also conducted empirical studies to examine the pass-through of LTV policy to borrowers' leverage and credit growth and their respective contributions to financial stability (Wong et al (2015)). Our findings, based on econometric analyses of panel data from 13 economies, suggest that countries with LTV policies tend to have a lower sensitivity of mortgage default risk to property price shocks.⁵ The sensitivity of the mortgage delinquency ratio to property prices is found to be negative and lower (in absolute terms) in economies with LTV policies than in those without LTV policies. A 1% drop in property prices would increase the delinquency ratio by 0.35 basis points in economies with

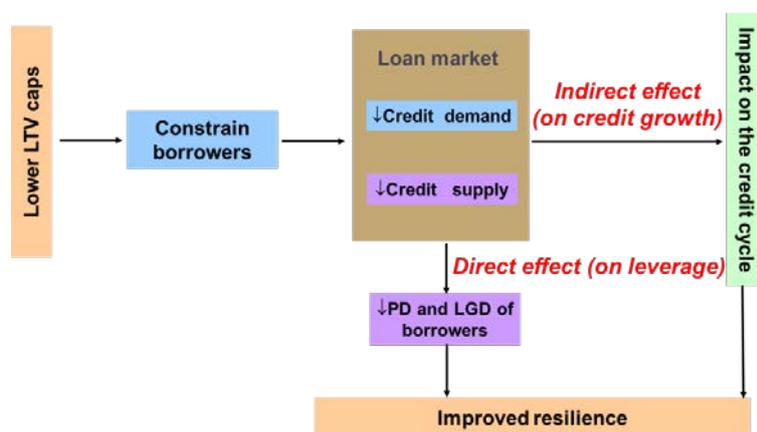
⁵ The 13 economies include: Australia, Canada, Greece, Hong Kong, Korea, Malaysia, the Philippines, Portugal, Singapore, Spain, Thailand, the United Kingdom and the United States. Of these, Hong Kong, Korea, Malaysia and Singapore have adopted an LTV policy, according to the BIS (2010) and information obtained from their respective central banks/supervisory authorities.

LTV policies, and by 1.29 basis points in those without. Overall, the findings are consistent with the evidence presented in Section 1.

To understand how LTV policy helps to increase banks' resilience to property price shocks, Graph 7 outlines the transmission mechanism of LTV policy. Theoretically, it works through both direct and indirect effects (CGFS (2012)). The direct effect improves the resilience of banks by lowering leverage, because mortgagors would hold a larger equity buffer at origination, contributing to a lower likelihood of negative equity and thus a lower default risk. The indirect effect works through lower credit growth by preventing banks from underwriting excessively fresh mortgage loans, which are generally subject to higher default risks due to a relatively low portion of equity.

Transmission mechanism of LTV policy

Graph 7



Source: A simplified version of Graph 3.3 from CGFS (2012).

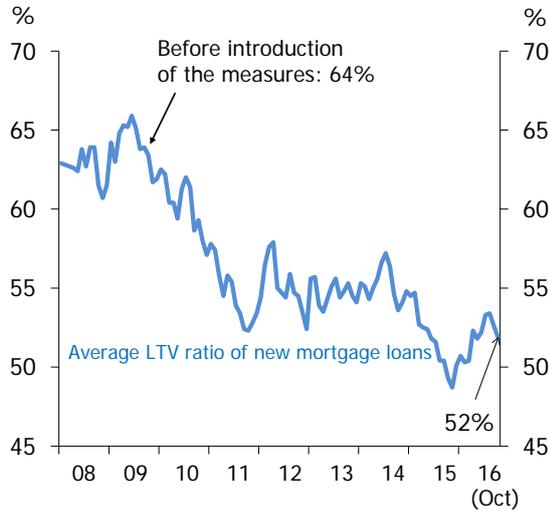
In fact, the countercyclical macroprudential measures have helped to contain household leverage and build a substantial buffer for banks against a sharp correction in property prices. Panel A of Graph 8 shows that, due to several rounds of tightening of the LTV ratio, banks can now absorb, on average, a 50% drop in property prices before incurring default losses (compared with 36% in 2009). Panel B shows a lessening of the repayment burden of the borrowers after the DSR was reduced to 34% from around 41% in 2010.

Average LTV ratio of new mortgage loans and the DSR

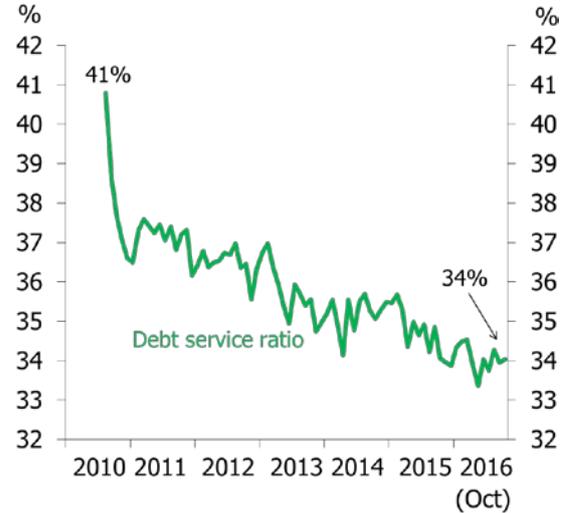
In per cent

Graph 8

A. Average LTV ratio of new mortgage loans



B. Debt service ratio



Source: HKMA.

We also try to quantify the contribution of the direct and indirect effects to strengthening the banking sector's resilience to property price shocks (Wong et al (2015)). We apply an econometric model to estimate the problem loan ratio from Q1 2013 to Q4 2014 under the actual and "no policy" scenarios, assuming there is a significant adverse economic shock in the eight quarters starting from Q1 2013.⁶ Chart 9 shows that the problem loan ratio in the actual scenario (denoted by d_A) would increase from 0.03% in Q4 2012 to around 0.95% in Q4 2014. By contrast, the problem loan ratio in the counterfactual scenario (denoted by d_C) would be much higher at 2.32%.

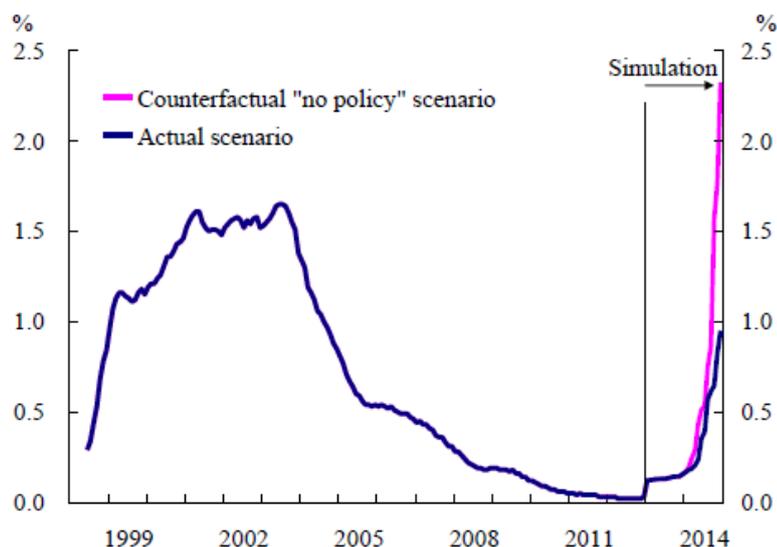
The results show that the five rounds of LTV cap tightening improved the banking sector's resilience to a severe property price shock. Our core interest, however, is the relative contribution of the direct and indirect effects of the LTV cap tightening to the 1.37 percentage point reduction in the estimated problem loan ratio from the counterfactual "no policy" scenario to the actual scenario. To this end, we estimate the direct and indirect effects separately. Table 1 shows that the effect of LTV policy on reducing the sensitivity of mortgage default risk to property price shocks is mainly through direct effects. These findings suggest that tightening LTV caps would reduce household leverage, and that the effect on leverage plays the primary role in reducing the mortgage default risk. The effect of LTV policy would be transmitted mainly through the impact on the household leverage rather than on property market activities.

⁶ This shock includes a 60% drop in property prices; a 300-basis-point increase in the reference interest rate; a 20% decline in household income; and the unemployment rate increasing to 8.5%.

Estimated stressed delinquency ratio for mortgage loans under the actual and counterfactual scenarios

In per cent

Graph 9



Source: Wong et al (2015).

Estimated problem loan ratio under different scenarios

Table 1

Scenarios	Estimated problem loan ratio at end-2014 (%)
1. Actual (both the direct and indirect effects)	$d_A = 0.95$
2. Only the direct effect	$d_{NI} = 0.98$
3. Only the indirect effect	$d_{ND} = 2.03$
4. Counterfactual ("no policy")	$d_C = 2.32$

Source: Wong et al (2015).

Conclusion

Property market bubbles can have huge repercussions on financial and macroeconomic stability and therefore implementing policies to lean against the wind is important. Macroprudential policies, especially LTV policy, are effective in strengthening banks' resilience to property price shocks through reducing borrowers' leverage. However, decisions on the timing and intensity of LTV tightening and easing need a considerable degree of judgment and discretion. This calls for frequent and comprehensive monitoring of property market activities and of the potential risks to the banking sector.

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Regionally-differentiated debt cap rules: a Hungarian perspective

Péter Fáykiss, Márton Nagy and Anikó Szombati¹

Abstract

Budapest, the capital of Hungary, has experienced a two-year growth rate of 50% in housing prices (Q2 2014 – Q2 2016). This increase has been significantly higher than in the rest of Hungary, but calculations show that houses are not yet overvalued in any region of the country. Still, the characteristics of the housing market in the Budapest metropolitan area make this region the primary candidate for a possible regional housing bubble in the future. International experience has shown that housing bubbles accompanied by lending booms pose a serious risk to financial stability. Therefore, the Magyar Nemzeti Bank has started to evaluate the potential macroprudential interventions that could be applied in a regionally-differentiated manner.

Our analysis allowed us to identify capital requirements and concurrently implemented payment-to-income (PTI) and loan-to-value (LTV) limits (referred to as debt cap rules) as the most promising avenues for intervention. According to our evaluation, debt cap rules outperform capital requirements in several dimensions. Several challenges need to be addressed before actual macroprudential policy intervention can be considered. We highlight a number of calibration issues and review potential spillover effects. We conclude that the regional tightening of the already introduced PTI and LTV limits could support financial stability objectives but their interaction with other policy areas, including fiscal, social and employment policy, would warrant careful consideration and very tight coordination.

Keywords: financial stability, housing market, lending boom, macroprudential policy, regional housing bubble, loan-to-value ratio, debt-service-to-income ratio, policy interactions

JEL classification: E58, G28, R23, R31, R38

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Housing bubbles and macroprudential policy

Housing bubbles and household leverage

The term “housing bubble” refers to a sustained and often explosive overvaluation of houses. Such serious mispricing can severely distort real economic allocation, which frequently culminates in financial instability or even economic crises. Reinhart and Rogoff (2009) show that major recent banking crises in advanced economies tend to be associated with housing busts.

Three special features of the housing market make it peculiarly exposed to damaging bubbles. First, temporary deviations from long-run equilibria are more likely in the housing market because of decentralised trading with imperfect information, high transaction costs, and slow supply responses due to construction lags and limited land availability. Temporary overvaluations attract speculative investors, who then exaggerate and prolong them.

Second, residential real estate purchases typically involve borrowing, which readily gives rise to credit-fuelled housing bubbles. Lending against collateral with increasing value may trigger a financial accelerator mechanism where excessive lending and excessive house prices reinforce each other. Rapidly growing house prices also imply declining household savings, overinvestment in houses and inefficient construction of new homes. When the housing bubble eventually bursts, highly indebted households often face repayment difficulties and must curb their consumption, with the result that the financial and construction sectors incur heavy losses. Altogether, a general recession starts to unfold.

Third, real estate constitutes a large part of household wealth; residential mortgages account for a sizeable portion of bank assets; and the construction sector makes a major contribution to GDP. These factors magnify the aforementioned adverse effects of housing and credit cycles. The home ownership rate in Hungary is especially high (it reached 86.3% in 2016).

As Mishkin (2008) observes, modern economies tend to be affected largely by two types of housing bubble, the purely equity funded “irrational exuberance” type and the “credit boom” type. Credit-financed housing bubbles pose the highest risk to financial stability compared with other forms of asset bubbles. Various studies (eg Crowe et al (2013); Claessens et al (2009); and Jordà et al (2015)) have found that housing bubbles accompanied by credit booms tend to be followed by deeper recessions and slower recoveries. The basic reason is that when unleveraged bubbles burst, they are not characterised by the subsequent deleveraging feedback loops and hence pose a lesser threat to financial stability.

A strong surge in house prices is usually accompanied by an excessive credit growth and increasing indebtedness. Crowe et al (2013) examined a sample of 40 countries, of which only seven had experienced a real estate bubble without excessive credit growth, with two ending up facing a relatively mild crisis. Since equity financed booms are not funded by credit, they can be better targeted with fiscal policy interventions and structural reforms focusing on the supply side of the housing market.

Although credit booms may lead to devastating financial busts, the relevance of sustainable credit growth as an indispensable contributor to economic activity is well known. Some empirical estimates directly examining this macrofinancial relationship

lend support to it. For example, Garcia-Escribano and Han (2015) showed that, in emerging market economies (EMEs), consumer and housing credit growth in the composition of private sector credit had a significant positive effect on the contribution of private consumption to real GDP growth.² Rondorf (2012) estimated a similar positive effect of credit growth induced by changes in loan supply on output growth in his cross-country panel regression for euro area countries. Indirectly, the empirical literature discussing the bank lending and balance sheet channels of monetary transmission contribute to these findings. For instance, Cappiello et al (2010) examined the bank lending channel in the euro area and found a positive relationship between credit and GDP. Ciccarelli et al (2015) estimated mortgage demand and supply effects, and found that changes in demand significantly affect GDP growth. In countries where post-crisis deleveraging did not put downward pressure on household loan demand, sustained household consumption expenditure and housing investment acted to stabilise economic growth. Côté (2011) gave a similar recount of the Canadian experience.

The various policy measures that can be employed to combat the risks associated with house price bubbles can be summed up as shown in Table 1.

Measure	Potential impact	Effects on	
		Unleveraged booms	Leveraged booms
Fiscal tools:			
Abolishing the tax deductibility of mortgage interest	Decreases benefits of highly leveraged purchases, mitigating credit demand	X	✓
Transaction taxes (buyer/seller stamp duties)	Discourages the resale of properties and speculative investments	✓	✓
Recurrent property taxes	Reduces speculative housing demand and benefits of home ownership	✓	✓
Taxes on imputed rents and capital gains	Reduces indirect benefits of home ownership and housing demand	✓	✓
Macroprudential tools:			
Capital requirements	Increases resilience of banks and leads to higher funding costs that curb excessive lending	X	✓
Dynamic provisions		X	✓
Limits on LTV or PTI ratios	Prevents the excessive indebtedness of borrowers at the contract level	X	✓
Note : The green cells with checkmarks indicate that the measure is expected to be effective, while the yellow cells with the crosses mark that a measure is expected to have little effect during a certain type of house price boom.			
Sources: Crowe et al (2013); IMF (2016b).			

Several countries have used the above taxation tools to mitigate house price movements with encouraging results. Sweden and Ireland have abolished or tightened the usage of mortgage interest rate deductibility. In addition, various

² However, recent studies highlight that the contribution of household lending to GDP growth in the long term depends on the driving forces and sustainability of such credit growth (see Mian et al (2015) and references therein).

transaction taxes, such as seller and buyer stamp duties, have been used in different jurisdictions in certain Asian countries. China, Singapore and Hong Kong SAR have introduced seller stamp duties for real estate that is resold within a specific time period, and buyer stamp duties (excluding China) for certain purchases, such as speculative investors or non-residents. Such measures successfully dampened house price growth in these countries (IMF (2016b)).

When it comes to credit-financed housing bubbles, macroprudential authorities should address these proactively, as they pose serious risks to financial stability. Constraining excessive lending may not always prevent the overvaluation of houses, but it can be effective in mitigating the economic losses that housing bubbles can potentially cause. Therefore, a precautionary macroprudential authority should pay close attention to signs of excessive house prices, even if empirical results are not conclusive about the precise direction of causality between credit and house prices (Table 2).

Literature evidence on the interaction between housing prices and credit

Table 2

Author (s)	Long-term relationship			Short-term relationship		
	ph → d	ph ← d	ph ↔ d	ph → d	ph ← d	ph ↔ d
Hofmann (2003)	*					*
Hofmann (2004)	*					
Brissimis and Vlassopoulos (2009)	*					*
Gerlach and Peng (2005)	*			*		
Oikarinen (2009a, 2009b)		*			*	
Fitzpatrick and McQuinn (2007)			*		*	
Berlinghieri (2010)			*			*
Gimeno and Martinez-Carrascal (2010)			*			

¹ Asterisks show the empirical findings on the direction of causality between housing prices (ph) and credit (d).

Sources: Table 1 and Table 2 in Anundsen and Jansen (2013).

Possible regulatory interventions for curbing the effects of credit-fuelled bubbles include the following:

- Increasing capital requirements by raising minimum risk weights (RW) or loss given default (LGD) floors would force banks to build a buffer against possible losses occurring in the bust phase. Furthermore, by increasing the cost of credit through higher funding costs, demand might be reduced and lending constrained (Cohen and Scatigna (2016)). Countries that have employed such a measure include Bulgaria, Croatia, Poland and Romania, although only in Poland have they had some effect on minimising post-bust damage (Lim et al (2011)).
- Dynamic provisions, ie loan loss provisions set aside in good times, can be regarded as being very similar in nature to capital requirements, as they help increase the resilience of banks in preparation for bad times. This measure, however, has proven to be less efficient in containing excessive credit growth in the boom phase, as was the case with higher capital requirements. The most prominent example of a jurisdiction introducing dynamic provisioning is Spain in 2000, with only a moderately effective impact (Crowe et al (2013)). The tool had a marginal effect on credit growth in the boom phase, as profit opportunities

proved too high for provisions to restrict banks' lending activity (Fernández de Lis and Garcia-Herrero (2010)). Moreover, due to a low regulatory cap on provisions, such a measure proved insufficient to cover the losses suffered by banks in the latest crisis (Mahapatra (2012)).

- Limits on the loan-to-value (LTV) or debt-service-to-income (DSTI, alternatively payment-to-income or PTI) ratios, or so-called debt cap rules, directly prevent the build-up of vulnerabilities for individual loan contracts, thereby providing protection both for borrowers from overindebtedness and for lenders from elevated losses in case of a crisis. Such tools have been used extensively in Asian jurisdictions, including China, Taiwan, Hong Kong, Japan and Korea, while European examples include, among others, Denmark, Sweden and Norway (McDonald (2015)).

Household leverage and debt cap rules

Debt cap rules are among the most promising macroprudential tools to effectively curb excessive lending. Two forms of debt cap rules are prevalent (ESRB (2015); Kuttner and Shim (2013); and Cerutti et al (2017)). They limit the maximum loan amount to a proportion of the collateral value (LTV) and limit the instalments that can be made to a proportion of income (DSTI, PTI). PTI caps primarily strive to ensure the solvency of borrowers, while LTV caps reduce lenders' losses on loans that may become non-performing.

Since future values are not observable, these caps refer to incomes and collateral values at the beginning of the loan contract. Therefore, it is expedient to apply debt cap rules in a countercyclical manner. When houses are becoming overvalued or expected future wage growth deteriorates, previously set regulatory limits no longer ensure that the income of new borrowers or collateral values will remain high enough to prevent significant non-performance and bank losses in the future. In these cases, restoring the effectiveness of debt cap rules in preventing excessive lending requires their tightening.

The limited international experience gained so far indicates that a generally favourable effect can be expected from debt cap rules intended to rein in excessive household indebtedness and house price inflation (Table 3). Analyses of debt cap rules also highlight the possible variance in the potential ability of the two distinct types of instrument to affect policy targets (eg debt outflow, house price growth and household debt servicing capacity), which could prove even more diverse across jurisdictions.

Studies estimating the effects of PTI and LTV regulations worldwide

Table 3

Cross-country analyses

Variable affected	Author(s) (geographic coverage) [other details on the variable affected]	PTI (& LTI)	LTV
Housing/mortgage credit (growth)	Kuttner and Shim (2013) (57 countries worldwide)	significant and material	non-significant
	McDonald (2015) (17 countries worldwide)	significant	significant
	Akinci and Olmstead-Rumsey (2015) (57 countries worldwide)	significant and material	significant and material
	Jácome and Mitra (2015) (5 countries in East Asia and Eastern Europe)	na	significant
	Morgan et al 2015 (10 countries in Asia)	na	significant
Private sector credit (growth, real)	Lim et al (2011) (49 countries worldwide)	significant	significant
	Geršl and Jašová (2014) (11 countries in Central and Eastern Europe)	significant	
	Cerutti et al (2017) (119 countries worldwide)	significant	significant
House price (growth)	Crowe et al (2013) (21 countries worldwide)	significant	non-significant
	Vandenbussche et al (2015) (16 countries in CEE and Southeastern Europe)	non-significant	non-significant
	Kuttner and Shim (2013) (57 countries worldwide)	non-significant	significant
	McDonald (2015) (17 countries worldwide)	significant	
	Akinci and Olmstead-Rumsey (2015) (57 countries worldwide)	significant and material	significant and material
	Cerutti et al (2017) (119 countries worldwide)	non-significant	non-significant
	Carreras et al (2016) (19 OECD countries)	significant	significant
Individual country analyses			
Delinquency ratio	Baek et al (2013) (Korea)	significant	significant
Housing/mortgage credit	Igan and Kang (2011) (Korea) [non-metropol. household debt growth]	significant	significant
	Kim (2013) (Korea) [quarterly growth]	significant	significant and material
	Lee (2013) (Korea) [real level]	non-significant	non-significant
	Price (2014) (New Zealand) [annual growth, counterfactual est.]	na	significant
	Wong et al (2014) (Hong Kong) [est. supply and demand]	na	significant
	Neagu et al (2015) (Romania) [growth]	significant	
	Kuncl (2016) (Canada) [level, also impact on residential investment]	na	significant

House price	Craig and Hua (2011) (Hong Kong) [quarterly growth]	na	significant and material
	Igan and Kang (2011) (Korea) [growth, metropolitan areas]	non-significant	significant
	Kim (2013) (Korea) [quarterly growth]	significant	significant and material
	Lee (2013) (Korea) [real level]	non-significant	non-significant
	Price (2014) (New Zealand) [annual growth, counterfactual est.]	na	significant
	Kronick (2015) (Canada)	na	non-significant

Note: LTI is the ratio of the total loan amount to household income. Yellow indicates a significant effect found by the related study, white indicates an insignificant finding and orange indicates cases where the estimated effect of the modelled policy interventions was quantitatively outstanding compared with other types of policy instruments (eg capital instruments and fiscal tools). Grey indicates that the related study does not examine a specific instrument. Cells not separated in the middle represent estimates that do not differentiate between PTI and LTV type instruments.

Source: MNB and the referenced papers.

Debt cap rules in Hungary

The high degree of risk-taking that characterised the Hungarian banking sector up until the later period of the international unfolding of the 2007–2008 Great Financial Crisis (GFC) led to excessive credit growth. The wide-spread extension of loans under overly liberal lending conditions and insufficient collateral resulted in a sharp increase in non-performing loan portfolios after the crisis. Risks were substantially amplified by the high share of foreign currency (FX) loans, which exposed households to substantial level of exchange rate risk. Consequently, the crisis and the ensuing exchange rate depreciation resulted in the recognition by the Hungarian banking sector of losses that were nearly equivalent to its pre-crisis capital stock. The losses incurred, the deteriorating capital position and the increasing risk aversion resulted in a substantial decline in credit supply.

Required limits for LTV and PTI levels

Table 4

		HUF	EUR	Other currency
PTI	Net monthly income lower than HUF 400,000	50%	25%	10%
	Net monthly income equal to or greater than HUF 400,000	60%	30%	15%
LTV	Mortgage loans	80%	50%	35%
	Motor vehicle loans	75%	45%	30%

Note: HUF 400,000 is approximately equal to EUR 1,300.

Sources: MNB.

With a view to preventing the reappearance of excessive lending, the Magyar Nemzeti Bank (MNB) introduced debt cap rules in the household sector in January 2015.³ For the majority of borrowers under the rules, the amount of new household loans may not exceed 80% of the collateral value (LTV), and the related instalments may not be greater than 50% of a borrower's regular, legal income (PTI) (Table 4).

The debt cap rules were calibrated with several different factors taken into consideration:

- Coverage: the rules cover all loan products and protect both lenders and borrowers. This is to ensure that regulatory arbitrage is minimised.⁴
- Foreign currency risk: a depreciation of the Hungarian forint against the currency in which the loan is denominated could increase significantly the monthly instalments and principal relative to the collateral value. This warrants an additional buffer to cover the added risk.⁵
- Income level: higher income levels lower the probability of default, which allows restrictions to be eased. Given that the increase in consumer expenditure usually lags behind income growth, higher income levels mean that a higher portion of income is available for loan repayments. This warrants higher household indebtedness limits.
- Type of income: only legal, certified income is considered. This incentivises economic agents to move out of the informal economy. Certified, legal income can be regarded as more stable than other earnings, which means that only such income may be considered for the purposes of calculating the PTI ratio. This also encourages borrowers to declare their income to the tax authority.

To prevent excessive growth in household indebtedness and help the adjustment of both lenders and borrowers, the regulatory framework was put in place long before lending could become overheated. The MNB continuously monitors developments over the lending cycle with a view to intervene if necessary. Lenders have integrated the rules into their lending practices, and thus the room for competition in risk-taking has diminished. Given the present situation of the domestic financial cycle, the implementation of the debt cap rules does not have any substantial negative impact on household credit extension. This is supported by the fact that the substantial increase in the volume of new lending has been realized with loan contracts exhibiting PTI ratios that have not clustered excessively around the regulatory limits.

³ MNB Decree No. 32/2014. (IX. 10.) on the Regulation of the Payment-to-Income Ratio and the Loan-to-Value Ratio.

⁴ With the rapid emergence of new intermediaries (eg marketplace and balance sheet lenders) in some countries – especially in the United States and the United Kingdom – reaching out to borrowers through the innovative means of financial technology (FinTech) regulators should consider whether the effectivity of debt cap rules could become undermined by regulatory arbitrage.

⁵ The limits differentiated according to currencies were determined by taking exchange rate movements into account, based on value-at-risk estimates.

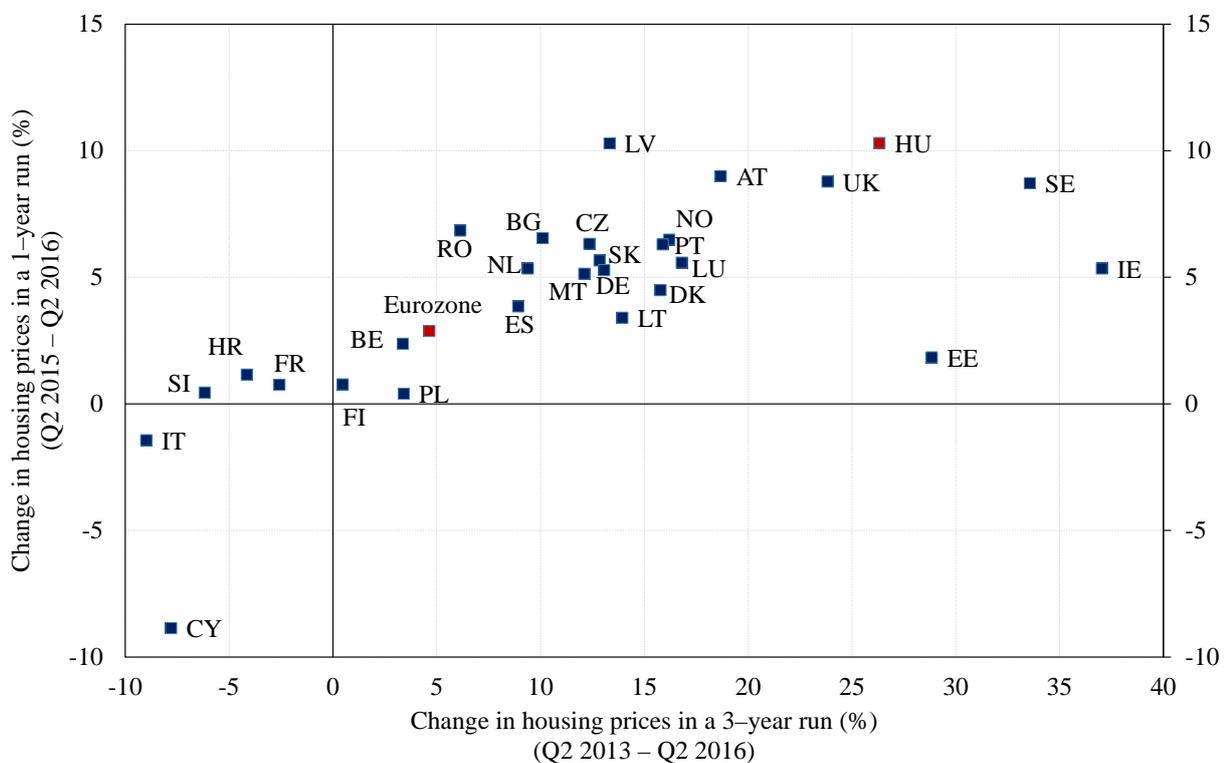
Regional differences in house prices and lending

House prices have started to pick up across the European Union, but there are significant differences between countries (Graph 1). Markets in several member states have shown rapid price growth, often coupled with high leverage, pointing to medium-term vulnerabilities that can pose a serious risk to financial stability. This has prompted the European Systemic Risk Board (ESRB) to issue warnings regarding the vulnerabilities of housing markets in eight EU countries.⁶ Even though price increases in Hungary have not reached a critical level, they surpass not only the EU average, but those of all regional peers as well, which warrants a constant monitoring of the market.

Changes in nominal housing prices in the EU

In per cent

Graph 1



AT= Austria; BG = Bulgaria; BE = Belgium; CY = Cyprus; CZ = Czech Republic; DE = Germany; DK = Denmark; EE = Estonia; ES = Spain; FI = Finland; FR = France; HR = Croatia; HU = Hungary; IE = Ireland; IT = Italy; LT = Lithuania; LU = Luxembourg; LV = Latvia; MT = Malta; NL = Netherlands; NO = Norway; PL = Poland; PT = Portugal; RO = Romania; SE = Sweden; SI = Slovenia; SK = Slovakia; UK = United Kingdom.

Source: Eurostat.

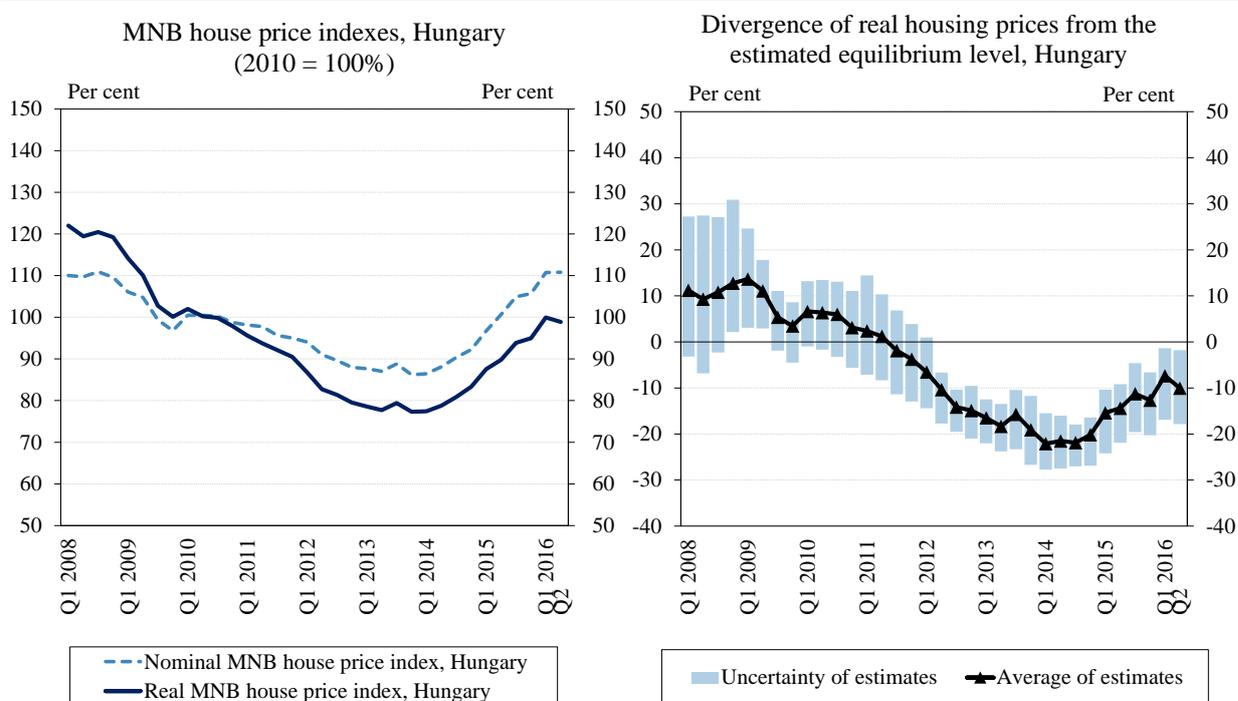
⁶ For further information on the warnings and their basis, see ESRB (2016).

These developments deserve additional attention due to the economic importance of the real estate market in Hungary, given that housing wealth accounts for a high share of households' total wealth⁷ and that mortgage loans represent a large proportion of households' total debt. House price swings in the country therefore have an accentuated effect on the consumption and savings decisions of households, and on the collateral position of banks.

Following the steady decline in both house prices and market turnover after the start of the GFC, a recovery started at the end of 2013. Since then, prices have shown rapid growth, reaching pre-crisis levels in the second quarter of 2016 (Graph 2). This growth can be mostly attributed to the overall economic expansion in Hungary and slow supply side accommodation in the real estate market.⁸ Given the country's strong macroeconomic fundamentals, including unemployment, household income and credit conditions, house prices have not yet surpassed their estimated equilibrium level.

Housing price indexes and the divergence from the estimated equilibrium level

Graph 2



Source: MNB.

However, the increase in house prices exhibits strong regional differences. Regions and especially certain cities situated in the economically more developed north western and central parts of the country have outperformed other regions in terms of house price growth since 2014 (Graph 3), with this growth being mostly driven by cities with county rank. Prices in Budapest stand out especially, with a two-

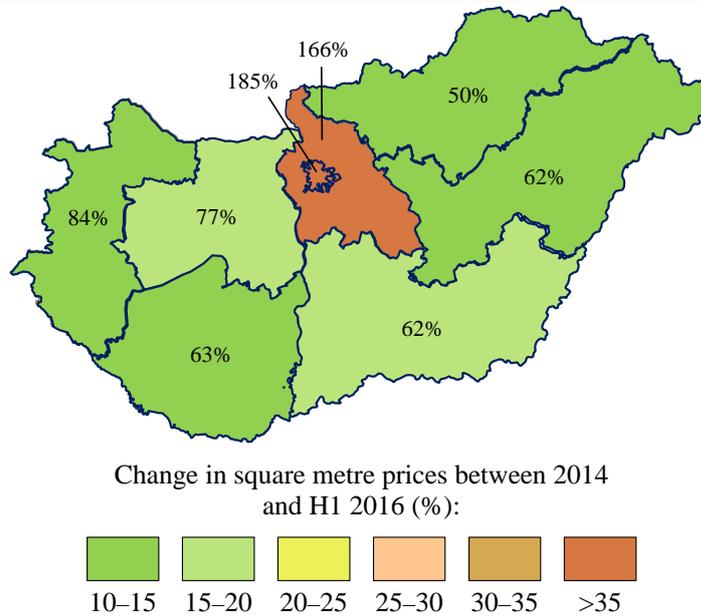
⁷ For an international comparison, see Horváth and Körmendi (2009).

⁸ For further information on the Hungarian residential real estate market, see the Housing Market Report of the MNB: www.mnb.hu/en/publications/reports/housing-market-report.

year growth rate of 50% (Graph 4). The steep increase is strongly supported by the lack of suitable housing supply and the low interest rate environment which may have increased investment-purpose demand.

Relative square metre prices in 2016 and the change between 2014–16

Graph 3

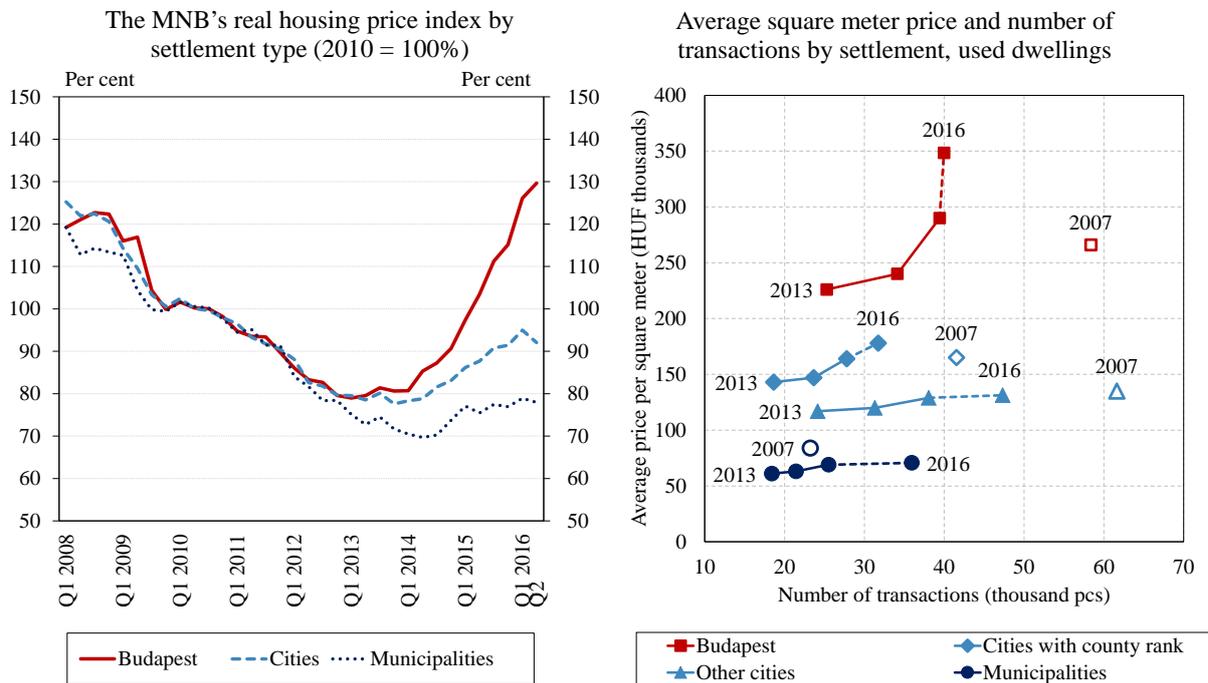


Note: Colours denote the change in square metre prices between 2014 and H1 2016 by region. The numbers indicate regional square metre prices for H1 2016 relative to average country-wide square metre prices in the same period.

Source: Hungarian Central Statistical Office (HCSO)

Recent house price increases in Budapest do not yet imply the formation of a real estate price bubble. More positive labour market conditions and demographic trends currently warrant higher housing market demand in the capital, which may partially explain the higher-than-average rise in housing prices. Furthermore, the number of construction permits issued in 2016 grew at a faster rate in Budapest than in the rest of the country, which may help somewhat in alleviating price pressures in the near future.

The risks of a foreign investment-driven speculative bubble should also be considered, as foreign investors searching for yield may add to the pressures faced by domestic buyers. Foreign buyers and legal entities can purchase property in Hungary directly. The effect of their purchases can currently be considered moderate, with a share of around 5% of total house market transactions in Budapest. But the rapid increase from the level of 3% in 2014 and the high concentration of foreign investments in certain parts of the city warrants attention. Furthermore, the effect of foreign investment may also be amplified by purchases of foreign-owned Hungarian firms, which are harder to track.

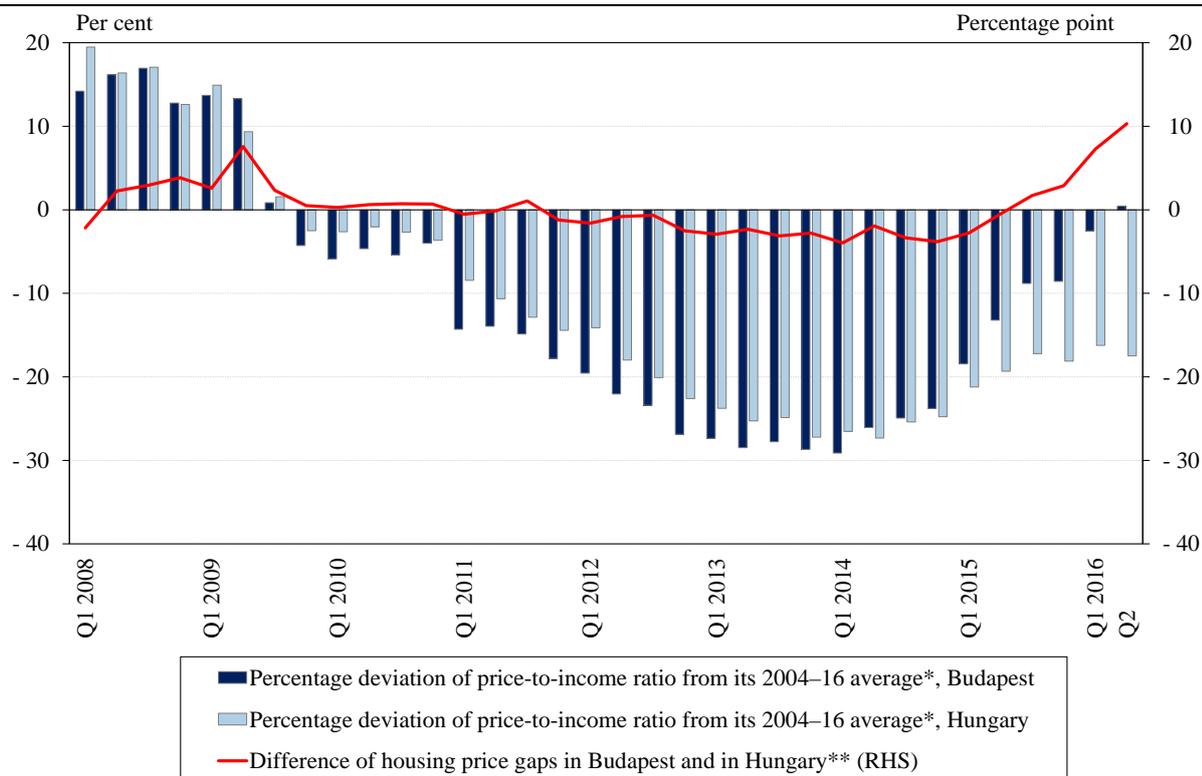


Note: Right panel data in 2016 are estimated based on observations from the first two quarters.

Source: HCSO, MNB.

Indicators relating to the possible overvaluation of house prices in the capital also point to increasing valuations but no overheating yet (Graph 5). House prices have increased at a faster pace than household income in Budapest during the last two years (Q2 2014 – Q2 2016), resulting in a convergence of the price to income ratio to its long-term trend. Housing prices in the city have also started to deviate positively from their long-term trend to a higher extent than the rest of the country. However, based on the current level of these indicators and the fundamental macroeconomic conditions in Budapest, it can be concluded that house prices in the capital do not exhibit a major overvaluation at this point.

Household indebtedness also shows marked regional differences (Graph 6). Lending growth is more elevated in major cities in general but Budapest stands out somewhat. The higher proportion of highly indebted borrowers, higher average loan amounts and the incipient but still indefinite increase in the average maturity of housing loans support the conclusion that the housing loan market in the capital is not yet overheated, but deserves enhanced regulatory attention, especially since the rapid growth in housing prices may further elevate the level of household leverage in the future.

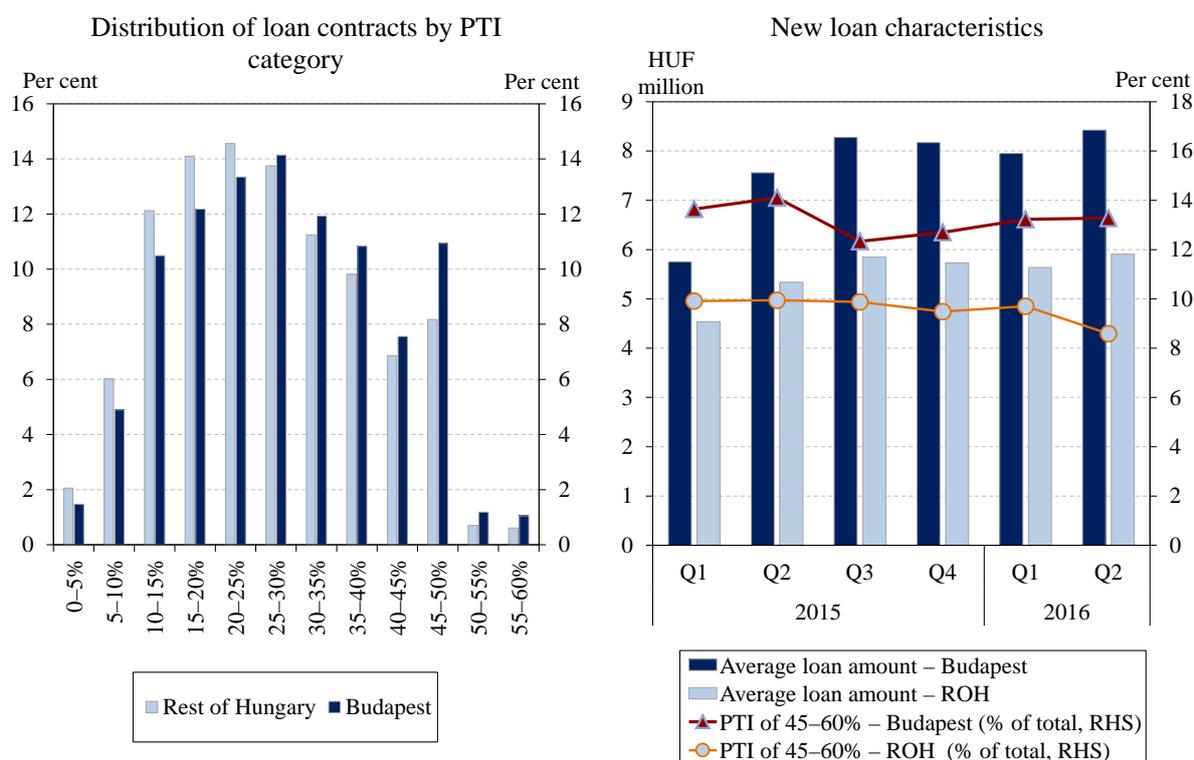


* Based on the nominal MNB house price index (2010 = 100%) and average net wage. ** Calculated by filtering real MNB housing price indexes (2010 = 100%) from 2001 with a non-recursive HP-filter with lambda 1600.

Sources: HCSO, MNB.

Despite the currently supportive economic fundamentals in the capital, both the outstandingly high level of housing prices and the rapid rise in these levels over the past two years (Q2 2014 – Q2 2016) point to the need for constant regulatory vigilance. An environment of prolonged low interest rates combined with optimistic economic expectations may, in the future, result in excessive house price growth, increasing the probability of household overindebtedness and a severe price correction. In addition to closely monitoring house price and credit market developments, an overview of possible policy steps that could be taken to react in a timely manner to control such a fast expansion is warranted.

The emergence of significant regional differences in house price growth is a well known phenomenon. Recently, housing markets in major cities of several countries show significantly higher increases than other regions in these countries, including China, Germany, Korea, New Zealand and the United Kingdom (IMF 2016a). Growth differences in these countries range from moderate levels, such as the 12% average yearly growth rate for the past three years in London compared with 7.5% in the rest of the United Kingdom, to extreme levels, such as the 28% annual growth of Beijing residential property prices for the period 2004–2015 compared with 7% in other cities in China (ESRB (2016); Wu et al (2015)).



Note: Distribution between Q1 2015 and Q2 2016, by contract number.

Sources: MNB.

Justification for regionally-differentiated macroprudential interventions

The introduction of a regionally-differentiated macroprudential tool is advisable only when several basic conditions apply.

Marked regional vulnerability

Housing markets are usually segmented geographically. Moreover, market developments can diverge significantly between them even permanently. In some regions, the housing market is more sophisticated and liquid because rental housing is more extensive, the housing stock is larger and transactions are more frequent. There may be significant regional differences in the amount of surplus housing capacity and in constraints on expanding the current housing stock, such as administrative restrictions or land availability. These imply different price responses to similar housing demand shocks. As some areas are specialised in particular economic activities, they and their housing markets are exposed to idiosyncratic economic shocks, and even general economic shocks can impact them specifically. Trends in internal mobility also exert different local demand and supply effects.

According to these criteria, in Hungary the natural candidate for regional housing overvaluation is the Budapest metropolitan area, possibly supplemented by some major cities in other areas. Its housing market can be considered as a single and relatively large and sophisticated one. There are significant economic differences between the metropolitan area of the capital and the rest of the country. Budapest has special rules for construction, land availability is relatively restricted and its metropolitan area has been the main destination of internal mobility for the last three decades.

Enforcement

At least theoretically, several capital requirements and debt cap rules may be applied in a regionally-targeted manner. Rules may be based on the geographical location of the collateral or the permanent residence of loan applicants. Regionally-differentiated tools, however, give rise to incentives to circumvent them in special ways. One important example is applying for a mortgage loan to purchase a house in a more tightly regulated region, using a house in a more loosely regulated region as collateral. In this respect, regionally-targeted tools are more easily enforceable when they are connected to the geographical location of the collateral rather than the permanent residence of the loan applicants. The exact calibration of the chosen macroprudential intervention should minimise regulatory arbitrage.

Efficiency

Regional macroprudential tools may only achieve a regional shift in credit-fuelled local housing overvaluation. If the potential development of house price bubbles is expected to be slow, then the macroprudential authority can apply a step-by-step geographical extension of tightening. Otherwise, only country-wide interventions have an efficient impact on excessive lending. In Hungary, significant regional economic differences make it unlikely that a potential housing bubble in the Budapest metropolitan area would be shifted to other parts of the country as a response to regionally-targeted macroprudential intervention. The low level of geographical mobility observed in Hungary reinforces this conclusion.

Spillover effects

Properly calibrated regional macroprudential interventions have the added benefit that they may also alleviate the adverse effects of regional housing bubbles and not just of those of overindebtedness. A regional housing bubble is a serious mispricing which can constrain efficient house purchases. Consequently, households in the region are hindered from obtaining a proper living at a reasonable price. Living in a smaller, worse quality and more distant flat (from the workplaces of household members) implies several additional costs: discomfort, additional commuting expenses, more expensive health costs, delayed family formation etc. Regionally-differentiated macroprudential tools mitigate these adverse effects under two conditions. On the one hand, they should be successful not only in restraining excessive lending but also in reducing housing overvaluation. On the other hand, they should be targeted precisely enough to let potential borrowers with lower risk obtain the necessary loans.

A housing bubble in the Budapest metropolitan area may also significantly distort the optimal geographical reallocation of labour. This is a serious concern in Hungary, since the capital's metropolitan area is the most economically developed region, and geographical mobility in the country can be inefficiently low (even in normal times due to the inflexible labour market and the underdeveloped rental market). Regionally-targeted macroprudential interventions can have an additional social benefit in supporting geographical mobility to the extent that they facilitate access to a proper living space in a region with excessive housing prices.

Regional housing bubbles distort the allocation of capital as well. Excessive investment in the housing market and construction crowds out efficient investment projects in other sectors. Excessive housing prices worsen the competitiveness of firms in regions with overvalued houses. Regionally-targeted macroprudential interventions can mitigate these adverse effects only if they can also dampen excessive housing prices.

A potential housing bubble in the Budapest metropolitan area might increase inequality in several dimensions. Excessive house prices in the capital intensify regional differences between house owners. Property owners in areas affected by the bubble gain but tenants lose and could even be forced into worse living spaces. Older generations also tend to gain at the expense of younger ones, since home ownership is higher among them. Richer households can invest more easily in overvalued houses, because of their higher savings and generally better access to financial intermediation. Poorer households rely more heavily on geographical mobility, which tends to be hindered by a potential housing bubble in the capital's metropolitan area. Although assessing the welfare effects of rising inequalities is subject to value judgement, properly applied regional macroprudential interventions could mitigate these effects to the extent that they decrease housing overvaluation.

In the unfavourable case when regional macroprudential interventions cannot impede effectively the overvaluation of houses, such interventions may even aggravate difficulties in obtaining a proper living space and in internal mobility, since households face not only excessive housing prices but also tighter credit constraints. Even so, renting would be constrained less severely, because housing bubbles are not always accompanied by a proportionate increase in rents. This may exert a positive vitalising effect on the currently underdeveloped rental market in Hungary. Also, unexpected additional housing demand may arise in some settlements located at the border of the region with tighter macroprudential rules. This then generates additional demand for public infrastructure in traffic, education and healthcare.

Ultimately, regionally-targeted macroprudential policy interacts with numerous other policies. Fiscal policy aspects arise vis-à-vis public investments in regions where potential demand is at least partially supposed to be redirected. Social policy is primarily affected through its role in supporting people in obtaining proper living spaces and for decreasing unintended inequalities. Employment policy can have the objective of creating a more flexible labour market, for example, by incentivising atypical forms of employment such as part-time jobs and teleworking – which are not prevalent in Hungary – and by conducting more efficient retraining programmes. A strengthened legal infrastructure for the housing rental market would reduce the informal economy and extend the currently underdeveloped and partly informal rental market. Access to public services should be equal across regions, which also means that investment in public infrastructure should be well coordinated with private investment in new houses. All of these potential interactions highlight the

dilemma that any policymaker would face in implementing regional macroprudential intervention. It also highlights the necessity of closely cooperating with the other parties responsible for the relevant policy areas.

Regionally-differentiated debt cap rules

Selecting the most fitting macroprudential intervention to address regional differences

If credit market developments reach a critical level and the criteria for regional interventions are satisfied, several dimensions for the selection of the specific regulatory intervention should be considered. Based on the international experiences with different sectoral tools elaborated upon in Section 1 and the criteria above, the possible sectoral macroprudential interventions to target regionally overheated mortgage lending markets can be summed up as in Table 5.

Based on this comparison, debt cap rules may provide the most fitting regulatory response. Capital-based instruments can be regarded as less effective in tackling the risks associated with the boom phase of the lending cycle due to their less targeted nature. Moreover, they also offer no direct protection against household indebtedness. Debt caps, on the other hand, have proven to be effective in tackling risks of excessive lending and household overindebtedness by directly imposing restrictions at the contract level. Internationally, debt caps have also served as differentiated tools for targeting specific geographical areas (see Box 1). Even though the regulatory intent may be circumvented to some extent (eg by extending loan maturities), most issues can be resolved through the careful and comprehensive calibration of the measure. The regulatory framework has already been put in place by the MNB, which enables effective, timely and targeted reactions to overheated regional lending.

Macroprudential interventions that could combat excessive lending regionally¹

Table 5

	Increasing RW and LGD floors / direct capital requirements / dynamic provisioning	Debt cap rules
Effectiveness	<ul style="list-style-type: none"> + Higher levels of capital increase banks' resilience. + Increasing funding costs makes excessive lending less attractive for banks. – Higher capital requirements do not restrain households from becoming overindebted, which may have broader economic and social consequences. – Banks may react through decreasing voluntary buffers. 	<ul style="list-style-type: none"> + Debt caps restrict the conclusion of overly risky loan contracts, protecting both lenders and borrowers.
Efficiency	<ul style="list-style-type: none"> + Frontloading is usually less of an issue, as the measure could be applied to all real estate exposures, not only new lending. – There is an incentive but no direct prevention against excessive lending. – There is limited room for differentiating requirements according to the riskiness of real estate exposures. – Lending might be relocated to less heavily regulated entities or to foreign entities within the same banking group. 	<ul style="list-style-type: none"> + Debt cap rules set restrictions directly at the contract level. + The necessary framework has already been introduced by the MNB and its rules have been integrated into lending practices. This should allow for smoother accommodation to differentiated rules. ± Frontloading might occur in anticipation of regional tightening but this effect can be diminished through appropriate timing and communication. ± Regulatory limits may be circumvented (eg LTV caps by the increased use of unsecured loans or PTI caps by longer loan maturities). The risks of such impediments can be mitigated by applying a comprehensive set of measures (LTV and PTI caps, limits on loan maturity) and by constantly monitoring market developments.
Proportionality	<ul style="list-style-type: none"> – Banks with high outstanding loan in the affected region would face higher requirements, regardless of their contribution to new lending. – Lending opportunities may be too attractive for increased capital requirements to have any significant impact on credit availability. 	<ul style="list-style-type: none"> + As individual loan contracts are targeted, the measure affects banks in proportion to their contribution to the build-up of systemic risks.

Note: "+" denotes strengths of the given measure, "–" denotes weaknesses, and "±" denotes weaknesses that can be counterbalanced by additional regulatory steps if necessary.

¹ Evaluating the impact of policy measures according to the concepts of efficiency, effectiveness and proportionality is an approach deeply embedded in the global and other international, eg EU level regulatory and supervisory legislation and practice. For instance, these are included in the BCBS (2012) Core Principles for Effective Banking Supervision and at level 1 legal rules in Capital Requirements Regulation (EU) No. 575/2013, see eg Recital (22) and (46) among several other occurrences. Effectiveness and efficiency are focal points of evaluation in eg IMF–FSB–BIS (2016) and the European Systemic Risk Broad 2013/1 Recommendation. Proportionality in the implementation of the Basel standards are investigated in BIS–FSI Insights (2017) and the application proportionality was explored conceptually and by case studies in the Report of the EBA (2015).

Sources: MNB based on Crowe et al (2013), ESRB (2014).

International experience with regionally-differentiated debt caps

A couple of countries have implemented a geographically-targeted LTV or PTI regulations:

- New Zealand: to tackle the issue of rapid house price growth, especially in Auckland, LTV limits were introduced in 2013, with no direct banning of high LTV loans but with a limit on the proportion of such loans in new lending. In response to growing house market risks in Auckland, LTV limits were tightened on a regional basis in 2015, with tighter rules being applied to Auckland mortgages. Even though house prices and lending showed a temporary fall at the end of 2015, house prices and mortgage credit continued on an elevated growth path at the national level, which forced the central bank to introduce tighter LTV limits overall in September 2016 (Reserve Bank of New Zealand (2016)).
- Korea: after experiencing the adverse effects of two major housing cycles, Korea has been conducting an active macroprudential approach since 2002. Following the first housing crisis, the Korean authorities introduced LTV limits in 2002, which were complemented by DSTI restrictions in 2005. As house price movements are determined by geographically heterogeneous demand and supply factors, the LTV and DSTI restrictions have been implemented on a regional basis, determining higher restrictions in the speculative parts of southern Seoul. Since their implementation, the restrictions have been tightened several times, significantly mitigating excessive credit and house price movements (Crowe et al (2013); and Igan and Kang (2011)).

Calibration issues to be addressed in designing regionally-differentiated debt caps

To ensure that regionally-differentiated debt caps promote the achievement of the predefined regulatory goals effectively and efficiently, several calibration issues should be considered.

Instrumental calibration

Regarding instrumental calibration, the following dilemmas should be considered:

- Tightening of limits: limits on both instruments could be set more tightly regionally to effectively tackle possible risks. Along with LTV limits that directly relate to the possibly severe price correction that follow the bursting of a bubble, PTI limits also have an impact on house prices by limiting credit availability.
- Scope of tightening: lower regional limits could be applied in a targeted manner to limit spillover. First, the basis for tightening should be the geographical location of the collateral property, not the place of residence of the borrower, so as not to open up possible loopholes. Furthermore, whereas LTV limits apply to each secured loan contract, PTI limits are based on borrowers' ability to repay all their credit obligations. Instead of lowering the PTI limit for debtors borrowing against collateral in the overheated region, a certain limit could be applied only to instalments from loans secured by real estate located in the overheated region without lowering the aggregate PTI limit for these borrowers. This would ensure that no additional constraints are put on loans that do not carry the added risk related to overheated regional housing markets.
- Addressing lengthening maturities: tighter PTI limits could incentivise banks and borrowers to lower PTI values through lower instalments resulting from

lengthening loan maturities. If this occurs in the region affected, it may be advisable to set limits on loan maturities.

- Addressing interest rate risks: risks of borrowers defaulting in overheated regions could be further mitigated by pairing tighter debt caps with an interest rate stress test that banks would conduct before granting new loans in the region. This would incentivise banks to lend with longer interest fixation periods, mitigating interest rate risks that might worsen the situation.

Geographical calibration

As mentioned before, the natural candidate for a possible regional housing overvaluation in Hungary is the Budapest metropolitan area. The exact region where the tightened debt cap rules should be applied, however, should be defined according to the next three criteria.

- Excessive growth: the designated region should include the area where signs of credit-fuelled house overvaluation or even housing bubbles arise, and areas where the bubble may quickly develop as a response to regulatory intervention in the region actually affected.
- Monitoring regional differences: the exact localisation of narrowing LTV and PTI limits is subject to a detailed and sensitive monitoring system that is capable of closely tracking regional diversities in housing overvaluation. While the recently created MNB housing price index can be easily adapted to geographic regions, regional monitoring must develop further. The extensive granular database the MNB possesses on household lending can be a useful tool in this respect.
- Side effects: unintended negative side effects and regulatory arbitrage should also be minimised. Debt cap rules always face a trade-off between hindering excessive indebtedness and constraining efficient financial intermediation. Defining the region too broadly would result in too high a level of false restriction of loan contracts without a high risk of non-performance.

Addressing possible side effects

Besides adequately setting the scope for intervention, the possible unintended consequences of tighter debt cap regulations might warrant consideration of certain exemptions. Tightening measures can have unintended economic consequences regarding borrowing and availability of housing to certain, less risky groups of borrower. This might require the inclusion of some preferential treatment when debt caps are tightened regionally.

Preferential treatment may be granted in a general or specific manner. Proportionate caps, ie allowances for a certain portion of new lending to be exempted from the limits, provide room to manoeuvre for lenders without interfering with the mix of mortgage products. Examples of such caps can be found in several countries, including Norway, the United Kingdom, Ireland, Estonia and Lithuania. However, lenders may have other considerations that would contradict regulatory objectives when deciding what mortgages to exempt from the lower limits. Differentiated treatment can be applied to specific kinds of borrower or property. This allows for a more targeted approach, but it adds the risk of overly restricting market players'

decisions regarding the types of mortgage extended. Country examples include Cyprus, Denmark, Finland, Ireland, Estonia and Romania.

Some of the specific issues to review before tightening debt caps regionally include the following:

- Differentiating by quality: newly built houses and other buildings with certain characteristics (eg high energy efficiency) might exhibit lower price corrections due to higher demand even in economic downswings. This may justify looser treatment under regionally tighter debt cap regulations. Such an exemption might also be helpful if the limited supply of housing is a fundamental factor in a regional house price bubble.
- Differentiating by price: properties with excessively high prices that are not supported by high quality could be treated more strictly, as they may carry a significantly higher risk than houses with lower prices. This might warrant the use of LTV limits differentiated by collateral value, with the price limit set high enough to minimise unwarranted effects on lower-income households (who target houses of lower value and are not involved in the rapid inflation of house prices). However, possible fundamental factors that may underpin the higher price of certain properties should also be considered.
- Differentiating by borrower groups: socially vulnerable debtors, especially first-time buyers in a given region, might be restricted from purchasing a property due to stricter limits, as they do not possess a high amount of equity or income. First-time buyers who are usually young can reasonably be expected to have higher incomes in the future and lower probabilities of default, which would underpin preferential treatment. Preferential treatment for certain groups would also mean a more targeted approach towards any speculative behaviour on the part of borrowers using debt to purchase properties with intent on profiting from rising prices. EU countries differentiating limits for first-time buyers include Cyprus, Ireland and Finland.
- Borrowers in the buy-to-let mortgage market may warrant stricter standards, as their borrowing may worsen house price swings and endanger financial stability. In a downturn, they may be quick to sell their investments, thereby exacerbating the scale of the fall in prices. This may justify stricter debt caps or other underwriting standards in the buy-to-let market, as is the case in the United Kingdom.

Conclusion

Housing prices in Hungary have risen dynamically by European comparison over the last two years (Q2 2014 – Q2 2016), reaching their pre-crisis levels in nominal terms. This growth exhibited significant regional differences, as shown by a two-year increase of 50% in Budapest. Based on MNB estimates, actual house prices are not considered to be overvalued either in Hungary or, more specifically, in Budapest. Although housing price inflation has been accompanied by significant credit expansion with stronger dynamics in the capital, for the moment the volume of new housing loans is not considered to be excessive.

The Budapest metropolitan area is the most developed region in Hungary; it has a large and sophisticated housing market but relatively inelastic housing supply. This

means that current market developments may eventually lead to a regional, credit-fuelled housing bubble. Since this could bring about systemic financial instability, the MNB monitors the situation closely for signs of excessive house prices and lending in Budapest (and other regions).

The macroprudential regulatory response to a regional housing bubble that is accompanied by excessive lending could be more effective by regional differentiation if certain conditions are met. The primary potential regional tool is an appropriate combination of debt cap rules. International experience shows that such rules can efficiently constrain both excessive country-wide and regional lending. The MNB already introduced debt cap rules in the household sector in January 2015. The exact calibration of a regionally-targeted tool would benefit from the experience gained since then. Although curbing excessive lending may not be entirely effective in preventing housing overvaluation, some international evidence shows that regionally-differentiated debt cap rules could considerably contribute to the mitigation of the adverse effects of regional housing bubbles on both financial instability and on some other aspects of socio-economic exclusion, such as constrained access to adequate living space, hindered internal mobility and enlarged inequalities. However such intervention would go beyond normatively calibrated debt cap rules, with the potential to interfere with other policy objectives that are outside the scope of macroprudential policy, such as facilitating regional development. Nevertheless, if central banks as macroprudential authorities decided to embark on this road, the need to handle these spillover effects would call for a coordinated implementation of regionally-targeted macroprudential policy with various other public policies – eg fiscal, social and employment policies. This could open a Pandora’s box for institutional setups and macroprudential mandates.

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Macroprudential frameworks, implementation, and relationship with other policies

Reserve Bank of India

Abstract

Macroprudential tools were actively used in India long before the onset of the global financial crisis. The regulatory tools, and the power to activate them, reside with sectoral authorities, while the Financial Stability and Development Council is the apex body concerned with financial stability. Its Sub-Committee has taken on the role of finalising broad-based macroprudential policies and tools. As India is a bank-dominated economy, and the Reserve Bank of India regulates banks, non-bank financial companies and most other important segments of the financial markets, the Bank is the main centre for macroprudential analysis. This paper documents the successful implementation of various macroprudential tools such as provisioning, risk weights, loan-to-value ratios and capital flow measures. We also highlight the coordinated use of macroprudential and monetary policies in response to changes in the macro-financial environment before and after the crisis. Lastly, the analytical approaches to systemic risk assessment in India, together with the use of communication as a policy tool, are discussed.

Keywords: macroprudential, countercyclical policies, risk weights

JEL classification: G28, E44, E58

Background

The use of macroprudential framework and tools has found support from the G20 as a part of the post-crisis international regulatory reforms agenda. More recently, a joint stocktaking of the international post-crisis experience of developing and implementing macroprudential policies was presented to the G20 Leaders' 2016 Hangzhou Summit by the International Monetary Fund (IMF), Bank for International Settlements (BIS) and Financial Stability Board (FSB).

In this context, it may be mentioned that the Reserve Bank of India (RBI) applied macroprudential tools long before the Great Financial Crisis (GFC). In fact, we believe that, thanks to these pre-crisis macroprudential measures, the banking system emerged more resilient and better prepared to withstand the impact of the GFC. The IMF's 2012 Financial Sector Assessment Program (FSAP) for India also noted that the country had long-standing experience in the use of macroprudential instruments to counter credit cycles and that continued efforts to strengthen systemic oversight were being made.

This note presents the macroprudential policy framework in India covering the institutional framework, the RBI's policymaking mechanism for banks, non-banks and other sectors, interaction with other policies, process for systemic risk assessment, and communications policy.

Institutional framework

No single statutory authority or body is explicitly tasked with macroprudential policy for India's financial system as a whole. The Financial Stability and Development Council (FSDC) is the apex body responsible for financial stability. Its Sub-Committee (FSDC-SC), has become a body for finalising broad-based macroprudential policies for the system as a whole. Traditionally, the RBI has played a predominant role in the design and implementation of macroprudential policies as the regulator of a large section of the Indian financial system.¹ This function complements its lender of last resort role. Since its inception in 1935, the RBI has had a legal mandate to secure monetary stability and, for about a decade since 2004, financial stability was also included as an additional objective in its articulation of monetary policy, recognising its role in the conduct of monetary policy and to price stability. More recently, the RBI has formally moved to flexible inflation targeting, following the monetary policy framework established through an amendment of the Finance Act, 2016. This legislation established a Monetary Policy Committee (MPC) to determine the policy interest rate required to achieve the inflation target. The primary objective of the monetary policy is to maintain price stability, while taking economic growth into account.

Post-crisis, the institutional framework for financial stability underwent some significant changes. With a view to establishing a body to institutionalise and

¹ The RBI is the regulator of the scheduled commercial banks (SCBs), non-bank financial companies (NBFCs) and important segments of financial markets, ie forex, government securities and money markets.

strengthen the mechanism for maintaining financial stability, financial sector development and inter-regulatory coordination, the Financial Stability and Development Council (FSDC)² was set up in December 2010. As stated earlier, the FSDC has become the apex body concerned with financial stability along with macroprudential supervision of the economy, although it has a broader mandate that also includes financial sector development and inclusion. The RBI is a member of the FSDC along with the Securities and Exchange Board of India (SEBI), the Pension Fund Regulatory and Development Authority (PFRDA) and the Insurance Regulatory and Development Authority of India (IRDA). Given the largely bank-based system in India, macroprudential analysis and policy is carried out mainly by the RBI, in conjunction with other regulatory authorities such as SEBI, IRDA and PFRDA.

The FSDC is headed by India's Finance Minister. The executive arm of the FSDC is its Sub-Committee (FSDC-SC), which is headed by the Governor of the RBI. A number of permanent technical groups under the aegis of the FSDC-SC, such as the Inter Regulatory Technical Group (IRTG), discuss issues relating to financial stability risks and inter-regulatory coordination. Among these groups are also the Inter Regulatory Forum (IRF) for monitoring financial conglomerates (FCs) and the Early Warning Group (EWG), which looks for early signs of crisis situations. Each regulator independently takes decisions in its respective domain, while inter-regulatory issues, are discussed at the FSDC-SC Inter Regulatory Technical Group (IRTG) and then decided at the FSDC-SC itself. Macroprudential measures as well as tools framed or identified by each regulator may also be brought to the FSDC-SC for finalisation. Thus, the FSDC-SC serves as the authority for finalising broad-based macroprudential policies for the system as a whole.

The RBI's macroprudential policy framework

Regulatory tools, as well as the decision about when to activate them, reside with the sectoral authorities rather than with the FSDC. Given that India's financial system is dominated by banks and that the RBI regulates both banks and other types of financial institutions, macroprudential policy is set mainly by the RBI.³ Macroprudential policy at the RBI has developed organically from microprudential regulation and supervision, and the same internal processes are used for decision-making purposes. The macroprudential dimension complements the microprudential focus on the soundness of individual institutions. Overall, macroprudential policy is assessed regularly through the biannual Financial Stability Reports (FSRs), which are subsequently discussed in the FSDC. Thus, a framework exists to consider macroprudential policy and assess its implementation.

Macroprudential tools are used to target the build-up of risks arising from (i) cyclical fluctuations in the credit supply, ie time-varying capital, time-varying general and specific provisioning etc; (ii) interdependence across institutions and sectors; and (iii) cross-border spillovers. Tools are implemented and calibrated based on continuous monitoring of various indicators of vulnerabilities, ie aggregate credit growth, credit growth in different segments such as commercial real estate,

² Set up by a Gazette notification available at <http://finmin.nic.in/fsdc/GazNote31122010.pdf>.

³ Financial Stability Board (2016).

loan-to-deposit ratios, the credit-to-GDP gap, growth of non-performing assets, interest coverage ratio etc. In addition, tools can be differentiated by type of institution, sector, currency etc.

Bank-specific macroprudential orientation

In terms of Section 35 A of the Banking Regulation Act 1949, the RBI is empowered to issue directions to banks or bank groups. Some of the specific macroprudential measures are discussed below.

One of the early experiments with macroprudential policy in India can be traced back to the early 2000s. Banks were then directed to build up an investment fluctuation reserve (IFR) of at least 5% of their investment portfolio by transferring the gains realised on sale of investments within a period of five years. The IFR enabled banks to maintain stable capital adequacy and ensured that a cushion was built up during “good times”, which was then used to “buffer” the hard times. This helped to cushion the impact of fluctuations in interest rates on banks’ mark-to-market profits. The prescription was withdrawn gradually as the capital charge for market risk was implemented in a phased manner during 2004–06.

The RBI has used risk weight and provisioning requirements at different times to protect banks’ balance sheets. Such measures also helped to reduce overheating of various sectors, such as capital markets, housing and commercial real estate. Anticipating emerging risks from this runaway credit growth, the RBI adopted pre-emptive countercyclical provisioning and differentiated risk weights for these sectors in 2004.⁴ In addition, provisioning requirements for standard assets were also raised in November 2005, May 2006 and January 2007 in certain specific segments such as capital markets, retail loans and exposures to NBFCs. After the crisis unfolded, during 2008–09, RBI unwound some of the pre-crisis tightening measures, again responding countercyclically – easing both risk weights and standard asset provisioning norms – following a largely sectoral approach.

A loan-to-value (LTV) cap, along with a differential risk weight requirement for housing loans, was used to reduce overheating of the housing sector. An LTV cap as a function of loan size was introduced for the first time in 2007.⁵ In the years leading up to 2012 and amidst a rapid increase in gold prices, some NBFCs expanded their lending against gold jewellery as collateral at a very rapid pace. The RBI noted that such growth rates were out of line with their NBFC peers and past experience. In response, the RBI imposed, in March 2012, a 60% LTV ratio on these companies as a prudential ceiling. Also, margins have been applied for loans against sensitive commodities and sectors that are generally subject to market fluctuations. For example, in the case of loans to individuals against capital market instruments as collateral, banks are required to maintain a minimum margin of 50% of the market

⁴ In its Mid-term Review of the Annual Policy for 2004–05, the RBI put in place a macroprudential measure by raising the risk weight on housing loans from 50% to 75% and that for consumer credit (including personal loans and credit cards) from 100% to 125%. The move had a major impact in arresting the credit and asset price bubble in a timely manner.

⁵ For loans of up to INR 3 million, a risk weight of 35% was allowed in the case of an LTV of up to 80%, but a higher risk weight of 75% was levied if the LTV exceeded 80% up to an LTV cap of 90%. For loans of INR 3–7.5 million, the risk weight was kept at 35% with the LTV cap at 80%. For loans exceeding INR 7.5 million (around US\$ 150,000 at the time) a higher risk weight of 50% was prescribed with a lower LTV cap of 75%.

value of equity shares/convertible debentures held in physical form. In the case of shares/convertible debentures held in dematerialised form, a minimum margin of 25% is prescribed. There are also limits in relation to net worth on exposure to capital market instruments other than assets held as strategic investments.

Apart from the above tools, a framework for the countercyclical capital buffer (CCyB) and additional capital requirements for domestic systemically important banks (D-SIBs) have also been put in place. As regards the CCyB, its activation will take place when circumstances warrant. While taking the final decision on the CCyB's activation, along with the credit-to-GDP gap as the main indicator, the RBI may use its discretion to use all or some of the supplementary indicators, eg gross non-performing assets (GNPA) growth, the incremental credit-deposit ratio for a moving period of three years, the Industry Outlook Assessment Index, and the interest coverage ratio (along with its correlation with the credit-to-GDP gap). The indicators and thresholds for CCyB activation decisions are subject to continuous review and empirical testing, and other indicators may also be used by the RBI to support CCyB activation decisions.

For the D-SIBs, RBI uses a similar approach for adapting the Basel Committee on Banking Supervision (BCBS) framework to domestic circumstances.

Non-bank-specific macroprudential policies

NBFCs are exposed to risks arising out of counterparty failures, funding and asset concentration, interest rate movements and risks pertaining to liquidity and solvency. Risks of the NBFC sector can hence be easily transmitted to the financial sector, and similarly the NBFCs can be affected by adverse developments in the financial sector. As seen during the 2008 financial crisis, NBFCs came under pressure due to funding interlinkages between NBFCs and mutual funds. In response, RBI undertook a range of measures to support the NBFCs.

The NBFC sector is closely connected with the rest of the financial system and a few large companies that belong to financial conglomerates (FCs) operate in the insurance, broking, mutual fund and real estate sectors.⁶ Their interconnectedness with other financial intermediaries has increased with expanded access to public funds through non-convertible debentures (NCDs) and commercial paper (CPs), as well as borrowing from banks and financial institutions. The financial parameters of NBFCs are analysed through off-site data on a quarterly basis, while the build-up of concentrations in specific sectors is analysed through a robust off-site return mechanism and through on-site inspections. Any potential risks are mitigated by prescribed safeguards (stringent norms for NCD issuances) etc. A well structured regulatory framework comprising, inter alia, capital requirements, credit concentration norms, leverage prescriptions and asset-liability management (ALM) prescriptions acts as a risk mitigant. Further, there is an attempt to harmonise the NBFC regulations with those for banks, with the objective of removing any arbitrage opportunity that might have implications for financial stability.

⁶ A FC is identified on the basis of its significant presence – as determined by the respective regulator – in two or more market segments (banking, insurance, securities, non-banking finance, pension funds). Each FC has a “designated entity” within the group to act as the nodal entity.

Capital flow management measures

The RBI has also implemented measures to reduce financial stability risks caused by capital flow volatility, particularly those which amplify foreign currency risks or liquidity mismatch risks. To the extent the capital flow management measures (CFMs) address systemic financial sector risks, these measures may be viewed as being macroprudential in nature.

As regards capital flows, caps are in place, for various sectors receiving foreign investment, that have been gradually liberalised over time. These include sector-specific caps, domestic entity-specific caps and restrictions on external commercial borrowings (ECBs). Such prescriptions have been changed from time to time depending upon the circumstances. For instance, during the crisis, the all-in-cost ceilings under the approval route were removed, so that corporates could access ECBs. When credit market conditions improved, the all-in-cost ceilings under the approval route for the ECBs were re-imposed. RBI has also modulated the eligibility limit for foreign exchange remittances under the Liberalised Remittance Scheme (LRS) in both directions, as warranted by external market situation.

The Indian strategy has generally been to use soft capital account measures when needed. For example, to contain the forex volatilities seen in the wake of the 2013 “taper tantrum”, the RBI applied CFMs, including direct administrative measures aimed at reducing capital outflows⁷ and incentivising capital inflows, as well as measures to tighten domestic liquidity through the interest rate and the quantity channels. When the adverse spillover of these policies in the domestic markets, particularly the debt market, became evident, the RBI announced regulatory dispensations to protect banks’ earnings. These measures were largely macroprudential in their orientation. In addition, the RBI introduced incremental provisioning and capital requirements for bank exposures to entities with unhedged foreign currency exposures in 2014.

Interaction with other policies

The RBI is mandated by law to maintain inflation within a $4\pm 2\%$ band. The Bank also functions as the main pillar of macroprudential policy authority in India, besides serving other objectives such as banking regulation and financial inclusion. The optimal balance between conflicting objectives may depend upon the circumstances under which a policy decision has to be undertaken.

Monetary and macroprudential policy could both work to a significant degree in shaping economic agents’ expectations about the macro-financial outlook. As cited in a recent CGFS report,⁸ the Indian experience shows how both policies could be used in a coordinated fashion in response to changes in the macro-financial environment. For example, countercyclical policies were accompanied with monetary policy tightening during 2004–08. During October 2008 to April 2009, when the RBI

⁷ India temporarily lowered the limit on the outward US dollar remittances of resident Indians from \$200,000 to \$75,000. It also lowered the cap on the overseas direct investment (ODI) of Indian firms for all fresh transactions from 400% of the net worth to 100%. In addition, it took monetary policy measures to lower rupee liquidity to curb dollar purchases and increased short-term interest rates as a transitory response.

⁸ Committee on the Global Financial System (2016b).

relaxed its macroprudential measures, it was also aggressively easing its monetary policy. The stance reversed after October 2009, when inflationary pressures warranted monetary tightening while increased credit growth in some segments of the economy necessitated macroprudential tightening. This demonstrated a coordinated approach to the conduct of monetary and macroprudential policy with the aim of simultaneously pursuing price and financial stability. Such coordinated responses were facilitated by the RBI's wide regulatory ambit. RBI policies were effective in reducing credit to commercial real estate and housing credit. Further, these measures were able to curb the disproportionate increase in sectoral credit without jeopardising or disrupting the flow of credit to other productive areas and priority sectors.

The Indian experience, so far, has also not demonstrated any major conflict between financial stability, financial sector development and financial inclusion. As discussed above, the regulatory framework for banking and non-banking sectors, has discouraged regulated entities from entering excessively risky business areas. On the other hand, steps to accelerate financial inclusion have further accelerated the diversification and expansion of banks' retail base. The competences of the FSDC, FSDC-SC and the regular interactions of the Ministry of Finance with financial sector regulators are considered adequate to deal with trade-offs, if any, between stability, development and inclusion.

Systemic risk assessments

The RBI uses state-of-the-art techniques for systemic risk assessment in support of the macroprudential analysis. The aim is to take a holistic view of the financial system through an ongoing systemic risk analysis process that includes stress tests, network analysis and contagion simulation. Various analytical tools, including advanced econometric tools, are employed, including (a) the systemic risk survey; (b) single factor sensitivity analysis; (c) banking stability maps and indicators; (d) estimation of expected loss, unexpected loss and expected shortfalls of banks; (e) macro stress testing; (f) stress testing of the derivatives portfolio of banks; and (g) financial network analysis. Macro stress tests aim to capture the impact of the real economy on the banking system. Most of the stress tests conducted by RBI are top-down in nature. However, bottom-up methodology is used in stress testing banks' derivatives portfolios, in which more than 20 leading banks in terms of the notional value of their derivatives portfolios participate. Also, a bottom-up version of the sensitivity analysis is carried out to assess credit risk, interest rate risk, liquidity risk and forex risk. Network analysis primarily looks into the interconnectedness that exists between different institutions to identify any build-up of systemic risks. It captures these linkages through different connectivity ratios. Further, contagion simulation helps in assessing the possible loss of capital to the financial system due to a random failure of one or more financial institutions. Both the solvency and liquidity effects of an institution's failure are assessed in this joint solvency-liquidity contagion analysis.

A Systemic Risk Survey is conducted twice a year with external experts, including market participants. More recently, the RBI has started to carry out detailed stress analysis of highly leveraged corporates and their impact on the health of the banking system. Other authorities, particularly the SEBI, have also begun to carry out systemic risk analysis.

The biannual *Financial Stability Report* (FSR) highlights vulnerabilities and potential risks, and include stress tests to assess the resilience of the banking system. The vulnerabilities and resilience of other sectors such as the capital markets, insurance and pension funds are assessed and monitored through the internal stability assessment framework of the respective regulators (ie SEBI, IRDA and PFRDA) and reported in the FSR. The report is approved by the FSDC-SC and published by the RBI, with contributions from all other members of the Sub-Committee.

In the case of banking system, the regulatory departments of the RBI identify the risks and vulnerabilities pointed out in the FSR and prepare a detailed analytical note on the regulation/initiatives in place to deal with them as well as those required to be put in place to mitigate risk. The note is submitted to the Board for Financial Supervision (BFS), the apex body for the supervision of banking system, and the issues and required actions are then discussed. The observations in the FSR are also submitted to the RBI's Central Board of Directors.

Progress has also been made in addressing data gaps, for example via the creation of a Central Repository of Information on Large Credits (CRILC) and the collection of data on corporates' foreign currency exposures and their hedging. Steps have been initiated by the FSDC to form a Financial Data Management Centre to facilitate information-sharing and analysis.

Communication of macroprudential policies in India

In India, macroprudential policy announcements are made when required, generally as part of the Statement on Developmental and Regulatory Policies released together with the Monetary Policy Statements. The aim and reasoning behind the policy is explained in the policy statements or in the notifications on policy changes. Major intended changes are often communicated in draft form and comments or feedback are solicited from the stakeholders. The comments or feedback received are analysed and any changes are incorporated before the final report or notification is communicated to the wider public.

While policy decisions are communicated through notifications and press releases, any background information on the rationale and possible impact of the policy stance, or any possible alternatives, is communicated to the wider public mainly through speeches by senior management and publications such as the Annual Reports and Financial Stability Reports. Regulations relating to a particular aspect of policy are consolidated in regularly updated master documents. In addition, the RBI conducts workshops for the media on the background and rationale of regulations.

The RBI's annual *Report on Trend and Progress of Banking in India* traces developments in banking regulation and supervision together with the major policy guidelines and their rationale. The biannual *Financial Stability Report* has been mentioned above.

Concluding observations

The RBI generally uses macroprudential tools in coordination with other policy instruments. Macroprudential policy actions are based on informed judgment rather than rules, in response to trends in aggregate credit and sectoral credit growth. This

approach also meets the need for coordination between the macroprudential, monetary, and fiscal policymakers. On the whole, the RBI exercises guided discretion in the appraisal and implementation of macroprudential instruments, based on qualitative judgement supported by quantitative analysis to the extent possible.

Generally, macroprudential tools are implemented with a specific objective in mind. The RBI's analysis and decision-making process for macroprudential policies are not influenced by the state ownership of a large part of the banking sector. As is widely accepted, measuring the cost of macroprudential actions is difficult especially when more than one tool is used concomitantly. Further, measuring the costs and benefits of the macroprudential policies may not always be quantifiable and hence the analysis is more subjective in nature. This has been a challenge globally. However, the RBI is continuously seeking ways to improve the robustness of both its qualitative as well as quantitative cost-benefit analysis of macroprudential policy tools keeping in view global developments in this area.

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Indonesia: the macroprudential framework and the central bank's policy mix

Perry Warjiyo*

Abstract

Recent crises have clearly highlighted the importance of understanding macro-financial linkages in order to mitigate the build-up of systemic risks to financial and macroeconomic stability, and sustainable economic growth. This note describes the role of macroprudential policy as an integral part of the central bank policy mix and financial stability in Indonesia. It encompasses regulation and surveillance from a macro perspective with a focus on systemic risk. A number of macroprudential policy measures have been implemented in Indonesia, including loan-to-value (LTV) ratios, reserve requirements and a capital conservation buffer, and these have proven successful in mitigating the build-up of systemic risks to financial stability as well as strengthening monetary policy in achieving price stability. In line with the central bank's revised mandate for combined price and financial system stability, the policy mix comprises interest rate, exchange rate, capital flow management and macroprudential elements. Our experience since 2010 shows that the current policy mix has advantages over the standard inflation targeting framework. In addition to implementing a sound macroprudential framework to promote financial stability, Indonesia has underpinned its crisis management protocol for prevention and resolution of the financial system crisis with a strong legal foundation (ie the Law on Financial System Crisis Prevention and Resolution of 2016).

Keywords: central banking, policy mix, financial stability, monetary policy, macroprudential policy, crisis management

JEL classification: E52, E58, H12

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Macroprudential policy is an integral part of Indonesia's central bank policy mix. It encompasses regulation and surveillance from a macro perspective and focuses on systemic risk with the aim of supporting financial system stability. It is implemented through a number of instruments, including LTV ratios, reserve requirements and a capital conservation buffer, and has been successful in mitigating the build-up of systemic risks to financial stability as well as in strengthening the effect of monetary policy in pursuit of price stability.

Institutional setting: a brief perspective

Bank Indonesia started to develop its macroprudential function in 2002 as a part of its overall transformation programme, in line with trends in other central banks towards strengthening monetary and financial stability policy. While inflation targeting was adopted to achieve price stability, macroprudential policy was introduced to strengthen microprudential regulation and supervision in the interests of financial stability. Indonesia's macroprudential policy has the aims of (i) mitigating systemic risk; (ii) promoting a balanced and sound intermediary function; and (iii) increasing financial system efficiency and access. The latter objective is specifically designed to promote the development of the financial system, especially in terms of financial deepening and inclusion.

These three objectives strike a balance between maintaining financial stability and optimising the contribution of the financial system to economic growth. Macroprudential policy adds the macro-financial and system-wide dimensions of financial stability to the focus on individual bank soundness of microprudential regulation and supervision. Furthermore, it strengthens the effectiveness of monetary policy transmission in achieving price stability. Against this backdrop, Bank Indonesia started to implement a mix of monetary and macroprudential policies in 2010 (Warjiyo (2016a, 2016b)). Capital flow management also complements the central bank policy mix.

Bank Indonesia has continued to implement its macroprudential policy since 2013, when responsibility for microprudential supervision was transferred to the newly established Financial Service Authority (*Otoritas Jasa Keuangan*, OJK) under the OJK Law no 21 of 2011. The microprudential supervision of the OJK focuses on ensuring the soundness of individual financial institutions, while Bank Indonesia's macroprudential policy encompasses regulation and surveillance from a macro perspective, focusing on systemic risk. As the two policies are complementary in promoting financial system stability and their instruments may be similar, a mechanism for close coordination has been established between Bank Indonesia and the OJK at the board level as well as at senior official and technical levels. The OJK coordinates with Bank Indonesia in regulating banking sector supervision in such areas as (a) monitoring of banks' minimum capital; (b) integrated information systems; (c) policy on foreign fund flows, admission of foreign currencies, and foreign commercial lending; (d) banking products, derivative products, other bank business activities; (e) designations of institutions as systemically important banks; and (f) other data that are exempted from confidentiality rules.

In 2016, a new law was enacted to strengthen policy coordination in order to prevent or resolve a financial system crisis (ie the Prevention and Resolution of Financial System Crisis or *Pencegahan dan Penanganan Krisis Sistem Keuangan*,

PPKSK Law no 9). The law formalised the Financial System Stability Committee (*Komite Stabilitas Sistem Keuangan*, KSSK), which was set up in 2013 and is chaired by the Minister of Finance with the Governor of Bank Indonesia, the Chairman of the OJK, and the Chairman of Deposit Insurance Institution (*Lembaga Penjamin Simpanan*, LPS) as members. The law clarifies the roles and responsibilities of each of these four institutions in promoting financial stability, ie the Ministry of Finance's fiscal policy for mitigating excessive fiscal deficit, public debt and stability of the government bond market, Bank Indonesia's monetary and macroprudential policies for mitigating currency/external risks, macro-financial imbalances and systemic risks, and the OJK's microprudential supervision for mitigating individual banking and financial market failures, while LPS acts as the resolution institution for the financial system. The committee coordinates policy with the aim of preventing and resolving any financial crisis that may be caused by these multi-dimensional risks, paying due regard to the respective mandate of each institution. Crisis management protocols both at the national level as well as at each institution have also been developed to support policy coordination.

Furthermore, the new law sets out the criteria for the designation of domestic systemically important banks (D-SIBs) by the OJK, based on asset size, interconnectedness, complexity, and substitutability, following the recommendations of Bank Indonesia. D-SIBs are then required to (i) meet higher capital adequacy and liquidity ratios; (ii) maintain recovery and resolution (action) plans as agreed by the OJK, including the obligation that shareholders or other party increase bank capital or convert certain debt into equity; and (iii) meet the OJK's requirement for additional capital to absorb losses if the bank faces financial difficulty. The resolution mechanism for these D-SIBs by LPS is decided by the KSSK through the procedure and process under the national crisis management protocol as they pose systemic risks to the overall financial system, whereas resolution for non-D-SIBs is managed directly by LPS after closure on the instructions of the OJK. The resolution methods open to LPS have also been widened under the new law beyond the standard liquidation process to include purchase and assumptions, and bridge banks.

Macroprudential framework

Bank Indonesia's macroprudential framework is a part of the crisis management protocol at the national level along with the fiscal policy framework of the Ministry of Finance, the OJK's microprudential framework, and the LPS's resolution mechanism.

Objectives and instruments

The ultimate objective of Bank Indonesia's macroprudential policy is to mitigate risks emanating from the procyclicality of macro-financial linkages and to counter the build-up of systemic risk from interconnections and networks among and within financial institutions, markets and infrastructures, including the payment system. The first objective of macroprudential policy is to contain the build-up of risks from financial cycles driven by factors within the financial system as well as their interactions with economy. These risks can be in the form of excessive credit growth, property and asset bubbles, or excessive debt. The second objective is to strengthen

the resilience of financial system and to mitigate contagion from the interconnections and networks of the financial system. These two objectives are consistent with practice in other central banks.¹

Lim et al (2011) cite 10 macroprudential instruments for the management of procyclicality and systemic risks relating to exposures of credit, liquidity and capital. For procyclicality in credit, the instruments include loan-to-value (LTV) ratios, debt-to-income (DTI) ratios and limits on credit growth in certain sectors. For foreign exchange exposures, instruments such as net open positions (NOP), limits on foreign exchange credits, or regulations on hedging and maturity of foreign exchange debts can be adopted. For liquidity, reserve requirements are generally chosen calibrated according to the evolving liquidity condition. Meanwhile, instruments to strengthen capital in withstanding procyclicality and systemic risks include countercyclical capital buffers, regulations on allowances for non-performing loans according to credit procyclicality risk dynamics, and regulations on remuneration and profit distribution.

Galati and Moessner (2014) classified macroprudential instruments according to type of risk, ie leverage/credit boom/asset bubbles risks, liquidity/market risks, and interconnectedness/market structure risks, and according to risk dimensions, ie whether dynamically across time or statically across sectors. The first type of risk is generally addressed by dynamic across-time instruments to mitigate emerging procyclicality, eg LTV ratios and countercyclical capital buffers. For liquidity/market risks, dynamic instruments can be applied, such as loan-to-deposit ratios (LDR) and additional liquidity requirements for systemic banks, or static instruments such as additional capital for derivatives and levies on non-core liabilities. Meanwhile, for interconnectedness and market structure risks, cross-sectional static instruments are applied, such as higher liquidity and capital requirements for systemic banks or surcharges on deposit insurance premiums for systemic risks.

Bank Indonesia has applied a number of macroprudential instruments as shown in Appendix Table 1. To contain procyclicality in credit growth, LTV ratios on lending to the property sector and regulation of down-payments on car loans were applied for the first time in 2012. These measures also reinforced the effect of increases in policy interest rates in the interests of macroeconomic stability. To manage procyclicality in liquidity, Bank Indonesia enacted a loan-to-funding-linked reserve requirement whereby banks with an LFR below 78% or higher than 92% are subjected to higher reserve requirements. Bank Indonesia also put in place a regulation on a countercyclical capital buffer for D-SIBs in 2015, which is now set at 0% but can be increased up to 2.5% as necessary.

These macroprudential instruments can be tightened or loosened depending on any build-up in procyclicality and systemic risks. Claessens et al (2014), for instance, classify instruments that can be adopted during an economic expansion, contraction, or to mitigate contagion risks from interconnectedness and networks in the financial system. These instruments can be in the forms of limits on borrowers, instruments and transactions, or limits on the balance sheet of the financial sector, or regulations on a capital buffer. In Indonesia, the LTV ratio on property lending and down-payments on automotive lending were tightened in 2012 and 2013 but they were

¹ In addition to these two objectives, the ECB has also developed macroprudential regulation to promote incentives or disincentives for market players (structural dimension).

relaxed in 2015 and 2016. The floor of the LFR-linked reserve requirement was also raised from 78% to 80% while maintaining the ceiling at 92%.

It should be noted that Bank Indonesia has also put in place a number of measures that are classified as capital flow management instruments but which could also promote financial stability. To manage banks' foreign currency risks, in addition to limits on net open positions (NOP), Bank Indonesia sets a maximum limit on short-term offshore borrowing by banks of 25% of their capital. Banks that seek offshore borrowing with maturity beyond one year must seek clearance from Bank Indonesia. Meanwhile, to strengthen the risk management of non-bank corporates that have external debt exposures, Bank Indonesia issued a new rule in 2014 that require them to have (i) a currency hedging ratio of a minimum 25% of their net external debt due within three and six months; (ii) a liquidity ratio (including the current foreign assets in the hedging ratio) of a minimum 50% of their net external debt due within three and six months; and (iii) a minimum credit rating of one notch below investment grade. The effectiveness of these measures is encouraging, as about 92% of more than 2,400 companies that submit their quarterly financial reports in 2016 to the central bank have complied with the regulation.²

The policy process

Graph 1 depicts the policy process for formulating macroprudential regulation and supervision (Harun and Sagita (2013, 2015), Bank Indonesia (2016)). The process starts with the identification of a balanced set of systemic risks, followed by monitoring, identification and assessment of systemic risk, and policy formulation and evaluation. Bank Indonesia's systemic risk exercises cover the entire financial system, which comprises financial institutions (bank and non-bank), financial markets, corporations and households (as surplus and deficit units), and financial market infrastructure as well as domestic and global macroeconomic conditions. Data, information and research have been developed to support the process.

In the current process, a systemic risk survey is conducted biannually, in which respondents from the financial community are asked about (i) what shocks have the highest probability of happening and which would have the greatest impact on the financial system; (ii) which vulnerabilities raise the most concern, and whether these are structural or temporary; and (iii) the level of confidence in the financial system. The survey result is then analysed, with shocks and vulnerabilities paired to produce the most prioritised systemic risks in the form of a risk assessment matrix (RAM). The RAM then provides the focus of (i) activities in monitoring, identification and assessment of systemic risks; (ii) scenario design for stress testing; (iii) topical research; and (iv) the main pages in the macroprudential dashboard, which also helps to identify specific sources of risk and the relevant indicators to monitor.

Bank Indonesia has developed a number of tools for monitoring, identifying and assessing systemic risk. These include the Macroprudential Information System (SIMP) for banks and other data from financial institutions, as well as the Macroprudential Dashboard of risks in the market, which displays the most important

² The new rule also has a positive impact on the deepening of domestic foreign exchange market as hedging instruments in the form of swaps and forwards have increased significantly.

indicators including the Financial System Stability Index. The methodologies involved are grouped into three different subsystems, ie for banking; non-bank financial institutions, financial markets and infrastructure; and the corporate and household sectors. For risk assessment, microprudential top-down stress testing is conducted quarterly while a macroprudential stress-testing model is also under development. For risk signalling, policy communication on financial stability conditions is conducted regularly with other financial authorities, via the KSSK or other coordination meetings with relevant government agencies; and to the public via the biannual Financial Stability Review. To support assessment and surveillance systemic risks, thematic on-site examinations are conducted on daily liquidity reporting, bottom-up stress testing conducted by the banks themselves, and speculative activity in the foreign exchange market, among other topics.

Data are crucial for the monitoring, identification and assessment of systemic risk and the formulation of macroprudential policy. As a result of the separation of authorities, Bank Indonesia has developed its own interface for macroprudential data, tapping into the banking database shared with the OJK. A dashboard has also been developed to better monitor financial system stability conditions, while a big data application is used to support the identification of prioritised sources of systemic risk. Research topics include model development, systemic risk assessment tools, the corporate, household and financial system liquidity, as well as intermediation efficiency. Development, modification or evaluation of macroprudential instruments are based on a rigorous research process. Microprudential instruments that will be implemented by the OJK are also reviewed to assess their quantitative impact and their intended and unintended consequences. The research group also develops the models for microprudential and macroprudential stress testing, DSGE models for policy simulation, identification and assessment tools for the assessment group and topical research on the behaviour of market players.

Crisis management protocol

As stated above, the new PPKSK Law of 2016 formalises the protocol that has been in place since 2013 for the prevention and resolution of financial system crises. To support the protocol, each of the four institutions monitors early warning indicators and protocols for their respective roles and responsibilities. The Ministry of Finance, for instance, has developed fiscal indicators and government bond market indicators. The OJK has early warning indicators for problems at individual bank and non-bank financial institutions, as well as in the capital markets. Meanwhile, Bank Indonesia conducts its surveillance and assessment activities according to three sub-protocols that represent assessments on stress levels within (i) the monetary system (exchange rates and financial markets); (ii) financial system stability; and (iii) the payment system.³ Although the PPKSK Law classifies the stress level in the risks to financial system stability into “normal” and “crisis” levels, the crisis management

³ For these purposes, Bank Indonesia monitors a number of indices to assess the stress level: eg the Exchange Market Pressure Index (EMPI), the Financial Market Pressure Index (FMPI), the Financial Stability Index (FSI), and the Financial Institution Soundness Index (FISI), along with a heatmap of the indicators that underlie these indices. These indices and the heatmap are regularly reported to the Board of Governor meetings.

protocols of the four institutions use a four-stage classification: “stable” (green), “caution” (yellow), “alert” (pink) and “incipient crisis” (red).

These early warning protocols from each institution form the basis of discussions and policy coordination in the meetings of KSSK, which take place on a quarterly basis, with monthly meetings at a deputy level. Nonetheless, a KSSK meeting can be convened if any of the four institution’s protocols flags a warning that warrants an immediate policy response. For instance, if based on Bank Indonesia’s assessment process, exchange rate indicators have deteriorated from “stable” to “caution” or even “alert” due to sudden and huge foreign capital outflows, the Bank would summon a KSSK meeting. If the meeting should conclude that these risks do not threaten the overall financial system, or that they could be contained through a coordinated policy response, then there would be no declaration that systemic risks were present. If, on the other hand, the assessment process indicated a crisis condition, the KSSK would then report to the President as the basis for a presidential decision on whether a national crisis should be declared. If a crisis situation is declared, Bank Indonesia’s Board of Governors could decide to establish a crisis centre to monitor and coordinate the response. The crisis centre would be headed by a member of the Board of Governors.

National crisis simulations have been conducted regularly since 2014 in order to ensure the smooth cooperation of the four KSSK members. For instance, the scenario for the most recent crisis simulation, in September 2016, was designed to replicate the actual conditions for banks if crisis had occurred between August 2016 and January 2017. The scenario envisaged the rapid deterioration of global and domestic economic conditions, intertwined with vulnerabilities in a number of systemic and non-systemic banks that generated imminent systemic risks. In addition to crisis simulation within the KSSK, Bank Indonesia also conducts crisis simulations internally to ensure smooth collaboration and coordination among the relevant departments and working units during a crisis situation.

Macprudential elements in the central bank policy mix

As discussed above, the key issue for Bank Indonesia is how best to incorporate financial stability issues in monetary policy under a (flexible) inflation targeting regime with a view to addressing procyclicality and the build-up of systemic risks in macro-financial linkages. To enrich its understanding of macro-financial linkages, the Bank has expanded its macroeconomic forecasting model to include external default risk as a proxy for sudden stops and credit gaps with the aim of measuring procyclicality in the banking system (Harmanta et al (2012, 2013)). The model provides policy scenarios with the interest rate response (Taylor rule type) and reserve requirements from monetary policy and/or LTV ratios as possible macroprudential instruments. Since the forecasting model is forward-looking, it delivers important insights on how best to lean against the possible risks from sudden stops and the build-up of financial instability, ie via the policy interest rate or macroprudential measures or a combination of the two. For an improved understanding of credit booms and housing bubbles, separate models are run to assess the nature of such cycles and the possible build-up of systemic risks that are foreseen over the policy horizon (Alamsyah et al (2014), Harun et al (2014)).

Based on the overall policy process, the central bank policy mix consists of the following four main instruments (Warjiyo (2014a, 2015b, 2016a, 2016b)). First, based on the inflation targeting framework, the policy rate is set to ensure that the inflation forecast will fall within the targeted range (of 4%±1% in 2016–17). Second, the exchange rate policy is geared toward maintaining the stability of exchange rate movements along the fundamental trend to ensure their consistency with the achievement of inflation target and to avert any excessive volatility that may put pressure on financial stability. Third, capital flow management is conducted to support the exchange rate policy, particularly in periods of large capital inflows. Fourth, macroprudential policy is geared towards maintaining financial stability and supporting the effectiveness of monetary policy transmission. Financial market deepening is also encouraged to support the effectiveness of the policy mix. The central bank coordinates closely with the government, both at the central and regional levels, for macroeconomic management, as well as with the financial services authority and deposit insurance institution on matters relating to financial system stability. Clear communication is very important for the success of the policy mix.

A key question is how to mix the monetary and macroprudential policies in responding to different cases that may give rise to conflict between the price stability and financial stability objectives. This is an open debate as it deviates from the Tinbergen rule of one instrument for one policy objective. But there is a widely held view that, in many cases, both instruments can act in a complementary way to achieve both objectives (Yellen (2014)). The following table presents four cases of price stability and financial stability risks based on forward-looking macroeconomic and macro-financial forecasts and analysis over the policy horizon, and their corresponding mix of monetary and macroprudential policy stances. At the first quadrant, where forecast risks to both price and financial stability are low, it is natural that both monetary and macroprudential policy stances are neutral. At the other extreme of the fourth quadrant, where forecast risks to both price and financial stability are high, it is natural that both monetary and macroprudential policy stances are tight.

Four cases of price and financial stability

Table 2

		Forecast risk to price stability	
		Low	High
forecasted risk of financial stability	High	Quadrant II <ul style="list-style-type: none"> • Monetary NEUTRAL/LEANING • Macroprudential TIGHT 	Quadrant IV <ul style="list-style-type: none"> • Monetary TIGHT • Macroprudential TIGHT
	Low	Quadrant I <ul style="list-style-type: none"> • Monetary NEUTRAL/EASING • Macroprudential NEUTRAL/EASING 	Quadrant III <ul style="list-style-type: none"> • Monetary TIGHT • Macroprudential NEUTRAL/LEANING

The potential conflicts are in the second and third quadrants. In the second quadrant, where forecast risks of price stability are low but those to financial stability are high, the stance of macroprudential policy should clearly be tight. In this case, monetary policy could help macroprudential policy in leaning against the forecast

risks of financial stability. In the third quadrant, where the forecast risks of price stability are high but those to financial stability are low, the stance of monetary policy should clearly be tight. In this case, macroprudential policy could help monetary policy in leaning against the forecast risks of price stability. The choice and intensity of macroprudential measures will depend on the factors that give rise to these forecast risks to price stability. The selection could be directed toward reinforcing the channels of monetary transmission in safeguarding price stability. For instance, where risks to price stability stem from strong domestic demand induced by bank lending to the housing sector, an LTV ratio targeted on this sector would be one option.

The factual problems in the real world may not be as simple as just described, of course. But we think this approach could be a useful guiding principle to address the possible conflicts that may arise between price and financial stability objectives. Again, the choice of monetary and macroprudential measures will naturally depend on the corresponding factors that give rise to the forecast risks of price and financial stability in the respective countries. We also think the same approach could be used to address the policy trilemma of monetary independence in achieving price stability, exchange rate stability, and capital mobility, as outlined in Obstfeld (2015).

Experience since 2010

Indonesia's experience since 2010 shows that the current central bank policy mix has been superior to the standard inflation targeting framework relying solely on interest rates. Three episodes since the global crisis have provided evidence to support this case, ie the period from 2010 to the Fed tantrum in May 2013, the period since the Fed taper tantrum to mid-2015, and the period since then. During the first period, Indonesia benefited from favourable global spillovers, particularly high commodity prices and a surge in capital inflows (Warjiyo (2013b)). Economic growth peaked at 6.5% in 2011, moderating slightly to 6.3% in 2012. Inflation reached a historical low of 3.8% in 2011, below even the lower bound of the $5\% \pm 1\%$ target at that time. Indonesia also received large capital inflows, driven by global excess liquidity and the promising economic outlook. This lifted the exchange rate, which was also supported by the favourable current account surplus from high commodity prices. The challenge was how to mitigate the build-up in systemic risk as bank lending growth reached 23% annually during 2010–12. This is the case of second quadrant in Table 2, where the risks to price stability are low while those to financial stability are high.

Monetary policy

Consistent with the inflation targeting framework, the central bank cut the policy rate by 75 bps from 6.5% in 2010 to 5.75% in 2012. Further policy rate cuts would not have been consistent with the inflation targeting framework as inflation was then at its historical low. Nor would they have been effective in stemming capital inflows, which were driven more by "push" than "pull factors" (Indrawan et al (2013)). They would also have been inconsistent with the financial stability objective as bank lending growth was excessively high. As such, the central bank intervened in the foreign exchange market to stem the surge in capital inflows as well as to moderate the exchange rate appreciation. To sterilise its impact on domestic liquidity more

effectively, the reserve requirement was raised from 5% to 8% in November 2011. International reserves increased significantly from a mere US\$ 66.2 billion at the beginning of 2010 to a peak of US\$ 112.8 billion in 2012. It turned out that the increased reserves provided an important buffer against the capital reversals following the Fed taper tantrum in mid-2013.

The situation was then reversed. Large capital reversals immediately followed the surprise Fed taper announcement, running over the months of May to August of 2013. The sudden reversals from both government bonds and equity markets in such a short period created herding behaviour that put both monetary and financial stability at risk (Warjiyo (2014b)). The problem was aggravated by the widening current account deficit, which peaked at 4.4% of GDP as exports fell due to plunging global commodity prices while imports continued to increase on strong domestic demand. Inflation surged to 8.4% in 2013 as the government raised the fuel price in July 2013 and to 8.3% in 2014 as the fuel subsidy was removed in October 2014. Meanwhile, bank lending growth was still high at 21.4% in 2013. This is the case of the fourth quadrant, where risks to both price and financial stability were high.

The central bank responded swiftly to stabilise the situation, raising the policy rate and tightening macroprudential measures. Indonesia was among the first central banks to raise its policy rate in the aftermath of the taper tantrum. The Bank increased its policy rate by 25 bp in June 2013, and then aggressively raised it consecutively in the following months for a total of 175 bp to 7.50% within the six months to November 2013. The primary objective was to pre-emptively contain the inflation pressures stemming from the fuel price hike. The aggressive move also served to slow down domestic demand to reign in the current account deficit. The timing of the decisions reflected the need to respond to the capital reversals. The bold and aggressive response sent a strong and clear signal to the market on monetary policy credibility.

The central bank also intervened to stabilise the exchange rate. This caused the reserves to fall to their lowest level of US\$ 92 billion in September 2013 before recovering to US\$ 99 billion at the end of 2013. The intervention was supported by central bank purchases of government bonds in the secondary market, especially during the period of heavy capital reversals, a tactic that we call dual intervention (Warjiyo (2013c)). In essence, this serves to make sterilisation more effective, as purchasing bonds from the secondary market eases the liquidity squeeze from capital reversals that could not be compensated by foreign exchange intervention. It also strengthens the effectiveness of intervention in stabilising the exchange rate. The central bank sends a clear signal that it stands ready to supply foreign exchange and at the same time buy the bonds that foreign investors wish to unload, thus preventing herding behaviour and contagion from escalating capital outflows. Moreover, the dual intervention helps to harmonise the monetary stability objective consistent with the aim of maintaining financial system stability. By stabilising the foreign exchange and government bond markets, the dual intervention helps to stabilise the overall financial markets.

The bold monetary policy adjustments paid off. Market confidence was quickly restored, and capital inflows resumed from the end of 2013 and continued throughout 2014. Macroeconomic and financial stability remain intact. In fact, inflation came down from 8.3% following the subsidy reform in 2014 to 3.3% in 2015 and the current account deficit quickly narrowed from 3.3% to 2.0% of GDP during the same period. This is the case of the first quadrant, in which the risks to both price

and financial stability are low. Nonetheless, economic growth slowed from 5.2% in 2014 to 4.9% in 2015, and bank lending growth is tight at about 10%. With stability assured, the central bank was able to cut the policy rate six times by a total of 150 bp during 2016 to its current 4.75%, following the successful reformulation of the policy rate from the 12-month BI-Rate to the seven-day (reverse) repo rate. Reserve requirements were also lowered by 50 bp in November 2015 and again by 100 bp to 6.5% in February 2016. We believe the monetary easing will reinforce the fiscal stimulus, supporting economic growth with inflation contained at 3.0% in 2016 or at the lower bound of the target range of $4\pm 1\%$. Together with accelerated structural reforms, Indonesia's economic growth will be around 5.0% in 2016 and should increase to 5.1–5.4% in 2017.

Macroprudential policy

Bank Indonesia has also developed models to assess the optimal bank lending growth (Utari et al (2012)). The model is applied to aggregate lending growth as well as lending growth at each bank, certain types of lending (consumption, working capital, and investment), and vis-à-vis specific economic sectors. By comparing optimal versus actual lending growth, we can determine where excessive lending occurs and assess the build-up of systemic risks. Analysis of the procyclicality of bank lending is helpful in determining the timing of countercyclical measures. And we also assess which macroprudential measures are justified and when they can be applied.

This is the approach that we applied when introducing LTV ratios averaging about 70% to auto and property lending in 2012 (Warjiyo (2015a)). As discussed above, while price stability remains under control, we faced a build-up of risks to financial stability as bank lending growth was rapid during this period. To strengthen the adjustment needed to ensure macroeconomic and financial stability following the Fed taper tantrum, we then tightened the LTV ratio on property lending in 2013, especially on mortgages for second or subsequent homes, or on purchases of certain types of housing and apartment. The measures were also complemented by supervisory actions vis-à-vis banks that we viewed as exhibiting excessive lending behaviour. We note that the formulation and implementation of macroprudential measures require detailed and complex analysis and calibration, as well as the need for clear communication to the banks and business community.

Our experience shows that the macroprudential measures and supervisory actions have helped to reinforce the effectiveness of the monetary transmission mechanism and to support financial system stability (Purnawan and Nasir (2015), Wimanda et al, (2012, 2014)). Even though lending growth increased in the period prior to the implementation of these measures, probably because banks and their customers wanted to utilise the interim period, it fell substantially in a relatively short period subsequently (Graph 3). The growth of mortgage lending for housing of less than 21 square metres, for instance, declined from more than 100% to negative growth during the period between June and September 2012. Likewise, the growth of mortgage lending on apartments of less than 21 square metres dropped from more than 300% to less than 10% during January–November 2013. It should be noted that the auto and property sectors contain a large import content, and thus managing lending growth to these two sectors helps to reduce the current account deficit.

Subsequently, we relaxed our macroprudential measures by raising the LTV ratio by an average of 10% in June 2015 and again in August 2016 by an average of 5%, 10% and 15% for first, second and third mortgages (Tables 3a and 3b). As discussed above, our forecast risks to both price and financial stability were low, lying in the first quadrant. Nonetheless, the use of interest rate policy was constrained during that time due to uncertainty about the federal fund rate increase. For that reason, we started our easing policy stance by relaxing macroprudential measures in June 2015, only then following with policy rate cuts from January 2016. We believe our recent policy mix of policy rate cuts, lower reserve requirements, and relaxed macroprudential measures, together with an accelerated fiscal stimulus and structural reforms, will reinforce each other to deliver better economic prospects for Indonesia, in terms of both higher economic growth and enhanced macroeconomic and financial stability.

Final remarks

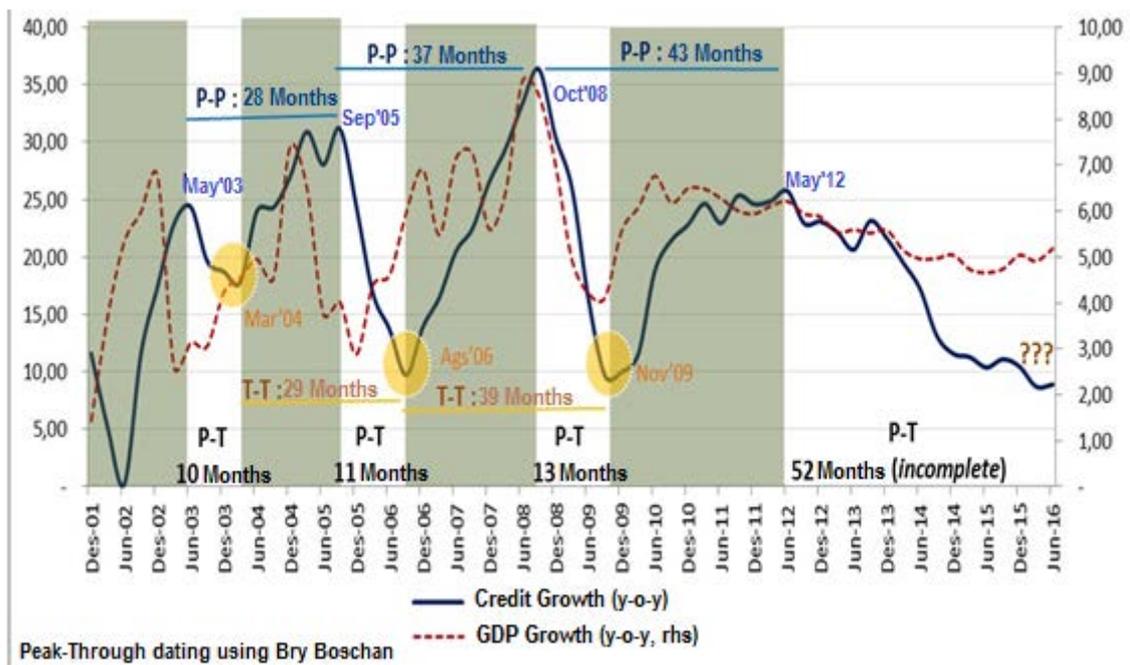
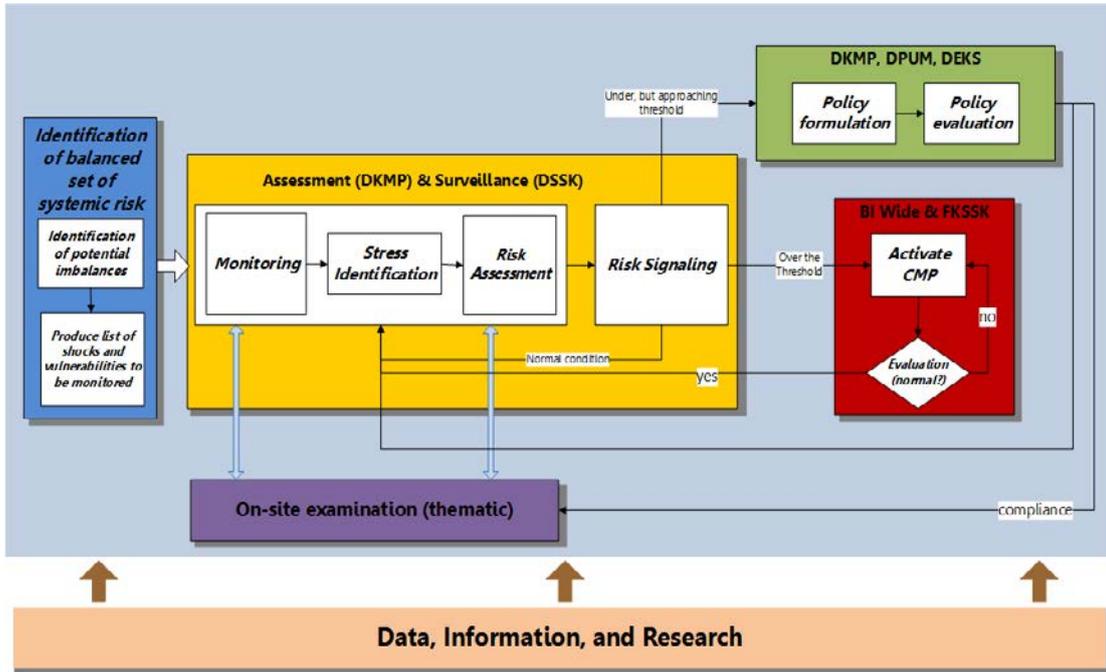
Macroprudential policy has played important role in the policymaking of many countries, including in Asia. The global financial crisis clearly shows the importance of understanding macro-financial linkages with a view to mitigating the build-up of systemic risks to financial stability. A sound framework for macroprudential policy with clear objectives and instruments, a detailed policy process, and corresponding crisis management protocols provide indispensable support for financial stability. Bank Indonesia has taken the initiative in implementing a macroprudential framework, as well as in advancing a crisis management protocol for the prevention and resolution of financial crises.

Furthermore, the central bank policy mix has been adjusted to meet the revised mandate for achieving price stability and supporting financial system stability. In Indonesia, policy comprises four key elements, on interest rates, exchange rates, capital flow management, and macroprudential measures. Our experience since 2010 shows that the new approach has proved superior to the standard inflation targeting framework. Closer coordination with the government and related agencies has also been strengthened, not only to promote financial system stability, but also to further macroeconomic policy and structural reforms.

Macprudential instruments implemented by Bank Indonesia

Table 1

No	Tool	Entities	Objective	Detail
1	Limit on Loan to Value/LTV and Financing to Value/FTV for Mortgage Lending	LTV: Commercial banks; and FTV: Sharia-based banks.	To contain excessive credit growth in the mortgage lending segment, and to dampen excessive housing price increase. However, in order to support economic growth by promoting more credit intermediation (in line with maintaining financial stability), BI has relaxed the limit since 2015.	Set the limit on LTV/FTV for consumer loan on residential properties (mortgage lending) at 85%–90% for the first mortgage lending facility, 80%–90% for the second mortgage lending facility, and 75%–85% for the third onward mortgage lending facility. The regulation is only applicable to banks with net NPLs for total loan and gross NPLs for property loan/financing below 5%, respectively. The measure excluded mortgage lending for properties used as home office/shop house and properties under the government housing program. Since it was introduced in 2012, BI has already changed the formulation of the LTV/FTV for mortgage lending 3 (three) times, either tightening/easing.
2	Limit on Down Payment (DP) for Automotive Loan	Commercial banks; Finance companies ^{*)} ; and Sharia-based banks. ^{*)} The regulation has been issued by the OJK	To contain excessive credit growth in the auto loan segment. However, to stimulate domestic demand in order to drive domestic economic growth momentum, BI has relaxed the DP since 2015.	Set the minimum level of down payment (DP) for auto loans/financing: (i) 20% for two-wheeled vehicles, (ii) 25% for three or more-wheeled vehicles for non-productive use, and (iii) 20% for three or more-wheeled vehicles for productive use. The measure is only applicable to banks with NPLs total and NPLs for auto loan/financing below 5 (gross), respectively. Since it was introduced in 2012, BI has already changed the formulation of the DP for automotive loan 3 (three) times, either tightening/easing.
3	Loan to Funding Ratio (LFR) linked Reserve Requirements	Commercial banks; and Sharia-based banks ^{**) still use LDR linked RR requirement}	To support economic growth by promoting more credit intermediation and to expand the source of bank's funding and the deepening of financial market. Previously, BI used loan to deposit ratio (LDR) linked RR. It was expanded to LFR by including limited Bond Issuance as part of bank funding.	Set the LFR-linked RR range: 78%–92%. Banks with a LFR below the lower limit will face an additional 0.1 RR from rupiah funding for each 1% short of the target, and an additional 0.2 RR from rupiah funding for each 1% above of the target with CAR below 14%. However, incentives upper limit of 94% were applied for banks that fulfil certain criteria: (i) allocation of loans to Micro Small Medium Enterprises (MSMEs) per BI Regulation no 14/22/PBI/2012; (ii) total NPLs below 5% of total loans; and (iii) NPLs to MSMEs below 5% of loans to MSMEs. BI raised the floor on the RR-LFR from 78% to 80%, with the ceiling maintained at 92%. (LFR range: 80%–92%).
4	Countercyclical Capital Buffer (CCB)	Commercial banks; and Sharia-based banks	Preventing systemic risk arises from excessive credit growth (procyclicality).	Implementation of CCB policy effective from January 1 2016 with initial rate 0% which will be evaluated at least every 6 months. During 2016, evaluation had been done on May and November. Both evaluations determine CCB rate remained 0%.

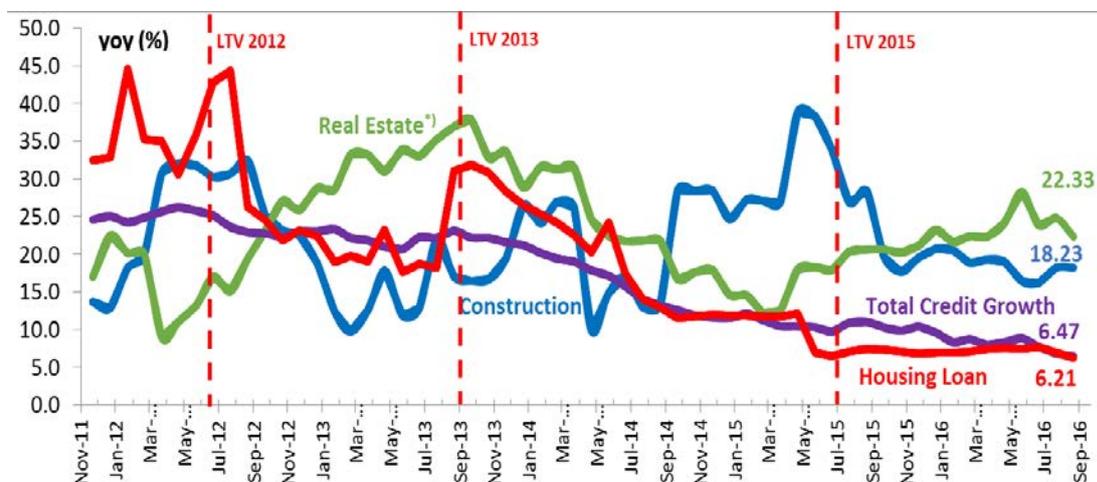


Property Loan and Property Financing based on Murabahah and Istishna'			
Property Type (m2)	Facilities		
	1st	2nd	3 rd and subsequent
House			
Type >70	80%	70%	60%
Type 22-70	-	80%	70%
Type ≤21	-	-	-
Apt/Condo			
Type >70	80%	70%	60%
Type 22-70	90%	80%	70%
Type ≤21	-	80%	70%
Small Office/Home Office	-	80%	70%

Property Loan and Property Financing based on Murabahah and Istishna'			
Property Type (m2)	Facilities		
	1st	2nd	3 rd and subsequent
House			
Type >70	85%	80%	75%
Type 22-70	-	85%	80%
Type ≤21	-	-	-
Apt/Condo			
Type >70	85%	80%	75%
Type 22-70	90%	85%	80%
Type ≤21	-	85%	80%
Small Office/Home Office	-	85%	80%

LTV and Property Credit Growth: 2011–2016

Graph 3



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Assessing the impact of macroprudential tools: the case of Israel

Nadine Baudot-Trajtenberg, Nitzan Tzur-Ilan and Roi Frayberg

Abstract

The Israeli financial system withstood the global financial crisis (GFC) of 2007–09 relatively well and came out unscathed. Notwithstanding this favourable outcome, Israel is a small open economy, which means that its domestic financial conditions cannot be disconnected from the consequences of low global interest rates. The upward trend in domestic asset prices, particularly home prices, has prompted policymakers to use macroprudential policy tools. This paper examines the effects that those measures have had on various risk indicators pertaining to credit providers and individual borrowers. We find that two typical risk indicators – the average loan-to-value (LTV) and payment-to-income (PTI) ratios – have declined. Moreover, the banking system has increased its capital buffer for possible credit losses on its housing loan portfolio. Nevertheless, the authorities in charge of macroprudential policy must ascertain whether the measures implemented are not shifting risks to other, perhaps less visible, parts of the financial system. To complete a full assessment of the impact such policy on systemic risk, more granular and better data would be needed.

Keywords: macroprudential policy, central banks, real estate, household finance, financial stability, monetary policy, mortgage rates

JEL classification: E5, E61, E63, E65, G21, G28

Institutional and legal framework

In Israel, three separate financial sector regulators deal with different aspects of macroprudential policy (MaP): the Banking Supervision Department (BSD) of the Bank of Israel (BoI), which reports to its Governor; the Capital Markets Authority (CMA),¹ which oversees pension and provident funds as well as insurance companies; and the Securities Authority (SMA), which regulates the activities of public companies and mutual funds. A team made up of representatives from each one of these bodies works as a cooperative forum on matters relating to systemic risk. This institutional arrangement will soon be formalised and enshrined in law by the establishment of a Financial Stability Committee (FSC)² chaired by the Governor of the BoI. The FSC's prime goal will be to identify sources of systemic risk, to discuss possible policy actions and measures, and exchange essential knowledge and opinions among the relevant authorities regarding on financial institutions' standing and financial markets and instruments.

Bank of Israel

Twice a year, the Monetary Policy Committee (MPC) of the BoI holds a special meeting on financial stability. At the meeting, the Financial Stability Unit of the Research Department – in collaboration with the BSD and the Markets Department – presents its analysis and findings. Issues covered include the risks to financial stability arising from the banking and insurance sectors; risk assessments of institutional investors' portfolios; results of stress tests applied to financial institutions; the monitoring of developments in real estate and stock and credit markets to detect the formation of bubbles. In addition, if necessary, the BSD, which has independent statutory authority, briefs the MPC on any impending financial stability issue and macroprudential policy steps under consideration or being implemented.

Housing market: prices and MaP measures

Following a 10-year period, housing prices began to rise in April of 2007 and continued obstinately to do so for another decade, rising cumulatively by 128% by October 2016 (91% in real terms). Housing prices rose particularly fast between 2009 and 2011, at 16.2% annually, while the stock of mortgages expanded cumulatively by close to 50% (42% in real terms). In early 2010, the BSD issued the first of a series of measures designed to reduce the exposure of banks to highly leveraged borrowers.³ At the same time, the BoI began to tighten monetary policy, raising interest rate successively to ensure that inflation remained within its target as the economy rebounded from the trough reached in 2009. Thus, both macroprudential and monetary policy actions moved in a common restrictive direction.

¹ The Israeli Knesset recently passed a law stipulating that the CMA, which used to be part of the Ministry of Finance, will become a separate and independent body. It will also oversee smaller financial institutions such as money changers and small lenders.

² The law passed a first reading of the Israeli Knesset in January 2017.

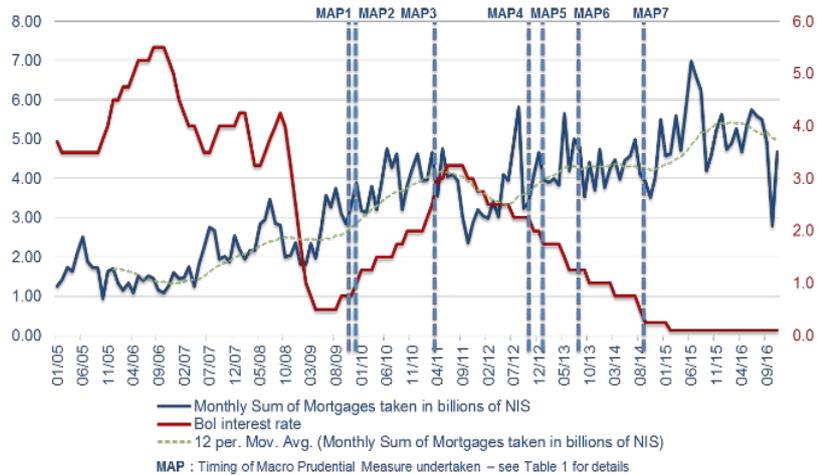
³ Banks have only been required to submit data giving detailed information on mortgage LTV ratios since 2011.

Direction changed in June 2011 when the BoI started to gradually reduce its policy rate from 3.25% to 0.1% in early 2015. This level has been kept until this day while additional macroprudential measures have been implemented (listed in Table 1; with the BoI's policy rate and a measure of activity in the mortgage market shown on Graph 1).⁴

Monthly stock of mortgages and Bank of Israel's policy interest rate

Monthly; in billions of NIS

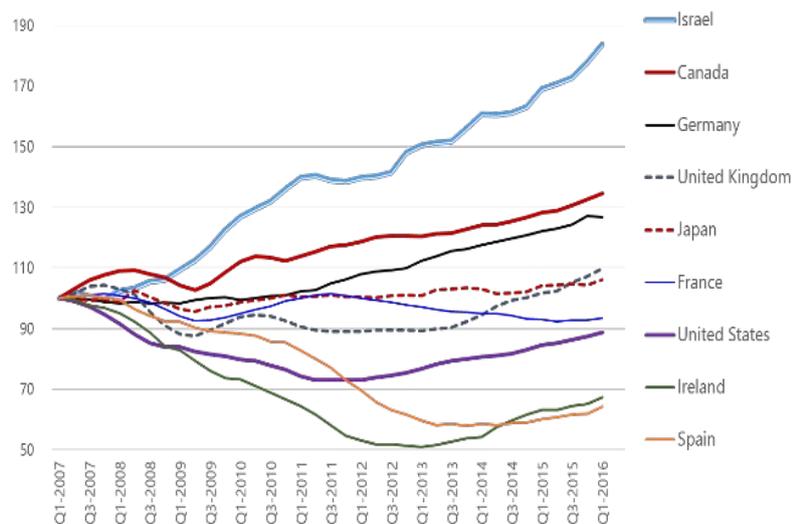
Graph 1



Housing prices – various countries

Index of real housing prices – 2007–16

Graph 2



⁴ Note that the sharp drop in mortgage activity in 2011 can be attributed in part to the social protest of the summer, during which public concerns about the high cost of housing became strong.

Brief description of measures

Several measures targeted banks' incentives to extend housing credit to highly leveraged borrowers (Table 1). Such measures worked by either requiring more capital (MaP2, MaP4, MaP5 and MaP7) to be held against such type of credit or by demanding higher provisions for mortgage loans classified as doubtful (MaP1). Other measures targeted borrowers (MaP3 and MaP6) by introducing PTI limits or restrictions on the portion of a mortgage loan subject to an adjustable interest rate.

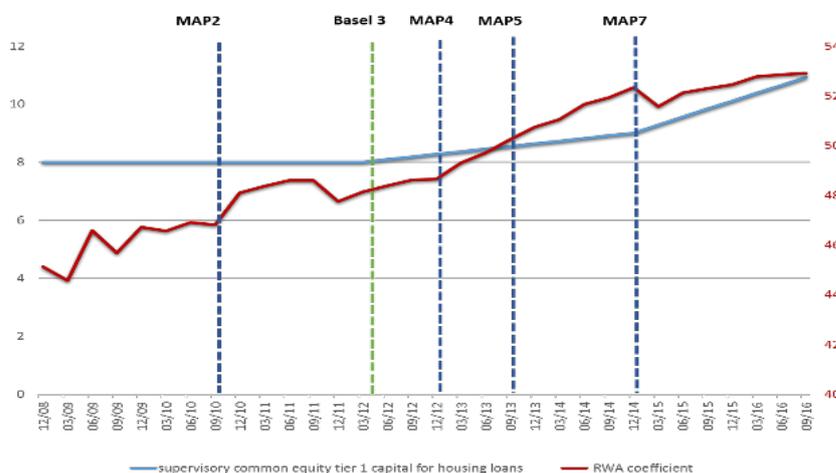
Measures directed at the banking system

Banks incur an additional "capital cost" for each additional shekel lent that is equal to its corresponding risk-weighted-asset (RWA) coefficient. This coefficient increased from 47% to 53%, as shown in Graph 3. In addition, it is worth noting that during this period the Basel III capital requirements came into force, thereby resulting in a gradual increase of the aggregate common equity Tier 1 ratio from 8% to 9%⁵ (over a three-year period). Also, MaP7 required from banks an additional amount of Tier 1-type capital equal to 1% of the outstanding housing credit portfolio (this stringent requirement was implemented gradually over a 28 month period, with the final target to be reached by 1 January 2017).

Tier 1 capital required for housing loans

2008–16

Graph 3



The average LTV ratio of newly-taken mortgages dropped from 56% at the end of 2011 to 50% by September of 2016. This was the intended effect of the earlier measures (MaP1, MaP2, MaP4 and MaP5) as they made it more costly for banks to lend funds for housing with higher LTV ratios. As shown on Graph 3, the share of loans with LTV ratios above 75% dropped immediately after MaP4 was introduced.

⁵ For systemically important financial institutions (SIFIs) – 10% until 1 January 2016.

This was not surprising since the measure effectively capped the LTV ratio at 0.75.⁶ Perhaps more interestingly, the increase in capital requirements imposed by MaP5 on loans with higher LTV ratios did not appear to have the expected impact until much later, when the share of mortgages with LTVs above 60% but below 75% dropped precipitously – from above 35% to 27% in 2016 – that is three years later.

The measures therefore seem to have reduced systemic risk in the banking system by raising capital buffers and shrinking highly leveraged transactions.

Measures directed at risks taken on by borrowers

There are four MaP tools aimed at borrowers: LTVs, PTIs, the proportion of adjustable rate mortgages (ARMs) and, finally, the length of loan repayment.

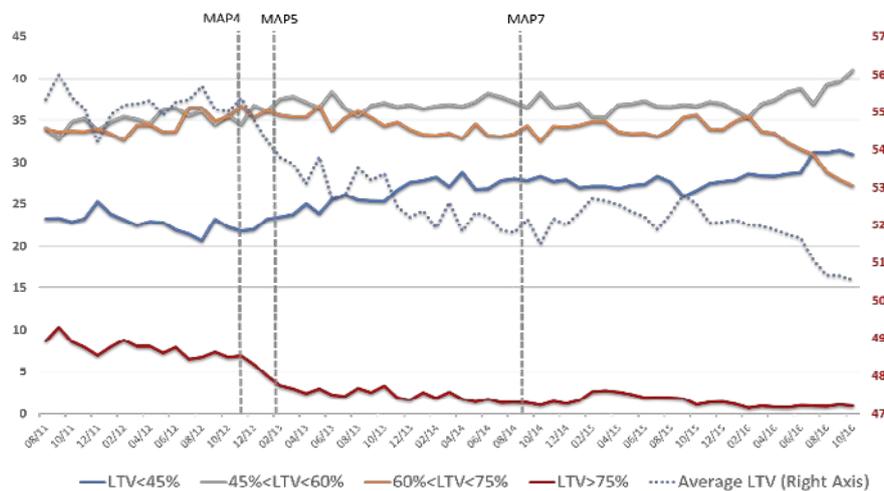
The LTV ratio implemented by the BoI in 2012 (MaP4) required commercial banks to limit the LTV ratio to 75% for first-time home buyers, 50% for investors and 70% for those upgrading their homes. As shown on graph 4, it worked as a binding constraint with the share of loans with an LTV ratio above 75% dropping substantially.

The PTI ratio implemented in August 2013 (MaP6) strictly limited the maximum value of the ratio to 50% of household income. As shown on graph 5, there was a sharp drop in the share of loans granted with a PTI above 40%,⁷ and a slight decline in the average PTI.

Share of mortgages by loan-to-value categories

2011–16

Graph 4



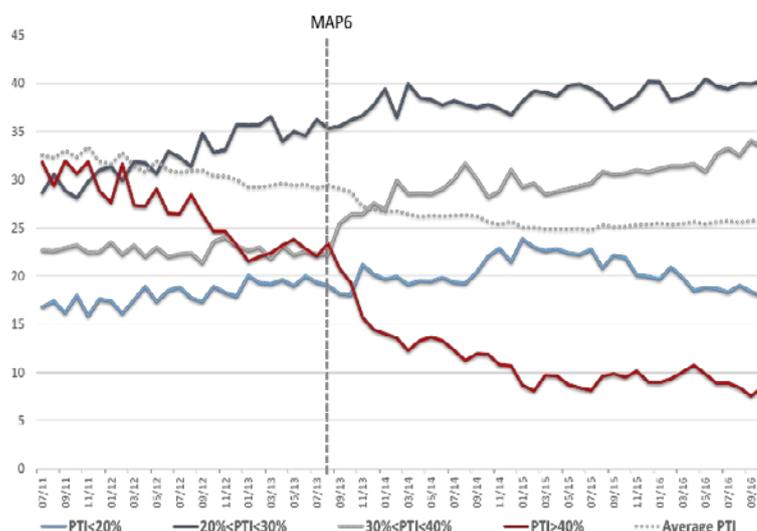
⁶ The remaining loans with an LTV of more than 75% comprised loans that were provided without collateral or monthly repayment provisions.

⁷ Note that MAP6 strictly limits the PTI to 50% and raises the amount of capital needed for mortgages with a PTI greater than 40%.

Share of mortgages by PTI limits

2011–16

Graph 5



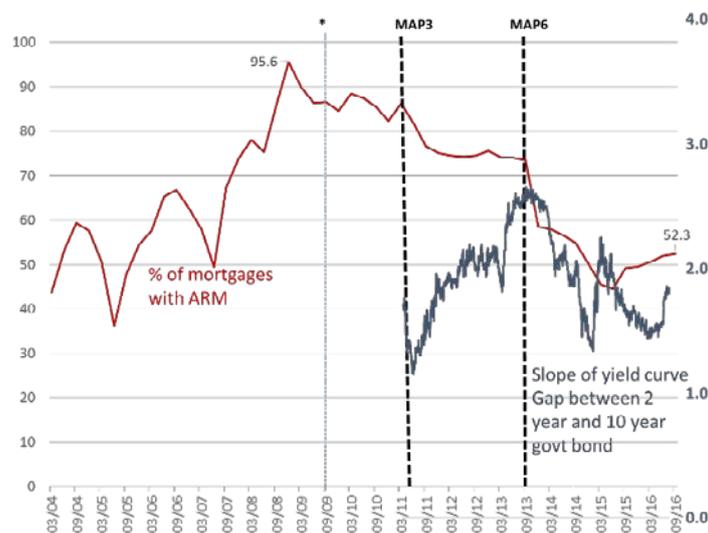
The third measure, MaP3, implemented in June 2011, set the share of housing loans that could be taken with an adjustable rate.⁸ This measure was tightened in August of 2013 by MaP 6 under which at least one third of any mortgage must be taken at a fixed rate. As shown on Graph 6, the share of adjustable rate mortgages (ARM) dropped from 95% to 52% following the two MAP measures setting limitations. These followed a BoI-issued warning – indicated by * on 9/2009 on the graph – about the risks of taking on an ARM. Note that in both cases – following MaP3 and MaP6 – the share of ARMs drops quickly, though in neither case does the limit appear to be binding. This is particularly striking for the second MaP, which limits the share of ARMs to 66%. In practice, however, borrowers have stayed well within the limit.

The period following the introduction of MaP3 was one during which the BoI gradually cut its policy rate to a low point of 0.1%. Yet the monetary policy stance evolved continuously during the entire period. The yield curve, which was initially steepening in the expectation that global monetary expansion would end, flattened as it became clearer that it was in fact deepening. A pattern of steepening and flattening repeated itself again in 2014 and 2015, presumably for a similar reason. Thus, as shown on Graph 6, the strict constraint on the share of ARMs was roughly binding as the yield curve steepened (between 03/2011 and 09/2013). But as the yield curve flattened, this was no longer the case.

The fourth MaP sets a limit of 30 years as the maximum period for repayment of a mortgage loan (MaP6).

Taken together, these restrictions sought to reduce the risk taken on by borrowers were a downturn to occur or were interest rates to rise (in the case of the PTI).

⁸ Adjustable rate – ie where the rate adjustment occurs within five years (most loans underwent monthly adjustment – though data are not available for that period).



It is difficult to assess how effective these measures have been, particularly given that since their implementation the economy has not experienced a downturn: unemployment keeps on falling; wages are rising; inflation remains low (and was even negative on some occasions); policy rates remain low; and housing prices continue to rise.

Interaction between macroprudential and monetary policies

At the height of the GFC, the BoI cut its policy rate decisively, which allowed the economy to recover quickly from its trough of 2009. As the economy and the housing market picked up, and inflationary pressures emerged, the BoI raised its policy rate to ensure that it met its inflation target. At the same time, tighter MaP measures were introduced, in part to counteract the buoyant housing market but also as lessons from the GFC were learned. Thus, both MaP and monetary policy measures were pointing in the same restrictive direction.

This changed in June of 2011, when the BoI began to gradually reduce its policy rate from 3.25% to 0.1% in early 2015 as global economic conditions became volatile, domestic economic growth slowed and inflationary pressures receded. However additional macroprudential measures were implemented.

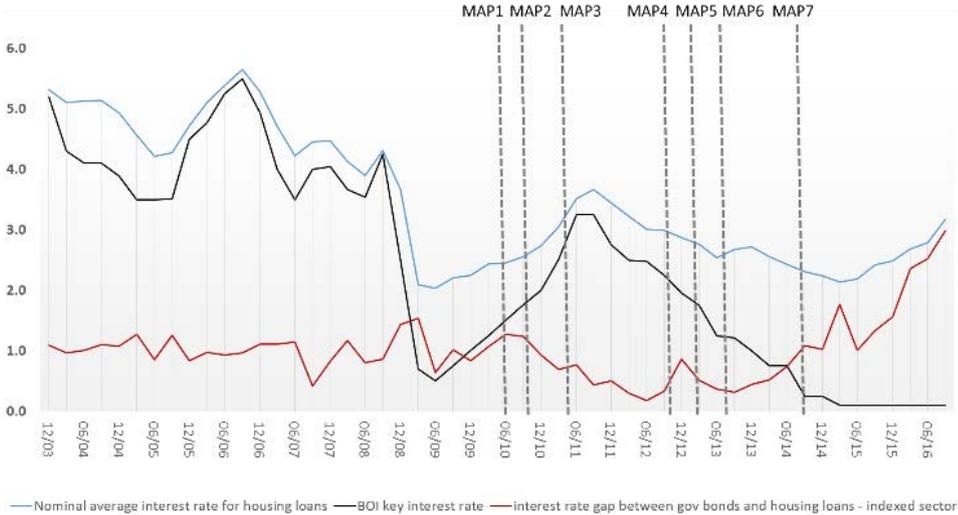
Looking at Graph 7, it is worth noting that when the first three macroprudential measures were introduced and monetary policy was tightened, the differential between housing loans rates and government bond yields of similar maturities stayed either stable or fell. Thus, if monetary policy was meant to be tightening for the housing market, it was apparently less so in practice since the interest rate differential declined. When the BoI's monetary policy stance changed and a gradual reduction in the policy rate occurred, the differential kept narrowing. So even before the imposition of additional MaPs, the fall in mortgage rates was less than that for government bonds of similar maturities. The imposition of additional measures led

the gap to widen and it did so quite significantly, adding almost 200 basis points over a two and a half year period.

Policy and mortgage loans interest rates

2003–16

Graph 7

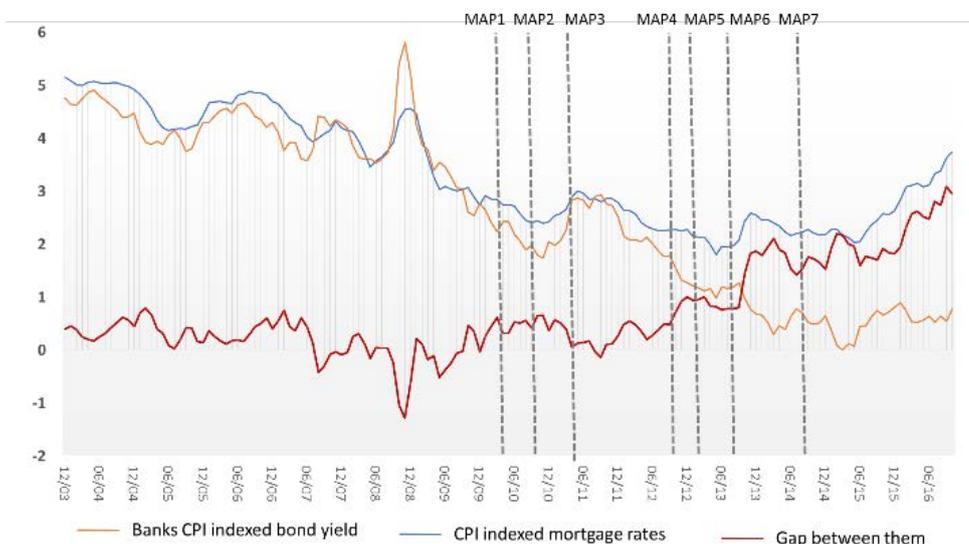


The interest rate charged on mortgages is a function of the funding cost of a bank, risk premia to compensate for uncertainty of repayment (handled by ratios such as the LTV and PTI) and a mark-up the elasticity of demand faced by banks. In Israel, the market is fairly competitive. The BoI’s policy rate, which touched its lowest level of 0.1% in March 2015, led to a lower funding cost (Graph 8). Yet, while low historically, the differential between that funding cost and mortgage rates rose steadily. It widened substantially following the implementation of a MaP that required additional capital equal to 1 percentage point of banks’ housing loan portfolios. As mentioned before, risk ratios, such as the PTI and LTV, did not increase over the period, lending support to the idea that the interest differential widened in response to policy and not to a higher risk premium. It is worth noting, however, that the average maturity of banks’ mortgage loans increased steadily (Graph 9). This means that one element of risk had indeed mounted. This could have contributed to an increase in overall portfolio risk.

Interest rates on bank indexed bonds and mortgage loans

2003–16

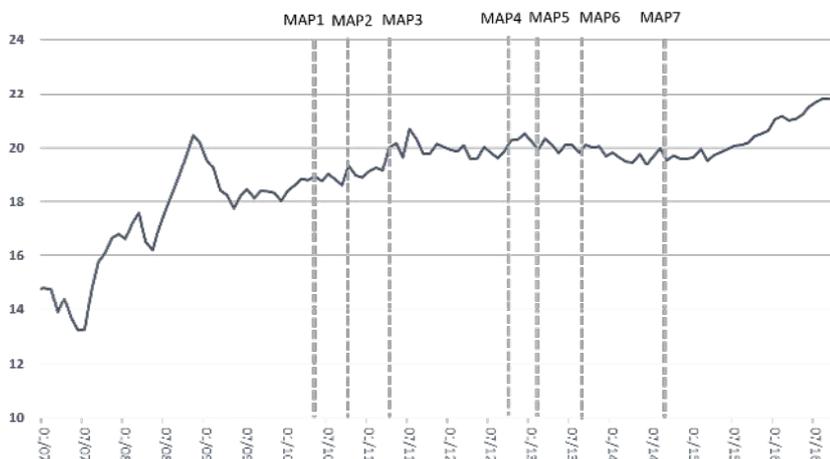
Graph 8



Average maturity of mortgages in years

2007–16

Graph 9



It is not easy to assess whether the MaP measures or other factors – such as the riskiness of borrowers not captured by aggregate risk ratios (eg average LTV and PTI) – contributed to widen the gap. It is possible that the buoyant housing market prompted entry by a riskier class of borrowers. In the absence of deeper analysis at this point, it is not possible to attribute the higher risk premium on mortgage loans to the implementation of MaPs. But it cannot be excluded.

Conclusion

The Bank of Israel has accumulated rich experience in recent years on the use of macroprudential tools targeted at the residential housing market. These measures were implemented both with the purpose of reducing potential systemic risk in the banking system and to contain demand for housing given a slow supply response. Two risk ratios – the average LTV and PTI – have declined, particularly at the extreme end of the risk distribution (transactions involving highly leveraged borrowers). However, a third parameter – the average maturity of mortgage loans – has risen. The measures implemented also included an increase in banks' capital buffers for scenarios generating potential credit losses in their housing loan portfolios. The ultimate effectiveness of such measures is, of course, difficult to assess, particularly given that the business cycle has not turned down since implementation: unemployment continues to fall; wages are increasing; inflation is low (and even negative at times); policy rates remain at all-time lows; and housing prices continue to increase.

There is some uncertainty as to whether the restrictions placed on housing loans have not shifted lending to riskier segments of the banking sector (eg to the consumer loan market for borrowers hitting the LTV or PTI limits) or to the non-bank financial sector (regulatory arbitrage). Consumer loans have grown over the period but not much above disposable income, which means that overall household sector leverage has not increased substantially despite the protracted period of low rates. The household debt-to-GDP ratio has increased from 39% to 42% during the past five years, which is still a relatively low level by international comparison.

When implementing macroprudential policy measures, the prudential authorities must make sure that such measures do not divert risks to other, perhaps less visible, areas of the financial system. A more efficient coordination mechanism between regulatory authorities and better and more granular data are still needed. The Bank of Israel has been promoting both actively. The establishment by the Bank of a Financial Stability Committee (now in its legislative phase) and a national credit registry are two other important steps.

Finally, the apparent need for MAP measures during times of monetary expansion poses a significant challenge as they may highlight weaknesses in the monetary transmission mechanism. Indeed, if large liquidity injections are mostly channeled into sectors that, instead of expanding output, fuel asset price inflation and then lead to the imposition of MaP measures, the effectiveness of monetary policy may have to be reconsidered. Even in a country that did not undergo a major financial crisis, such as Israel, the transmission mechanism may have weakened, both in terms of its ability to channel investment to productive uses as well as the time lag needed for policy to take effect. The latter is certainly the case in the Israeli housing market where the supply response is particularly slow owing to the many bureaucratic hurdles that need to be overcome. In fact, one could think of these hurdles as a particular long supply chain, with each step including a lengthy process. It would be interesting to see whether sectors characterised by such long supply chains have demonstrated a slower response to monetary incentives.

MaP measures implemented

Table 1

Date	Type of MaP	Intended impact on supply and demand for housing credit	Monetary policy stance
MaP1 May 2010	Banks required to make additional provisions (0.75%) for housing loans with a high LTV ratio (LTV>60%)	Raises cost of lending for higher LTV mortgages	Policy rate raised FX intervention (purchases)
MaP2 October 2010	Higher capital provision (100% of RWA instead of 35% – 75%) for floating rate loans granted with a high LTV ratio (LTV>60% AND % of variable rate loans>25%) – not applicable for housing loans worth less than 800,000 NIS	Raises cost of lending for higher LTV mortgage and variable rate loans Raises cost of borrowing since variable rate<fixed rate	Policy rate raised FX intervention (purchases)
MaP3 May 2011	Limit to the variable-rate portion of a loan for which the rate could change within less than five years from the date of approval or from the date on which the previous rate was set, to 33.33% of the total loan	Raises cost of borrowing since variable rate<fixed rate	Policy rate peaks in June 2011
MaP4 November 2012	Limit to the LTV to 75% for first time buyers, 50% for investors and 70% for upgrading homes	Reduces the demand for mortgages May increase demand for other types of credit	Policy rate reduced
MaP5 February 2013	Raises risk weights for capital adequacy requirements: housing loans where LTV<45% remain with a capital charge of 35%; those with 45%<LTV<60% see their weights rise to 50%; and those with 60%<LTV<75% are weighed at 75% Banks are required to maintain provisions of at least 0.35% of their housing loan portfolios	Raises the cost of lending for all loans where LTV>45%	Policy rate reduced FX intervention (purchases)
MaP6 August 2013	PTI limited to 50% of HH income	Reduces demand for mortgages	Policy rate reduced FX intervention (purchases)
	Raises risk weights for capital adequacy requirements for PTI>40% to 100%	Raises cost of lending	
	Limits share of variable rate loans to two thirds for all loan periods	Raises the cost of borrowing when variable rate<fixed rate	
	Limits loan period to 30 years	Reduces the demand for mortgages	
MaP 7 September 2014	Additional Tier 1 capital requirement equal to 1% of total outstanding housing credit portfolio. Gradual implementation with final target to be reached by 1 January 2017	Raises cost of lending	Interest rate reduced FX intervention (purchases)

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Macroprudential frameworks, implementation and relationship with other policies in Korea

Ho Soon Shin,¹ Jung Yeoun Lee,² Jungmin Park³

Abstract

In Korea, the authorities responsible for financial stability carry out their respective roles under their individual purviews. Macroprudential (financial stability) policy is conducted by sharing views about financial stability conditions and responding jointly in times of crisis through various channels for cooperation. The macroprudential policy instruments currently used in Korea include loan-to-value and debt-to-income regulations, countercyclical capital buffers, regulation of the domestic currency loan-to-deposit ratio (LDR), and FX-related macroprudential measures (the Macroprudential Stability Levy and leverage caps on banks' FX derivatives positions). The Bank of Korea (BOK) was given responsibility for financial stability under the revised Bank of Korea Act (which took effect in 2011). To this end, the Bank pre-emptively identifies potential risks in the financial system while conducting its monetary policy, as well as through its Financial Stability Report and Financial Stability Meetings. The BOK also shares its perceptions of financial conditions and responds jointly with the relevant government agencies at a macroprudential level.

Keywords: financial stability, macroprudential policy, loan-to-value ratio, debt-to-income ratio, monetary policy, communication

JEL classification: E32, E50

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1. Macroprudential (financial stability) policy frameworks

1.1 Governance

In Korea, the authorities responsible for financial stability carry out their respective roles under their individual purviews, while operating the macroprudential (financial stability) policy framework by sharing views about financial stability conditions and responding jointly in times of crisis through various channels for cooperation.

1.2 Roles of individual agencies

The agencies responsible for financial stability policy in Korea include the Ministry of Strategy and Finance (MOSF), the Bank of Korea (BOK), the Financial Services Commission (FSC), the Financial Supervisory Service (FSS), and the Korea Deposit Insurance Corporation (KDIC).

The MOSF is responsible for the formulation, overall control and adjustment of economic and fiscal policies, and conducts foreign exchange-related tasks under the Government Organization Act. From a microeconomic perspective, the MOSF has the authority to carry out real estate tax policy, which is important for financial stability.

The BOK not only establishes and carries out monetary policy under the Bank of Korea Act, but also has the responsibility for taking into account financial stability in its monetary policy implementation.

In normal times, the BOK can indirectly influence various financial market price variables (interest rates, stock prices and the exchange rate) and the total credit supply through monetary policy implementation.

In the event of financial instability, the BOK functions as the market-maker of last resort or the lender of last resort, thus providing liquidity to the financial markets and individual financial institutions.

The FSC is responsible for supervising the financial industry and financial institutions, and for setting policies related to the approval, management and supervision of the capital markets under the Act on Establishment, etc. of the Financial Services Commission. The FSS is in charge of inspecting and supervising financial institutions.

The KDIC is responsible for managing and operating the deposit insurance funds and resolving ailing institutions under the Depositor Protection Act.

Financial stability functions as shared responsibilities in Korea

Table 1

Stability of value of money	Ex ante actions for financial stability	
	Macroprudential policy	Microprudential policy
Monetary policy	Systemic risk surveillance and policy responses	Supervision of individual institutions
Payment and settlement system		
Reserve requirement system		
FX policy		
The Bank of Korea	MOSF	FSC-FSS
Ex post responses		
Deposit insurance payouts	Crisis management	Lender of last resort
Resolution of financial institutions	Injection of public funds	Foreign reserve operations
KDIC	MOSF	BOK
FSC-FSS	FSC	

1.3 Cooperation framework for financial stability

With the financial stability roles being shared among the multiple agencies in this way, during normal times these agencies share their perceptions about domestic and international financial and economic conditions. During emergencies, they operate channels for discussion to facilitate a prompt and effective joint response.

The BOK shares perceptions about financial stability conditions by having its Senior Deputy Governor attend the vice presidential-level Macroeconomic and Financial Stability Meetings and the Financial Services Commission meetings.

In addition to these high-level channels of cooperation, the agencies have also recently expanded channels for information-sharing and opinion exchanges by, for instance, setting up a working-level Consultative Group for Managing Household Debt and a working-level stress test council.

2. Operation of macroprudential policy in Korea

2.1 Korea's macroprudential policy measures

Housing sector-related policy: LTV and DTI regulations

As housing prices surged in line with abundant market liquidity and rising housing demand since 2000, home mortgage lending increased sharply. This led to the introduction of loan-to-value (LTV) regulations in September 2002, and of debt-to-income (DTI) regulations in August 2005.

These regulations were operated flexibly, being tightened or loosened in accord with housing price and home mortgage lending trends.⁴ This helped to slow the high rate of growth in household loans, one of the major factors posing domestic systemic risk.

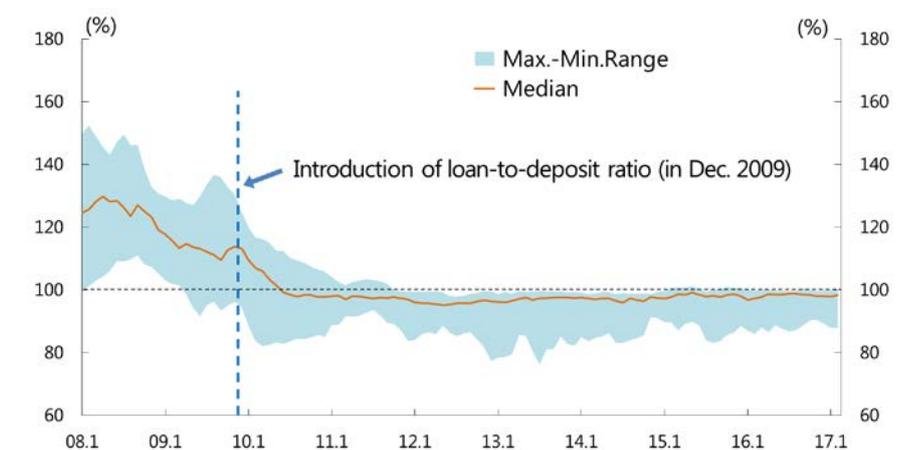
Loan-to-deposit ratio regulation

This regulation was introduced to curb the increase in loans that were dependent on banks' wholesale funding (CDs + RPs + cover bills + bank debentures) in December 2009.

With the introduction of the loan-to-deposit ratio (LDR) regulation, the LDR has remained continuously below 100% since 2011, as banks' wholesale funding has declined and their deposits have increased.

Banks' loan-to-deposit ratio trend¹

Graph 1



¹ Monthly domestic banks' loan-to-deposit ratio distribution.

Source: Bank of Korea.

Macroprudential foreign exchange policy

High capital flow volatility has presented major systemic risk in the foreign exchange sector. Against this backdrop, in order to mitigate capital flow volatility, the BOK has implemented macroprudential measures, including leverage caps on banks' FX

⁴ After it was introduced in Korea in 2002, the LTV was applied at different levels between 40 and 70% (for banks and insurance companies), depending upon the real estate collateral location and the type of lending institutions.

After its adoption in 2005, the DTI for home mortgage loans in the Seoul Metropolitan region was also applied at differing levels in the 40–60% range, depending on the real estate location and the type of lending institutions.

derivatives positions⁵ (which took effect in October 2010), and the Macroprudential Stability Levy⁶ (which took effect in August 2011).

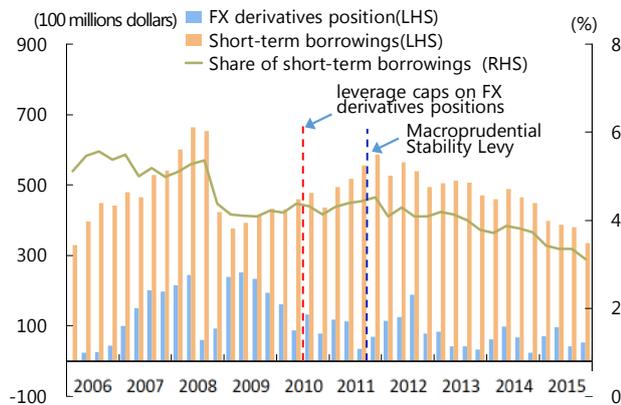
This policy is considered to have contributed greatly to easing vulnerabilities in the FX sector through reductions in external debt in the banking sector and improvements in maturity structures.

Since the adoption of this policy, the proportion of short-term in the total external debt of foreign bank branches in particular has declined greatly.

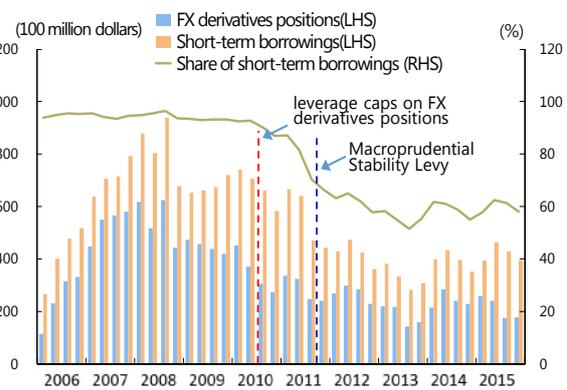
FX derivatives positions and short-term borrowings

Graph 2

Domestic banks



Foreign bank branches



¹ Dotted lines indicate when the regulations were introduced. ² Quarterly figures.

Source: Bank of Korea.

Introduction of Basel III macroprudential policies

The countercyclical capital buffer (CCyB) and the capital surcharge on D-SIBs were implemented in 2016.

The CCyB rate is decided every quarter, based on six base indicators⁷ such as the total credit-to-GDP gap and other real economic and financial indicators. As of March 2017, the CCyB rate was 0%.⁸

⁵ Leverage caps on FX derivatives positions were set at 40% of the previous month's capital for domestic banks, and at 200% for foreign bank branches (as of April 2017).

⁶ Macroprudential Stability Levy (MSL): a uniform levy of 0.1% was imposed on non-deposit foreign currency debts with remaining maturities of one year or less (as of April 2017).

⁷ Total credit-to-GDP gap, total credit gap, household debt-to-disposable income gap, housing price-to-GDP gap, wholesale borrowing-to-M2 gap, and short-term external debt-to-foreign reserves gap etc.

⁸ Korea decided on its first level of countercyclical capital buffer accumulation at the end of March 2016, and set it at 0%. There has been no change in this setting (up to the first quarter of 2017).

D-SIBs are designated every year based on the assessment criteria⁹ proposed by the BCBS. As of the end of 2016, a total of four bank holding companies and one bank were designated as D-SIBs.

2.2 The Bank of Korea's conduct of macroprudential policy

The BOK was given responsibility for achieving financial stability under the revised Bank of Korea Act (which took effect in 2011), but it does not have concrete macroprudential policy tools to pursue its financial stability mandate.

However, it has been involved in the conduct of macroprudential policies by preemptively identifying potential risks within the financial system and exploring measures for addressing them in concert with the relevant government agencies.

Through its Financial Stability Report (a biannual report submitted to the National Assembly) and Financial Stability Meetings, the BOK monitors the nation's overall financial stability conditions and issues early warnings of financial risk factors.

From 2017, the BOK has reduced the frequency of its Monetary Policy Board meetings from the previous 12 times to eight per year, and is instead holding Financial Stability Meetings four times a year.¹⁰

The BOK has operated its Household Debt Task Force, and sought to obtain micro-data on household debt to analyse the state of household debt on a regular basis and deliberate on effective policy options.

To enhance the effectiveness of its stress tests, the BOK has improved the SAMP (Systemic Risk Assessment Model for Macroprudential Policy) and at the same time it has strengthened its cooperation with the supervisory authorities (through the regularisation of joint stress tests with the Financial Supervisory Service).

Joint inspections are conducted with a focus on identifying systemic risk factors early on, and checking major financial issues.

The BOK has established close cooperative relationships with financial stability related agencies at home and abroad. Through the Macroeconomic and Financial Stability Meetings and the Consultative Group for Managing Household Debt, the BOK shares information on domestic and external financial risk factors with the relevant agencies, and discusses joint countermeasures. The BOK has also been actively engaged in the discussions on global financial regulatory reform led by the FSB and the BCBS.

Together with the government and the supervisory authorities, the BOK has worked for the smooth implementation of international standards such as the countercyclical capital buffer. It has in addition sought to enhance the stability of the payment and settlement systems and the foreign exchange sector. To improve the stability of the payment and settlement systems, the BOK adopted a system in

⁹ D-SIBs are selected based on their scores in terms of five criteria including their size, substitutability interconnectedness, complexity and country-specific factors.

¹⁰ Owing to the BOK's need to enhance its financial stability role in line with the increased macroeconomic and financial volatility at home and abroad, as well as the overhaul of the MPB meeting framework reducing the number of meetings, it has become necessary to hold these Financial Stability Meetings.

February 2012 to provide settlement liquidity through intraday reverse purchase transactions to financial investment businesses and the Korea Exchange.

To strengthen the stability of the FX sector, the BOK has, together with relevant organisations such as the Ministry of Strategy and Finance, pre-emptively operated macroprudential policy measures related to foreign exchange.

2.3 Major issues regarding macroprudential policy operations

Rules versus discretion

Macroprudential policy in Korea is conducted so that systemic risks are assessed through far-reaching monitoring of macroeconomic and financial indicators, and timely policy instruments are adopted as needed, rather than by following fixed rules.

As is widely known, it is difficult to precisely determine or gauge how far systemic risks have accumulated and so, if indicators are used to set thresholds for action, there is a high likelihood that discretionary decisions will also need to be made.

Model-based versus indicator-based

It is difficult to define a single indicator that broadly represents financial stability, the target of macroprudential policy, and various policy instruments exist. The BOK, therefore, does not rely on specific indicators or models, but takes various indicators and model results into overall consideration in making its policy decisions.

For indicators, the BOK uses housing prices, financial institution leverage, and financial market and supervision information, as well as the credit-to-GDP ratio.

In the course of measuring comprehensive systemic risks, a wide range of econometric and statistical models¹¹ have been used, but additional studies are still required, using macroeconomic models, in order to calibrate the various policy instruments to the systemic risk indicators measured.

Range of policy instruments

Given that macroprudential policies regulate financial institutions' business activities, policy instruments should be introduced so as to avoid excessively constraining financial institutions.

There is a need to reduce the potential for redundancy among regulations,¹² which could emerge if different rules are implemented side-by-side.

However, in implementing macroprudential policies, the relevant agencies should also seek to eliminate any regulatory blind spots, so as to ensure that non-compliance by affected institutions does not dilute the policy effects.

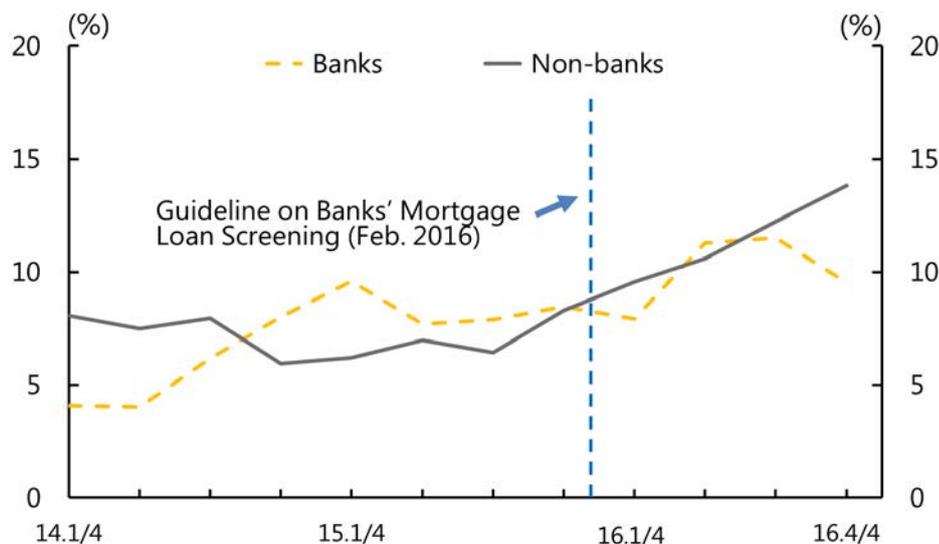
¹¹ Stress tests, analysis of connectivity, contingent claims analysis, analysis of default probabilities, network analysis, and other models are used.

¹² In Korea's case, the potential exists for redundancy vis-à-vis the Basel III liquidity regulations, including between the current LDR ratio and the NSFR regulations that are being implemented.

Korea has tried to curb the rising trend in household debt by introducing LTV and DTI regulations and strengthening the loan-screening process,¹³ but household loans have nevertheless increased, led by loans not subject to those regulations such as unsecured loans from non-banking institutions, or loans secured by collateral other than housing, and collective mortgage loans.¹⁴ As a result, the policy effects have been diluted.

Rate of increase in household debt by financial institutions¹

Graph 3



¹ Year-on-year, quarterly figures.

Source: Bank of Korea.

Relation to other policies

The fact that the financial and the business cycles often fail to coincide¹⁵ can hinder effective macroprudential policy implementation.

Despite the accommodative monetary and fiscal policies conducted since the Global Financial Crisis, the real sector recovery has been slow due to increasing domestic and overseas uncertainties. Credit to the private sector has continued to

¹³ The Guideline on Banks' Mortgage Loan Screening, which aims to strengthen the screening of borrowers' debt repayment capacities and increase the share of fixed rate and amortising loans, was implemented from February 2016. The guideline was first applied to banks (in the Seoul Metropolitan Area from February 2016, and in the rest of the country from May 2016), and as a result demand for loans has moved from banks to non-banks, and non-bank financial sector household lending has risen greatly. The guideline has meanwhile also been applied to insurance companies since July 2016, and to mutual credit cooperatives since March 2017.

¹⁴ Collective mortgage loans are loans offered to a group of home buyers who have submitted pre-orders even before construction begins. Often buyers make instalment payments throughout the construction period, and they are provided with group loans to make their instalment payments.

¹⁵ Since the global financial crisis, the link between the financial and the real cycles has weakened overall, as the two cycles have shown decoupling movements.

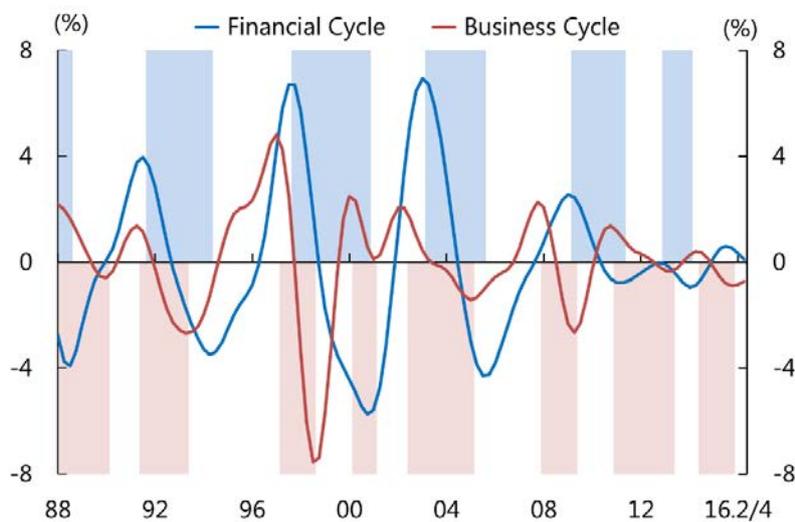
expand, with strong growth in household credit offsetting a slowdown in business credit.

In this situation, if macroprudential policy tightening measures that affect the credit market as a whole are adopted to curb the strong growth in household credit, then credit supply to the real sector will also decline, exacerbating the real economic slowdown.

Microeconomic policy measures are needed, so that the policy effects can be focused on the various vulnerable components of private sector credit (eg unsecured loans, loans to self-employed entrepreneurs, collective mortgage loans, etc).

Financial and business cycle trends¹

Graph 4



¹ The upper shaded areas indicate financial cycle downturns, and the lower shaded areas downturns of the business cycle.

Source: Bank of Korea.

3. Communication concerning macroprudential policies

3.1 Need for communication

Since macroprudential policies can affect various market participants, effective communication strategies are needed so as to enhance the policy effects.

When considering the introduction of policy measures, active external communication is required at these initial stages, in order to help market participants appreciate the need for such measures.

It is important in addition to publish analyses of the effects of previous policy measures, so that market participants can make decisions based upon rational expectations of future policy effects.

3.2 The BOK experience

The BOK has no financial stability policy instruments, but performs a signalling function related to financial stability conditions through a variety of channels.

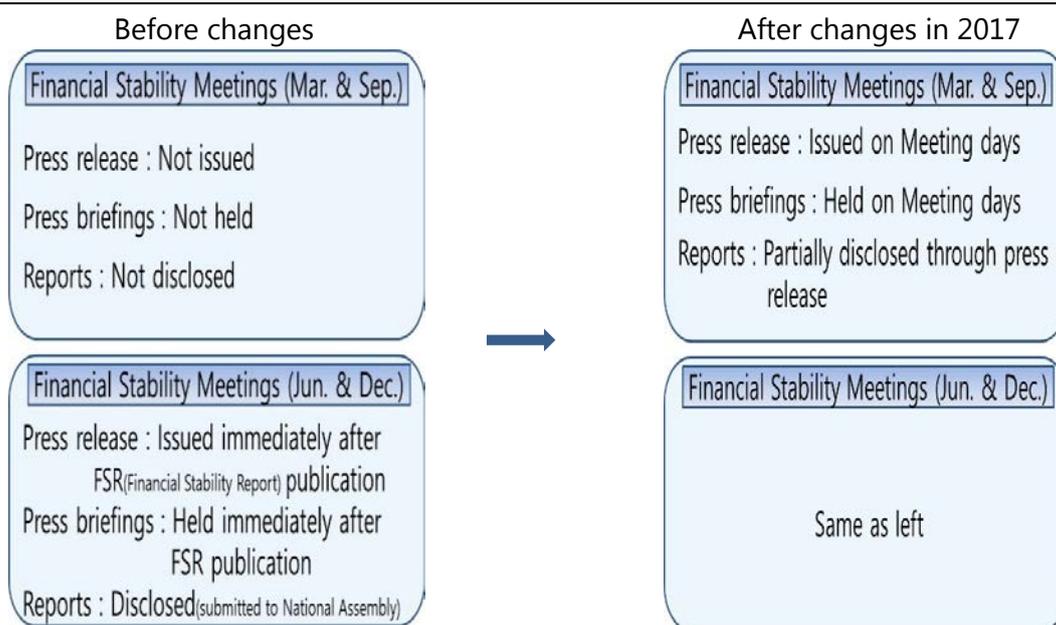
The BOK calls attention to potential risk factors at home and abroad through its Financial Stability Report, and its Governor’s press conferences and meetings with heads of financial institutions, and also provides information on the effects of its policies and suggests timely policy measures.

The BOK’s monetary policy decision meetings, previously held 12 times a year, are being held eight times starting from 2017. As a result, market participants have a growing interest in and expectations for the new Financial Stability Meetings that are held four times a year. The BOK is therefore working to significantly strengthen its communication related to these meetings.

Besides the release of the MPB meeting minutes, two weeks after those meetings, following the Financial Stability Meeting in March 2017, the BOK started to issue a press release on major issues discussed at the meeting, and also to hold a press briefing.

External communication related to financial stability

Graph 5



Source: Bank of Korea.

However, in circumstances where macroprudential policy might conflict with monetary or fiscal policy, information-sharing and prior consultations among the related institutions will be important in order to ensure consistent messages on future policy directions.

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Macroprudential frameworks: Implementation, and relationship with other policies – Malaysia

Central Bank of Malaysia

Abstract

Given the increasing complexity and interconnectedness of the financial system, central banks have broadened their mandates and policy toolkit to address emerging risks to financial stability. This paper describes Malaysia's experience in establishing its macroprudential framework. It highlights the institutional and governance arrangements made to support decision-making, and policy formulation to avert or reduce risks to financial stability. It also discusses the importance of coordinating different policy tools, such as monetary, macroprudential and fiscal measures, to balance policy trade-offs. Drawing on Malaysia's experience in implementing household- and property-related macroprudential measures, the paper argues that recalibration of existing policies hinges on the objectives and circumstances of individual jurisdictions.

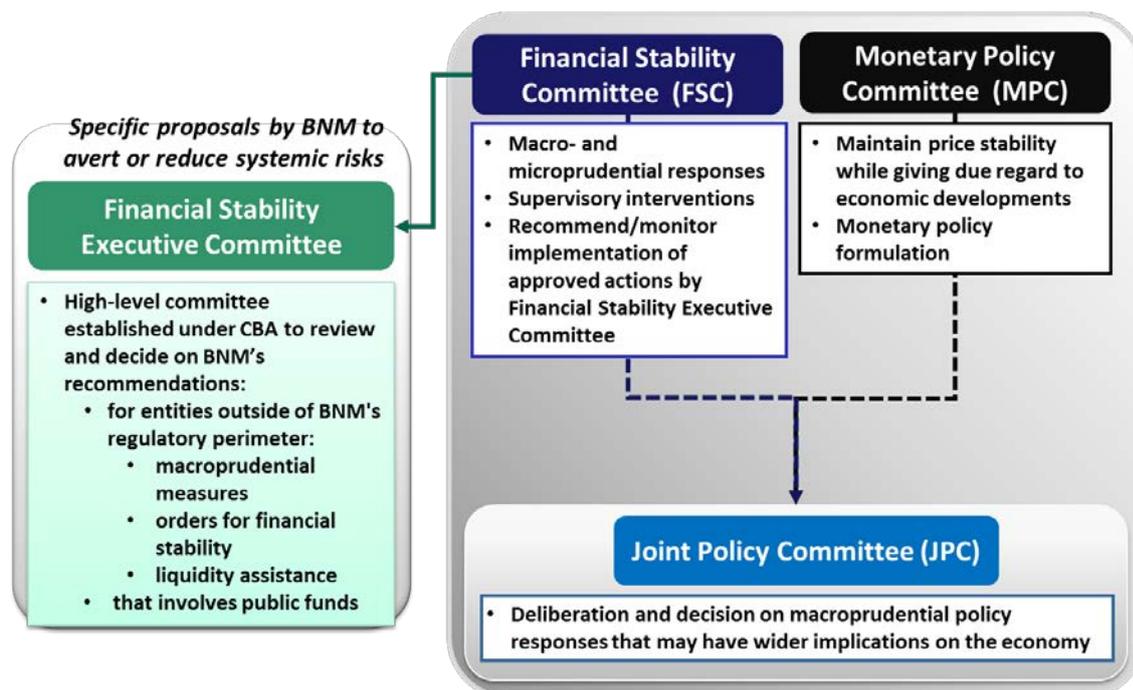
Keywords: macroprudential policy, financial stability, loan-to-value ratio

JEL classification: E58, G28

Macroprudential goals and framework

While the use of macroprudential instruments in Malaysia is not new, the enactment of the Central Bank of Malaysia Act in 2009 enhances the capacity of the Central Bank of Malaysia (Bank Negara Malaysia) to implement macroprudential policies to avert or reduce risks to financial stability. The Act provides the central bank with the autonomy to effectively fulfil its mandate of promoting monetary stability and grants powers to preserve financial stability conducive to the sustainable growth of the Malaysian economy. As the elements affecting financial stability are very diverse, establishing a comprehensive definition remains a challenging task. Malaysia therefore took the approach of defining financial stability by its risk aspects. Specifically, the Act defines “risks to financial stability” as those, which in the central bank’s opinion, disrupt, or are likely to disrupt, the financial intermediation process (including the orderly functioning of the money market and foreign exchange), or affect, or are likely to affect, public confidence in the financial system or the stability of the financial system.

To ensure effective fulfilment of its financial stability objective, the central bank discharges its mandate through two internal committees, the Financial Stability Committee (FSC) and Joint Policy Committee (JPC) (Graph 1). Chaired by the Governor, the FSC meeting is held four times per year. FSC members include all deputy governors and specific assistant governors in charge of financial regulation, supervision, development and markets. The FSC serves as a high-level internal forum responsible for discussing risks to financial stability stemming from both system-wide and institutional developments, and where necessary, it decides on policy responses to avert or reduce risks to financial stability. Under circumstances where the central bank intends to apply the financial stability powers on entities that are beyond the regulatory perimeter of the central bank, or the use of public funds is required, the Act provides that such decisions are taken by the Financial Stability Executive Committee (FSEC). Chaired by the central bank’s Governor, the FSEC is an inter-agency committee comprising public and private sector officials. The central bank’s representation in FSEC is limited to its Governor and one Deputy Governor out of the seven members, to ensure a proper check and balance on the use of the central bank’s extensive financial stability powers.



As the effects of monetary and financial stability policies interact, effective coordination between these policies is critical to achieve effective and targeted outcomes and minimise unintended consequences. The JPC was established to deliberate, decide and coordinate macroprudential policies that may have wider implications for both financial stability and the broader economy in addressing risks concerning the build-up of systemic risk and financial imbalances. The JPC consists of members from both the FSC and Monetary Policy Committee (MPC). Since its inception, the JPC has discussed and deliberated many important issues, particularly on household indebtedness and developments in the property market. With the primary goal of building resilience of financial institutions to manage systemic vulnerabilities, the JPC has implemented several macroprudential measures to address high household indebtedness and speculative behaviour in the property market since 2010.

Implementation of macroprudential frameworks: strategy, actions and tactics

The macroprudential framework in Malaysia aims to achieve an effective equilibrium between financial and monetary stability policy objectives, with the overarching objective of promoting sustainable economic growth. The calibration of macroprudential policies typically aims at addressing two main dimensions of system-wide risks, ie the evolution of systemic risks over **time** (eg risks associated with procyclicality) and the **cross-sectional** distribution of risks in the financial system (eg risks associated with concentration, contagion and interlinkages).

There are three key considerations in the design of macroprudential policies. First, macroprudential policies should be **discretionary**. Quantitative and qualitative assessments facilitate the task of shaping policy actions that are sufficiently pre-emptive to mitigate systemic risk, and adequately flexible to be promptly (re)calibrated or removed in response to financial sector and economic developments. Secondly, for enhanced efficacy and relevance, macroprudential policies should be **targeted** at specific segments of the financial system, ideally at the source of potential systemic risk. This keeps to a minimum the potential for over-reactions, spillovers and unintended consequences for the real economy. Finally, the design of macroprudential policies should not be considered in isolation, but **coordinated** with other policies for a holistic response. This necessitates a combination of policies – monetary, macroprudential, supervisory, fiscal and structural. To this end, the central bank has also established a culture of collaboration to benefit from the mutually reinforcing roles of macroprudential and microprudential assessments.

Recent implementation of macroprudential measures

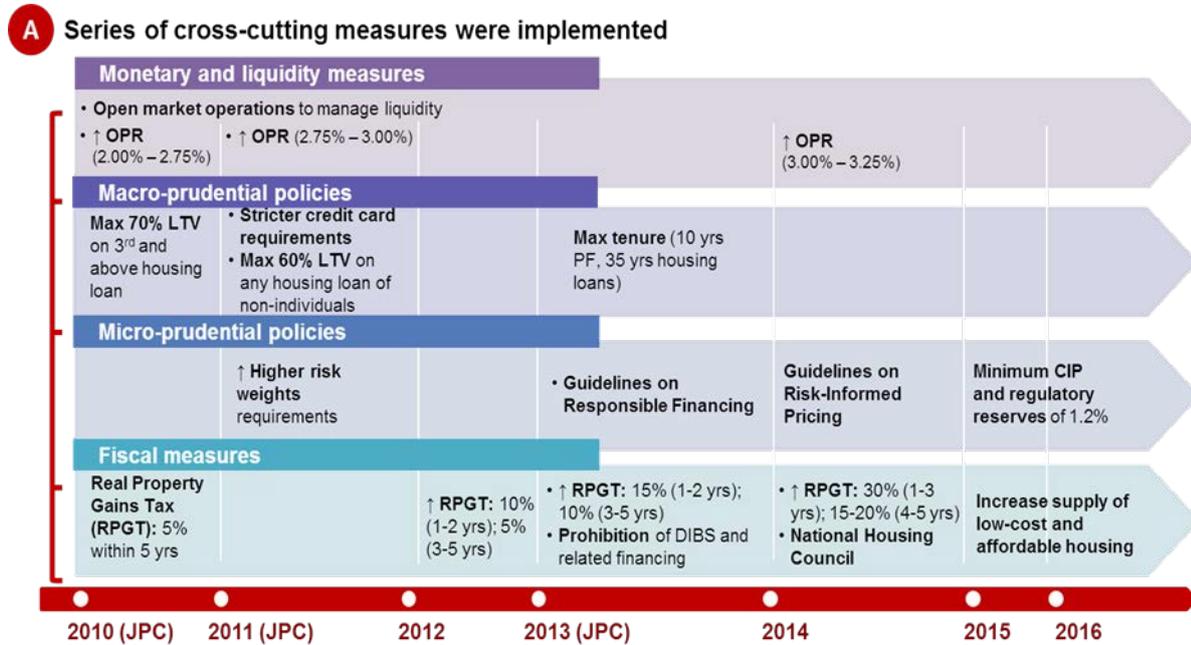
Since 2010, the Government and the central bank had introduced a series of policy measures. These measures aimed at addressing risks that emanate from both banks and non-bank financial institutions, such as avoiding excessive household indebtedness and reinforcing responsible lending practices by key credit providers (Graph 2). The development of these measures was supported by an overlay of judgement, anecdotal evidence, and supervisory assessments – using both quantitative and qualitative information. To address potential unintended consequences (eg the migration of risks to the informal lending sector), the supervisory and macroprudential measures were also extended to non-bank financial institutions, including a building society, a retail credit provider, and credit co-operatives regulated by the Malaysia Co-operative Societies Commission. This was intended to prevent regulatory arbitrage and to ensure consistency in financing practices across all major retail credit providers. To further manage potential unintended consequences, the Bank also promoted financial education programmes to advise young and first-time borrowers on effectively managing their finances, thereby contributing to a more resilient household sector.

Underpinned by improved assessments and underwriting practices by banks and non-bank financial institutions, household debt moved onto a more moderate growth path, with continued moderation in the expansion of personal financing. As at end-September 2016, the household debt annual growth rate slowed to 5.8% compared with 14.2% at end-2010. Since the loan-to-value (LTV) ratio limits were introduced on housing loans, credit-induced speculative purchases have remained in check. This was reflected in the annual growth of the number of borrowers with at least three outstanding housing loans (a proxy for speculative purchases), which fell to around 2% from 15.8% in 2010. Housing loans settled under three years (a proxy for flipping of properties) also remained contained, at 12% of total cases. The LTV ratio measure, however, was susceptible to circumvention and operational challenges. Following the introduction of the LTV ratio limit of 70% for the third and subsequent outstanding housing loan for individuals in November 2010, the central bank observed an increase in housing loans by non-individuals – which could be individuals circumventing the measure by obtaining financing under a company's name. In response, in December 2011, the central bank introduced a maximum LTV ratio limit

of 60% for all housing loans by non-individuals (see Appendix 1 for a list of measures to address household indebtedness).

Policy measures introduced since 2010

Graph 2



B Continuous emphasis on promoting financial literacy, enhancing consumer protection and putting in place mechanisms to assist distressed households

When it comes to removing macroprudential measures, the timing is guided primarily by whether the intended outcomes have been sustainably achieved, hence avoiding a premature exit or prolonging measures that could encourage the build-up of new risks. In determining whether to remove or recalibrate measures, there is a need to anticipate and manage potential circumvention, inadvertent spillovers or shifting of risks to other sectors. To this end, continuous monitoring of macroeconomic and financial indicators are important to assess effectiveness of macroprudential measures. For example, in reviewing the effectiveness and potential removal of macroprudential measures related to household indebtedness, the central bank monitors and assesses, among other indicators, financing trends (including access to financing) by banks and non-bank financial institutions, the asset quality of underwritten exposures, and house price growth. The central bank assessed that implementation of such measures has not affected eligible first-time home buyers or genuine long-term investors. These measures are currently still in place as part of prudential regulation, given the intended objectives of promoting prudent practices and curbing speculative purchases. In instances where macroprudential measures were introduced as part of a broader package or coordinated across countries (eg the announcement and subsequent removal of the blanket deposit guarantee by HKMA, MAS and the central bank), the timing for the removal of measures would also be subject to collective judgment and resolve.

Communication and cross-border issues

Clarity in communication is key in the deployment of macroprudential policy tools and contributes to its effectiveness. Communication strategies should be considered during the policy formulation and implementation stages. For example, following the issuance of the Guidelines on Responsible Financing, which was also extended to financial institutions outside the regulatory perimeter of the central bank, the central bank engaged with relevant consumer and industry associations, other regulatory authorities as well as officials from relevant government agencies to improve awareness of macroprudential issues, and insuring their support for the measures to be implemented.

A range of other communication tools (eg periodic reports, policy statements, press releases, speeches and interviews) are used to inform the public of the policy stance and objectives and where appropriate, encourage adjustments in the behaviour of market participants. For instance, given recent developments in the Malaysian financial markets, the central bank has continuously engaged with participants (eg banks and fund managers) to communicate and clarify its actions. Several statements were also released to provide greater clarity to and instil confidence in the markets and public. Several helplines were established to answer questions from the public. That said, the communication strategy remains a challenge. When economic conditions are less buoyant, stakeholders may press for macroprudential measures to be removed or recalibrated. Communication strategies also have to be adjusted to different scenarios, taking into account changes in the effects of the measures under prevailing economic and financial conditions.

Appendix 1

List of measures introduced by the central bank

Purpose	Introduced by the Central Bank of Malaysia	Nature of measure	Effective date
Promote responsible financial behaviour among borrowers and credit providers	Stricter credit card requirements: The minimum income eligibility for new cardholders is set at RM24,000 per annum with minimum age of 21 years; Cardholders earning \leq RM36,000 per annum can only hold credit cards from at most two issuers and the maximum credit limit extended to a cardholder shall not exceed twice monthly income per issuer	Macroprudential	Mar 2011
	Guidelines on Responsible Financing to promote prudent credit underwriting and affordability assessment (similar requirements extended to co-operatives and MBSB)	Microprudential	2012
Ensure prudent expansion of credit to households	Maximum financing tenure of 10 years for personal financing and 35 years for the purchase of residential and non-residential properties	Macroprudential	July 2013
	Prohibition on offering of pre-approved unsolicited personal financing products, and new personal financing products or variations to existing products must receive prior approval from the Bank	Macroprudential	July 2013
Promote sustainable property market and curb speculative activities	Maximum loan-to-value ratio of 70% for the third and above outstanding housing loan for individuals and 60% for housing loans by non-individuals	Macroprudential	Nov 2010 and Dec 2011
	Prohibit financial institutions from financing new development projects and end-purchases of properties with elements of interest capitalisation schemes (ICS), including developer interest bearing schemes (DIBS) or any permutations thereof	Macroprudential	Nov 2013
Enhance financial institutions' capacity to manage rising exposures to households	Guidelines on Risk-Informed Pricing to ensure pricing of retail financing products commensurate with risks assumed	Microprudential	2014
	Minimum collective impairment provisions and regulatory reserves of 1.2% of total outstanding loans, net of individual impairment provisions, to further strengthen buffers against potential credit losses	Microprudential	2015
Enhance households' capability to make informed financial decisions initiatives	POWER! Programme targeted at young adults, first time borrowers and private and public sector employees to provide practical financial knowledge, skills and tools to make sound and responsible borrowing decisions	Education and awareness	Ongoing
	Education programmes via mainstream (including radio) and social media	Education and awareness	
	Integration of financial education elements into core subjects of school curriculum (primary school: 2014; secondary school: 2017)	Education and awareness	2014 onwards

List of measures introduced by the government (cont)

Objective	Introduced by the government	Effective date																			
Curb speculative activities in the property market and promote affordable housing to ease upward pressure on house prices due to structural mismatch	More stringent real property gains tax (RPGT) since 2010	2010 onwards																			
	<table border="1"> <thead> <tr> <th rowspan="2">Disposal of property</th> <th colspan="4">RPGT with effect from</th> </tr> <tr> <th>2010</th> <th>2012</th> <th>2013</th> <th>2014</th> </tr> </thead> <tbody> <tr> <td>Within 1st and 2nd year <i>(Within 1st and 3rd year)</i></td> <td>5%</td> <td>10%</td> <td>15%</td> <td>30%</td> </tr> <tr> <td>Within 3rd and 5th year <i>(Within 4th and 5th year)</i></td> <td>5%</td> <td>5%</td> <td>10%</td> <td>15–20%</td> </tr> </tbody> </table>		Disposal of property	RPGT with effect from				2010	2012	2013	2014	Within 1st and 2nd year <i>(Within 1st and 3rd year)</i>	5%	10%	15%	30%	Within 3rd and 5th year <i>(Within 4th and 5th year)</i>	5%	5%	10%	15–20%
	Disposal of property			RPGT with effect from																	
		2010	2012	2013	2014																
	Within 1st and 2nd year <i>(Within 1st and 3rd year)</i>	5%	10%	15%	30%																
	Within 3rd and 5th year <i>(Within 4th and 5th year)</i>	5%	5%	10%	15–20%																
Prohibit new property development projects with elements of ICS, including DIBS or any permutations thereof	Nov 2013																				
Increased the floor for properties that can be purchased by non-residents from RM500,000 to RM1 million	2014																				
Establishment of the National Housing Council to develop strategies and action plans in a holistic manner; coordinate legal aspects and property price mechanism; and ensure provision of homes in a more efficient and expeditious manner. The Council members comprise federal agencies, state governments, National Housing Dept, PR1MA, SPNB and the private sector.	2014																				
Provide financial assistance to targeted household sub-segments	Increase the supply of low cost and affordable housing My First Home Scheme (Cagamas Berhad) 1Malaysia People's Housing Programme (PR1MA) including a rent-to-own scheme MyHome programme People's Housing Programme (National Housing Dept) Various low and medium cost housing by Syarikat Perumahan Negara Berhad (SPNB) Youth Housing Scheme	On-going (incl. Budget 2015)																			
	50% stamp duty exemption on instruments of transfer and loan agreements for houses valued up to RM500,000	Up to end-2016																			
Improve public transportation system, hence reducing need for private motor vehicles	For households with monthly earnings of RM4,000 and below: BR1M, SARA 1Malaysia	2012 onwards																			
	Schooling assistance and book vouchers																				
Improve public transportation system, hence reducing need for private motor vehicles	Improving remuneration structure for civil servants and restructuring of annual pension scheme for retired civil servants	Ongoing																			
	Enhance the urban public rail transportation over the medium and long term, such as the Sungai Buloh-Kajang MRT line, and extending the current Kelana Jaya and Ampang LRT line. (Budget 2015: Construction of Second MRT line from Selayang to Putrajaya, and LRT 3 project to link Bandar Utama to Shah Alam and Klang)																				
Improve public transportation system, hence reducing need for private motor vehicles	Initiatives to improve and integrate bus and other transportation (esp. within the city centre), and construction of new highways and expressways (Budget 2015).	Ongoing																			

On the relationship between macroprudential policy and other policies

Manuel Ramos-Francia and Santiago García-Verdú¹

Abstract

Our note has two related, albeit separate, goals. First, we extend an interest rate policy rule by appending a financial variable to it. Our key assumption is that the relationship between that financial variable and output is uncertain. This is an important assumption because policymakers seek policy rules that are robust to economic relationships. This exercise allows us to discuss a number of issues pertaining to the connection between macroprudential and monetary policies. Second, we examine some of the incentives faced by countries in coordinating their macroprudential policies and, thus, in working towards global financial stability, an international public good. We assume that the probability of a financial crisis decreases as more countries opt for coordination. Moreover, the heterogeneity of expected net benefits implies that countries' willingness to coordinate differs. While coordination to achieve financial stability faces important challenges, it can be socially optimal.

Keywords: monetary policy, macroprudential policy, financial stability, public goods provision, non-cooperative games

JEL classification: E52, F39, H41

¹ The opinions presented in this paper are those of the authors and do not necessarily reflect those of the Bank of Mexico.

Introduction

We first explore the problem of a policymaker with a macroprudential concern by including a financial variable in an otherwise ordinary interest rate policy rule. A key assumption is that the policymaker is uncertain about the relationship between the financial variable and output. As a related exercise, we consider a problem in which the policymaker is uncertain about the measurement error of the financial variable. Using a min max criterion (Hansen and Sargent, 2007), we assess the implications for robust policy rules under these two setups. In this context, we discuss a number of issues pertaining to the relationship between macroprudential and monetary policies.²

As a second and separate step, we assess the scope for the international coordination of macroprudential policies. A possible approach is to think of global financial stability as an international public good. In effect, it is for the most part non-rival and non-excludable and, thus, its provision entails international coordination. Accordingly, it faces important challenges.³

We think that there are three distinctive features of global financial stability as a public good. First, its provision is an uncertain undertaking.⁴ This is apparent in our setting but it is not a general feature of public goods. Second, arguably, if more players opt for coordination, financial stability is more likely to be achieved. The probability of a financial crisis is therefore a decreasing function of the number of players coordinating. Third, benefits and costs depend on the type of player. Thus, each player's willingness to coordinate differs, which has implications for collective action (Olson (1965)).

In sum, our note explores how macroprudential policy relates to other policies; namely, to monetary policy and, separately, to macroprudential policies abroad. Since the methodologies we use are notably different, we divide our note into two separate sections.

On monetary and macroprudential policies

"[...] I have argued for robust monetary policy rules that recognize that we face considerable uncertainty about the correct underlying model of the economy. I believe that the same basic framework may be useful for thinking about macroprudential policy." (Plosser (2014)).

To set the stage, we start with a streamlined model. Suppose that a policymaker faces the following problem:

$$\min_{y,\pi} w_y y^2 + w_\pi \pi^2 \quad (1)$$

² See Claessens (2015) for an overview of macroeconomic policy tools and Käfer (2014) for a literature review of the Taylor rule and financial stability.

³ One can more generally see its provision as a non-cooperative repeated game.

⁴ We use the word uncertain in this section in an ordinary way.

subject to:

$\pi = \lambda_y y + \beta E(\pi) + e$, where $\lambda_y > 0$ ("Phillips curve"); and

$y = \lambda_i i + u$, where $\lambda_i < 0$ ("IS curve").

where the w 's are the relative weights associated with inflation and output gap volatility, y is the output gap, π denotes inflation (ie we assume that the inflation target is zero), i is the monetary policy rate, and e and u are uncorrelated and independently and identically distributed (iid) shocks. The assumption of iid shocks allows us to focus on a one period problem. On the timing of shocks, we assume that the policymaker observes them before taking a decision. We refer to the output gap, simply, as output.

This problem leads to the following policy rule:

$$i = \frac{\beta E(\pi) + e}{-\lambda_i} \frac{w_\pi \lambda_y}{(w_y + w_\pi \lambda_y^2)} + \frac{u}{-\lambda_i}. \quad (2)$$

This is similar to an ordinary monetary policy rule as in Taylor (1993). In effect, all else being constant, a positive inflation shock (e) implies an increase in the policy rate (i). The strength of the policy response depends on the relative weight given to the variability of inflation (w_π) and on the effect of output on inflation (λ_y), given by the Phillips curve. The greater the inflation weight is, the stronger the interest rate response will need to be to accommodate a higher proportion of the shock towards output.

In general, the greater the effect of output on inflation (λ_y) is, the greater the interest rate response will need to be.⁵ In such a case, it is optimal for output to adjust further. The strength of its response depends inversely on the effect that the policy rate has on output (λ_i), based on the IS curve. In short, with a larger $-\lambda_i$, it takes a smaller change of the interest rate to accommodate a given shock. All else being constant, a positive output shock leads to an increase in the interest rate. For similar reasons, the strength of this response depends inversely on λ_i .

As is usually understood, a positive inflation shock combined with a negative output shock – commonly interpreted as an aggregate supply curve shift – is normally not accommodated. Based on the policy rule, the effects of both shocks on the interest rate would tend to cancel out.

Taylor (1993 and 1999) proposes this type of monetary policy rule on positive and normative grounds. There are a number of issues associated with monetary policy rules, including, measuring the output gap, the conditions under which the price level is determined and welfare considerations. We stop short of analysing the use of more than one instrument; ie we do not consider the *Tinbergen principle* (Blinder (1998)). Although these issues are important in their own right, we do not explore them further here (see Woodford (2003)).

Monetary policy rules have been extended in a number of directions. For example, some authors (Ball (1999), Bernanke and Gertler (1999), and Cúrdia and Woodford (2010)) have proposed the inclusion of a financial variable, such as the

⁵ The incidence of variable λ_y – which captures the effect of inflation shocks on the interest rate – depends on the relationship between w_y and $w_\pi \lambda_y^2$. If we assume similar weights, one would expect to have $1 > \lambda_y^2$ and, hence, a positive incidence.

exchange rate, asset prices, credit and other financial spreads. In many cases, their rationale has been to account for financial stability concerns.⁶

One can motivate this type of extension in, at least, two different ways. First, as a way of recognising that the interest rate affects the economy's financial stability. This is more of a positive approach. Second, as a way of incorporating macroprudential concerns in an otherwise ordinary monetary policy rule, which is more of a normative approach. In effect, there is a potential role for monetary policy in averting the accumulation of systemic risks, or managing them, if and when they materialise (Freixas et al (2015)).

Consider then the following problem, which extends (1):

$$\min_{y,\pi,z} w_y y^2 + w_\pi \pi^2 + w_z z^2 \quad (3)$$

subject to:

$$\pi = \beta E(\pi) + \lambda_y y + e, \text{ where } \lambda_y > 0 \text{ ("Phillips curve");}$$

$$y = \lambda_i i + u, \text{ where } \lambda_i < 0 \text{ ("IS curve"); and}$$

$$z = \lambda_z y + w, \text{ where } \lambda_z > 0 \text{ ("Financial relation").}$$

We added a financial variable as part of the policymaker's objective function, and of a relation that entails the financial variable, output, and the financial shock w . Similarly, we assume that w is observed by the policymaker before it takes a decision, and that it is an iid process, uncorrelated with e and u . We do not take a stance on a concrete financial variable. In fact, there is no consensus on a financial variable that could reliably be part of a policy rule.

This problem implies the following policy rule:

$$i = \frac{(\beta E(\pi) + e)}{-\lambda_i} \frac{w_\pi \lambda_y}{(w_y + w_\pi \lambda_y^2 + w_z \lambda_z^2)} + \frac{u}{-\lambda_i} + \frac{w}{-\lambda_i} \frac{w_z \lambda_z}{(w_y + w_\pi \lambda_y^2 + w_z \lambda_z^2)} \quad (4)$$

We next highlight some of its main features. First, its response to an inflation shock has the same sign as in (2); however, its relative magnitude depends on $w_z \lambda_z^2$. Thus, the presence of a financial stability concern affects how such a policy rule reacts to shocks that could be unrelated to the financial variable. Second, it responds to an output shock as in (2). In this particular case, the presence of the financial stability variable has no implications for the policymaker's reaction. Third, a given positive financial shock leads to an increase in the interest rate. The strength of such a response depends on the relative weight given to its variability in the objective function (w_z), as well as on the effect of output on inflation (λ_y) and the effect of the financial variable (λ_z). All responses depend inversely on the relationship between output and the interest rate ($-\lambda_i$).

Seeking robust monetary rules

In this subsection, we assume a central case in which the policymaker is *uncertain* about the relationship between output and the financial variable. Specifically, the policymaker is uncertain about the value of λ_z . It only knows the variable's interval,

⁶ While this approach sheds some light upon the relationship between monetary and macroprudential policies, we do not wish to propose a stance on macroprudential governance.

given by $[\lambda_0, \lambda_1]$. This assumption is motivated by the view of various authors who have expressed concerns about the state of our knowledge of macroprudential policy (Hansen (2013) and Freixas et al (2015)).

One way of dealing with concerns about ambiguity has been put forward by Hansen and Sargent (2007), who propose a robustness approach using a min max operator.⁷ One of the general motivations for using such an approach has been the evidence pertaining to ambiguity aversion as, for instance, supported by the existence of the *Ellsberg paradox* (Ellsberg (1961)).

This approach has, nonetheless, brought about an intense debate. For instance, Sims (2001) argues that the robustness approach fails to satisfy the *sure-thing principle*. He advocated instead a Bayesian approach.⁸ In the context of monetary policy, Svensson (2007) objected to the robustness approach on the grounds that it assigns too much weight to a possible state of nature.⁹ Still, such an approach assumes from the outset that the policymaker knows very little about the model's features.

One can use this framework to assess policies that minimise the loss under the most adverse scenario with respect to those features of the model that a policymaker is uncertain about. For us, it also provides a way of skeptically appending a financial variable to a policy rule in an attempt to reconcile different views about the role of monetary policy for macroprudential ends.¹⁰

In this context, we assume that the policymaker solves the following problem:

$$\min_{y, \pi, z} \max_{\lambda_z} w_y y^2 + w_\pi \pi^2 + w_z z^2 \quad (5)$$

subject to:

$$\pi = \beta E(\pi) + \lambda_y y + e, \text{ where } \lambda_y > 0 \text{ ("Phillips curve");}$$

$$y = \lambda_i i + u, \text{ where } \lambda_i < 0 \text{ ("IS curve"); and}$$

$$z = \lambda_z y + w, \text{ where } \lambda_z \in [\lambda_0, \lambda_1] \text{ ("Financial relationship").}$$

⁷ The distinction between risk and uncertainty can be attributed to Knight (1921). In fact, at times, it is referred to as Knightian uncertainty. Relatedly, Keynes (1921) introduced the concept of irreducible uncertainty.

The min max operator was proposed in Wald (1945) and subsequently developed by Savage (1951), who proposed a min max regret approach. The min max operator in economics has been used in three related approaches: Hansen and Sargent (2007), Gilboa and Schmeidler (1989), and Epstein and Wang (1994).

⁸ The *sure-thing principle* can be intuitively explained as follows. If you prefer A to B knowing that an event C will take place, and still prefer A to B knowing that event C will not take place, then you should prefer A to B without knowing anything about event C.

⁹ Such a view contrasts somewhat with the following remark: "This may come as a surprise to some of you, but I am not a fine-tuner. I think that the objective of the Federal Reserve ought to be to avoid a very bad outcome, and so my concerns are primarily with tail risks on both sides of our mandate." (Bernanke, transcript of FOMC meeting of June 24–25 2008).

¹⁰ Our problem is based on Barlevy (2011) who analysed the implications of robustness in the context of an ordinary monetary policy problem. Giannoni (2002 and 2007), for his part, studies robustness in general monetary models.

Hence, the agent is pessimistic about how the coefficient λ_z affects its objective function.¹¹ As a result, it minimises the objective function assuming the worst case scenario for the effect of output on the financial variable. One can also see this problem as an agent with a malevolent nature, who will respond as mischievously as possible to the policymaker's decisions (Hansen and Sargent (2007)).

The problem can be rewritten as:

$$\min_{\pi, z} \max_{\lambda_z} w_y(z - w)^2 / \lambda_z^2 + w_\pi \pi^2 + w_z z^2 \quad (5')$$

subject to:

$$\pi = \beta E(\pi) + \lambda_y y + e, \text{ where } \lambda_y > 0 \text{ ("Phillips curve")};$$

$$y = \lambda_i i + u, \text{ where } \lambda_i < 0 \text{ ("IS curve")}; \text{ and}$$

$$\lambda_z \in [\lambda_0, \lambda_1].$$

As a first relevant case, suppose that zero belongs to $[\lambda_0, \lambda_1]$; ie, the policymaker is uncertain even about the sign of the relationship between the financial variable and output. In this case, the optimal choice of λ_z is zero. This implies that the optimal policy rule obtained from (5) is exactly as in (2), which supports overlooking the financial variable when deciding the interest rate in the face of substantial ambiguity about its effect.

One can also interpret this result in the context of the clean versus lean debate. In effect, if there is much uncertainty about how output and the financial variable correlate, to the extent that the sign is unknown, the optimal rule implies that the financial variable should be ignored. This is in line with what is known as the Bernanke, Svensson and Greenspan approach. In effect, as has been argued: "[...] monetary policy is too blunt a tool to be routinely used to address possible financial imbalances." (Bernanke (2011)).

For the next case, we assume that zero does not belong to the interval. Specifically, assume that $\lambda_0 > 0$. In this case, the optimal choice of λ_z is equal to λ_0 . This can be seen by considering the first stage of the optimisation problem in (5'), as follows:

$$\max_{\lambda_z} w_y(z - w)^2 / \lambda_z^2 + w_\pi \pi^2 + w_z z^2$$

subject to:

$$\lambda_z \in [\lambda_0, \lambda_1].$$

Solving the minimisation part of the problem leads to the following policy rule:

$$i = \frac{\beta E(\pi) + e}{-\lambda_i} \frac{w_\pi \lambda_y}{(w_y + w_\pi \lambda_y^2 + w_z \lambda_0^2)} + \frac{u}{-\lambda_i} + \frac{w}{-\lambda_i} \frac{w_z \lambda_0}{(w_y + w_\pi \lambda_y^2 + w_z \lambda_0^2)}. \quad (6)$$

We then can ponder how the presence of uncertainty changes the policy rule in (4). Interestingly, the concern for robustness not only affects how the policymaker would react to financial shocks but also to inflation shocks. In effect, it diminishes the strength of the response to an inflation shock. This result is parallel to the *attenuation*

¹¹ While we are assuming that the policymaker confronts some uncertainty, another possibility is to assume that economic agents face uncertainty and that the policymaker is certain about the model of the economy (Hansen and Sargent (2007)).

principle (Brainard (1967)), which implies that if the policymaker is unsure about an effect, then it should proceed only gradually.

Nonetheless, we underscore that it is not always the case that the agent would attenuate or augment its response to a shock to the financial variable, both in absolute terms and relative to the model under certainty.

Being more specific, the response to a shock depends on how $w_z\lambda_0(1 - w_z\lambda_0)/(-\lambda_i)$ and $w_y + w_\pi\lambda_y^2$ compare to each other. We note that the first expression is a parabola as a function of λ_0 . So, if $w_z\lambda_0(1 - w_z\lambda_0)/(-\lambda_i) > (<) w_y + w_\pi\lambda_y^2$, then one would have a less (more) than proportional response.

Relative to the model with certainty in (3), the kind of response depends on how $\lambda_0(w_y + w_\pi\lambda_y^2 + w_z\lambda_z^2) - \lambda_z w_z\lambda_0^2$ and $(\lambda_z w_y + \lambda_z w_\pi\lambda_y^2)$ compare to each other. Note that λ_z is only known in the model with certainty. Similarly, $\lambda_0(w_y + w_\pi\lambda_y^2 + w_z\lambda_z^2) - \lambda_z w_z\lambda_0^2$ is a parabola with respect to λ_0 . Hence, if $\lambda_0(w_y + w_\pi\lambda_y^2 + w_z\lambda_z^2) - \lambda_z w_z\lambda_0^2 < (>) (\lambda_z w_y + \lambda_z w_\pi\lambda_y^2)$, the response is then attenuated (augmented). This last case underscores that the *attenuation principle* is not a general result (as also emphasised by Giannoni (2002)). It depends on a plethora of factors, such as the structure of the model, the parameters and variables that the agent is uncertain about, among other factors.

To provide a more concrete interpretation in this context, consider the following expressions:

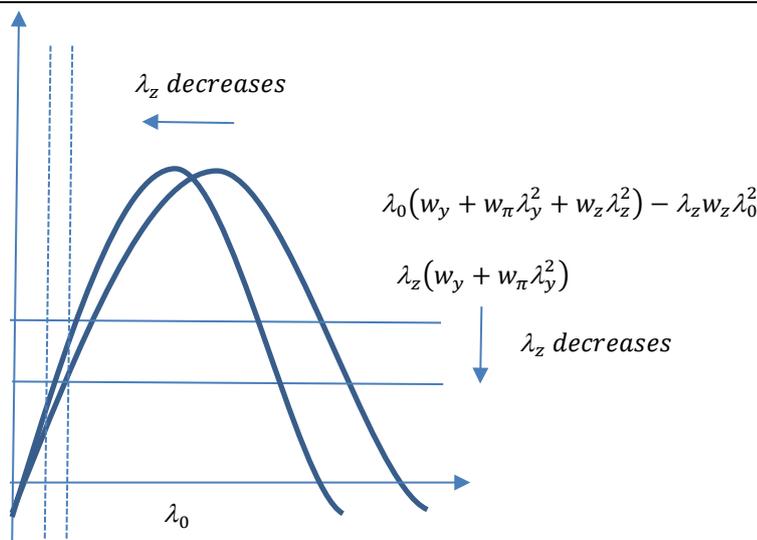
$$\lambda_0(w_y + w_\pi\lambda_y^2 + w_z\lambda_z^2) - \lambda_z w_z\lambda_0^2 \tag{7}$$

$$\lambda_z(w_y + w_\pi\lambda_y^2) \tag{8}$$

We will focus on the case in which λ_0 is small.¹² If λ_0 is sufficiently small, the rule calls for an attenuated response. One can think of the difference $\lambda_z - \lambda_0$ as a measure of relative uncertainty.¹³ It depends on the impact of output on the financial variable, based on the value of the parameter in the model with certainty, in (3), and the lower bound of the interval of λ_z in model (5).

¹² As a second case, it holds when λ_0 is sufficiently large. But since it is the lower bound of the interval, we stick to the first case.

¹³ Note that $-\log(\lambda_z - \lambda_0)$ is the entropy of a uniform distribution with parameters $[\lambda_0, \lambda_z]$. In a robustness setup under continuous-time, the distance between models is measured by their relative entropy.



The intuition underlying the model is as follows. The policymaker assesses the magnitude of the possible effect (λ_z) relative to the uncertainty outcome ($\lambda_z - \lambda_0$). If its magnitude is large relative to its uncertainty, the response will be augmented. We interpret this as an effect that is too important to be possibly ignored. However, if its magnitude is small relative to its uncertainty, the response will be attenuated. In this case, the policymaker's *ambiguity aversion* dominates.

If the knowledge of λ_z were only somewhat uncertain, one could find some support for leaning against wind. Although one might be uncertain about the relationship between output and the financial variable, there could be a basis for using the policy rate for macroprudential ends. In this case, λ_z is relevant with an acceptable level of uncertainty.

In this vein, Stein (2013) argues that: “[...] while monetary policy may not be quite the right tool for the job, it has one important advantage relative to supervision and regulation –namely that it gets in all of the cracks.” One possible interpretation of the tool not being quite right is the presence of uncertainty, while an interpretation of its advantage is the magnitude of the effect resulting from its reach.

The approach of Freixas et al (2015) is related. They argue for using the interest rate for macroprudential ends while a better understanding of how other macroprudential policies really work is gained. More generally, this points to the relevance of learning more about macroprudential policy and, in tandem, about the potential importance of monetary models incorporating a macroprudential extension.

Evidently, uncertainty about a specific parameter is only one of the features of a model deemed relevant by a policymaker. There might be other aspects to be concerned with. In the next subsection, we consider the case of a financial variable that comprises a measurement error which the policymaker is concerned with.

Measurement error in the financial variable

We explore a problem in which the financial variable has a measurement error. Specifically, the policymaker observes \hat{z} , instead of the financial variable z , with a measurement error $\hat{z} = z + \epsilon$. As a result, it solves the following problem:

$$\min_{y, \pi, z} \max_{\epsilon} w_y y^2 + w_\pi \pi^2 + w_z \hat{z}^2$$

subject to:

$$\pi = \beta E(\pi) + \lambda_y y + e, \text{ where } \lambda_y > 0 \text{ ("Phillips curve");}$$

$$y = \lambda_i i + u, \text{ where } \lambda_i < 0 \text{ ("IS curve");}$$

$$\hat{z} = z + \epsilon, \text{ where } \epsilon \in [\epsilon_0, \epsilon_1]; \text{ and}$$

$$z = \lambda_z y + w, \text{ where } \lambda_z > 0 \text{ ("Financial relation").}$$

We assume that the measurement error is uncorrelated with shocks. In addition, we assume that $E(\epsilon) = 0$ and $cov(\epsilon, y) = 0$. The latter assumption allows for an unbiased estimator of λ_z . In short, the financial variable z is observed with an error, which the policymaker is uncertain about.

The solution to the problem: $\max_{\epsilon} w_y y^2 + w_\pi \pi^2 + w_z \hat{z}^2$ is a function of ϵ_0, ϵ_1 and z . To solve it, we further assume that the interval $[\epsilon_0, \epsilon_1]$ is symmetric with respect to zero. Accordingly, we have that if $\hat{z} > 0$, then $\epsilon^* = \epsilon_1$, and if $\hat{z} < 0$, then $\epsilon^* = \epsilon_0$, which implies the following policy rule:

$$i = \frac{\beta E(\pi) + e}{-\lambda_i} + \frac{w_\pi \lambda_y}{(w_y + w_\pi \lambda_y^2 + w_z \lambda_z^2)} + \frac{u}{-\lambda_i} + \frac{w + \epsilon_0}{-\lambda_i} \frac{w_z \lambda_z}{(w_y + w_\pi \lambda_y^2 + w_z \lambda_z^2)}, \text{ if } \hat{z} < 0;$$

$$i = \frac{\beta E(\pi) + e}{-\lambda_i} + \frac{w_\pi \lambda_y}{(w_y + w_\pi \lambda_y^2 + w_z \lambda_z^2)} + \frac{u}{-\lambda_i} + \frac{w + \epsilon_1}{-\lambda_i} \frac{w_z \lambda_z}{(w_y + w_\pi \lambda_y^2 + w_z \lambda_z^2)}, \text{ if } \hat{z} > 0.$$

This rule leads to an intermittent interest rate policy with respect to z . We see two possible interpretations. One is that it accounts for an unobserved regime-switching variable captured by the change in the sign of \hat{z} . A second is that the rule is too erratic with respect to z . This can be seen as being supportive of the clean approach. As is well known, this approach posits that financial imbalances are too hard to identify in real time (Blanchard, Dell'Ariccia and Mauro (2010)).^{14, 15}

On a related matter, Kocherlakota (2016) explores policy rules in which inflation involves an uncertain measurement error.¹⁶ He conceives the implementation of monetary policy as a principal-agent problem, possibly having a rule as part of their contract. He argues that an uncertain measurement error is, by and large, non-contractual. He refers to such a variable as nonrutable; ie it cannot be part of a sensible policy rule. Kocherlakota characterises his solution in terms of the inflation record vis-à-vis the level of measurement uncertainty. He concludes that using a policy rule that

¹⁴ A related measurement difficulty also takes place, for example, in the case of credit. Albeit the importance of credit for financial stability is well documented, the key distinction between excessive credit growth due to a shift in demand or supply remains. Freixas et al (2015) underscore that the latter case is associated with longer and deeper financial crises.

¹⁵ The extent to which monetary policy affects credit is also an issue. Romer and Romer (1990), for example, argue that it has a limited influence.

¹⁶ In fact, he assumes that a component of inflation has an uncertain measurement error.

involves a component of inflation with an uncertain measurement error is only warranted if the inflation record is poor relative to the referred uncertainty.

In this context, a macroprudential goal implemented by extending a policy rule with a financial variable, whose measurement is uncertain, has significant implications. For instance, we could interpret Kocherlakota's (2016) result as a forewarning. This is particularly the case for emerging market economies that have no more than a satisfactory inflation record, and in which introducing a macroprudential mandate could lead to a decline in the inflation record. Still, there might be specific cases in which a central bank might prefer to be subject to an explicit policy rule. More generally, as Freixas et al (2015) have underlined, a macroprudential policy mandate would be difficult to implement in practice since it lacks a generally accepted measurable target.

Final remarks pertaining the first part

Using a robustness approach to assess the implications of including a macroprudential concern in a standard monetary policy rule is a useful approach. In fact, it sheds some light on the relationship between macroprudential and monetary policies. For instance, it is useful to assess some of the conditions under which a monetary rule could be a function of a financial variable.

In this context, it is worth recalling three of our motivations in appending a financial variable to a monetary policy rule. First, there is as a recognition that monetary policy affects financial stability. This is important since monetary policy is not only relevant for the time dimension of systemic risk but also for the cross-sectional one since it affects all financial intermediaries (Stein (2013)).

Second, the incorporation of a macroprudential concern into a standard monetary policy rule poses a challenge given that our understanding of how best to implement macroprudential policy is progressing. Thus, policymakers could decide to modify monetary policy by introducing a macroprudential rationale while learning more about implementation and potential implications (Freixas et al (2015)).

Third, it could be a way of reconciling different views of the role of monetary policy in a macroprudential policy framework. We think that this approach could be useful in considering a framework that unifies a number of approaches on the use of monetary policy for macroprudential ends.

On the international coordination of macroprudential policies

"[...] cooperation is a fair-weather phenomenon." (Schwartz (2000))

In this section, we explore a number of aspects relating to the international coordination of macroprudential policies. To that end, we draw results from two strands of the economic literature.

The first strand is the provision of public goods (Morrissey et al (2002)), which underscores the challenges that collective action entails (Olson (1965)). The literature on public goods offers useful elements to understand some of the factors leading to, or perhaps eluding, coordination. The logic of collective action can help us consider

the incentives that different types of agent have in reaching a coordination equilibrium.

The second strand is game theory (Gibbons (1992) and Mailath et al (2006)). In this strand, a public good is achieved in the absence of a government, giving place to a non-cooperative game. Three other features stand. First, achieving financial stability is a risky endeavor. Second, one can plausibly assume that as more economies opt to coordinate, the benefits and probability of maintaining financial stability increase. Thus, the expected aggregate net benefits of coordination are endogenous to the number of agents involved. Third, given agents' characteristics; in particular, the net benefits they can expect, their incentives to coordinate can differ markedly. One could more generally see this problem as a non-cooperative repeated game.

Game with deterministic benefits

To set the stage, we start with a simple setup in which a large number of countries are considering whether to coordinate in the provision of an international public good. In this case, there is no risk and each player faces the same constant unit benefits and costs. The only decision each one has to take is whether to coordinate or not.

If player i decides to coordinate, its pay-off is then given by:

$$(B \cdot n)/N + B/N \tag{1}$$

where B is the benefit that each player provides when coordinating, n is the number of players that opt to coordinate, and N is the total number of players. Note that the total benefits $B \cdot (n + 1)$ are equally shared among all countries (N) regardless of their decision. In addition, C is the unit cost, which is borne by each individual country that decides to coordinate.

Accordingly, if player i decides not to coordinate, its pay-off is given by:

$$(B \cdot n)/N \tag{2}$$

Naturally, if it decides not to coordinate, it incurs in no cost. However, since the good is non-rival and non-excludable, the player still obtains its proportional share of the benefits. This choice, in effect, would make the player a free-rider.

A player would opt for coordination if the pay-off in (1) is greater than (2). This happens if and only if:

$$B/N > C \tag{3}$$

Hence, it would do so if the individual cost is sufficiently small relative to the benefit. This inequality highlights a well-known result, collective action is harder to achieve in large groups (Olson (1965)). In effect, the larger N is, the less likely it is that (3) will hold.

Moreover, to see under what conditions coordination will be socially optimal, it is illustrative to analyse the social planner's welfare problem. Hence, the provision of the public good will lead to an increase in welfare of $N(B - C)$ relative to the no coordination equilibrium. To obtain this result, we add the individual benefits in (1) of all N players, assuming that all players opt to coordinate (ie, $n = N$).

Full participation will be welfare-enhancing provided that $B > C$. Thus, even if we have that $B/N < C$, a situation in which countries acting individually will *not* coordinate, we have that $B > C$ and, thus, the coordination equilibrium would be welfare-enhancing. This is a standard result in the provision of public goods.¹⁷

Game with stochastic benefits

We tweak this model in three ways. First, we assume that there are risks involved in the provision of the public good. Achieving financial stability is, after all, an uncertain undertaking. Hence, there is a positive probability that financial stability might not be achieved, albeit reasonable efforts are made to attain it.

Second, we assume that the probability of a financial crisis is a function of the number of players opting to coordinate. That is, the more players opting to coordinate, the smaller the probability of a financial crisis.

Third, we assume that there are two types of player, characterised by the benefit and cost each one gets if it decides to coordinate or not, as well as the impact that each one has on the probability of achieving global financial stability.

Thus, if player i of type j decides to coordinate, its expected pay-off is:

$$(F_1(n_1, n_2)n_1 + F_2(n_1, n_2)n_2)/N + F_j(n_1, n_2)/N - C_j(n_1, n_2),$$

with probability $p(n_1, n_2)$; and

$$(S_1(n_1, n_2)n_1 + S_2(n_1, n_2)n_2)/N + S_j(n_1, n_2)/N - C_j(n_1, n_2),$$

with probability $1 - p(n_1, n_2)$;

where $j = 1$ or 2 , n_j is the number players of type j opting for coordination, N_j is the total number of players of type j , and N is the total number of players (ie, $N_1 + N_2 = N$).

On the other hand, if a player decides not to coordinate, its pay-off is given by:

$$(F_1(n_1, n_2)n_1 + F_2(n_1, n_2)n_2)/N, \text{ with probability } p(n_1, n_2); \text{ and} \quad (5)$$

$$(S_1(n_1, n_2)n_1 + S_2(n_1, n_2)n_2)/N, \text{ with probability } 1 - p(n_1, n_2).$$

We associate the pay-off $F_j(n_1, n_2)$ with a financial crisis. Thus, $p(n_1, n_2)$ is presumed to be "small" (in line with Reinhart and Rogoff (2009)). Correspondingly, we think of $S_j(n_1, n_2)$ as the pay-off associated with a state of financial stability. Naturally, we assume that $F_j(n_1, n_2) \ll S_j(n_1, n_2)$; ie there are significant costs associated with a financial crisis. Furthermore, we assume the following properties:

$$\frac{\partial F_j}{\partial n_1} > \frac{\partial F_j}{\partial n_2} > 0; \quad (6)$$

$$\frac{\partial S_j}{\partial n_1} > \frac{\partial S_j}{\partial n_2} > 0; \text{ and,}$$

$$\frac{\partial p}{\partial n_1} < \frac{\partial p}{\partial n_2} < 0.$$

¹⁷ These types of problem have been studied at least since Lloyd (1833). See also Hardin (1968), Ferroni and Mody (2002) and Morrissey et al (2002).

In short, type 1 players have a greater influence in the determination of the expected benefits of coordination. All in all, the expected benefits, individual and collective, depend on the type and the number of agents that opt for coordination.

To see some of the factors that drive the decision to opt for coordination, consider its expected benefits. To simplify our notation, we omit the variables on which F , S , p and C depend.

An agent of type j will opt for coordination if:

$$[(F_1n_1 + F_2n_2)/N + F_j/N]p + [(S_1n_1 + S_2n_2)/N + S_j/N](1 - p) - C_j$$

is greater than:

$$[(F_1n_1 + F_2n_2)/N]p + [(S_1n_1 + S_2n_2)/N](1 - p).$$

This is the case if and only if the following inequality holds:

$$[F_j/N]p + [S_j/N](1 - p) > C_j. \quad (7)$$

This leads to the following implications, all else being equal. First, coordination is more likely the larger the values of F_j and S_j are (ie the smaller the costs of a financial crisis and the greater the benefits of financial stability), and the smaller the costs C_j . Second, in general, the larger the group the harder it is to observe a higher degree of coordination, in parallel with the original case in (3) but not if F_j and S_j increase sufficiently fast as n_1 and n_2 increase. Third, one is more likely to observe greater coordination if $\partial p/\partial n_j < 0$, as we have assumed. Note that the role of p is central, since each player faces financial uncertainty regardless of its decision to coordinate. Finally, all else being equal, type 1 players have more incentives to coordinate than type 2 players as inequality (7) is more likely to hold in their case.¹⁸

Olson (1965) distinguishes between three types of player, two of which have an interpretation in our context. If intermediate types, for instance, were to withdraw their contribution, this would lead to a notable decrease in the supply of the public good. In our model, this type is similar to 1. On the other hand, latent types are players that could withhold their contribution without causing a notable reduction in the public good. In our model, these are similar to 2.¹⁹ In our case, such features are captured by the properties of (6).

One could think of type 1 players as having a significant presence in the global financial system, possibly because of the presence of their banks abroad or of foreign banks in their economies. One could think of type 2 agents as playing a smaller role in the global financial system. In general, they are not as financially open. Importantly, type 2 players might have stronger incentives not to coordinate.

All in all, the type of a player is key to the decision to coordinate. This defines a situation that is markedly different from one in which the net benefits are deterministic. Relative to (3), whether collective action takes place will depend on the extent to which the net expected benefits increase as more agents opt to coordinate.

¹⁸ Assuming that differences in costs do not offset differences in benefits due to their types.

¹⁹ On a related note, the presence of a dominant type is similar to Olson's (1965) third type, which has two features. First, compared to other players, the units of public good it can provide are significantly greater. Second, the benefits it gets are therefore greater; in fact, it is in its own interest to unilaterally provide the public good. If the equilibrium is such that the dominant player opts for "coordinating"; then the bulk of the public good will be provided.

In this context, it is also illustrative to look at the welfare gains by considering the central planner's solution to the game. Such a gain is relative to the no coordination equilibrium. To calculate it, we add the expected individual benefits for both types of player, assuming that all of them opt for coordination.

$$[F_1N_1 + F_2N_2]p(N_1, N_2) + [S_1N_1 + S_2N_2](1 - p(N_1, N_2)) - N_1C_1 - N_2C_2.$$

The welfare gain is positive provided that:

$$[F_1N_1 + F_2N_2]p(N_1, N_2) + [S_1N_1 + S_2N_2](1 - p(N_1, N_2)) > N_1C_1 + N_2C_2. \quad (8)$$

Since F_j, S_j, C_j and p are not constant, inequality (8) is more likely to hold, particularly if type 1 players coordinate, relative to the model with deterministic benefits, as in (3).

Of course, we assume that certain properties of F, S, C and p make agents more likely to coordinate. They capture the idea that, in general, the more agents that opt to coordinate, the greater the expected net unit benefit associated with financial stability.

Although we see such properties as plausible, we think that the following questions naturally arise. First, what factors determine them? Second, what is done and what could be done to enhance such properties? Are players doing something, perhaps inadvertently, that is contrary to their benefit? All these considerations have a bearing on the likelihood and sustainability of coordination.

In this context, we succinctly describe a number of factors that could influence the determination of the referred properties, including the achievement of a coordination equilibrium. First, at a basic level, having the same accounting and financial conventions will be advantageous to coordination. For instance, the International Financial Reporting Standards (IFRS) are an effort in this direction. They, however, have not been free from challenges (Financial Times (2009)).

Second, a reason why there is a strong case for coordination is the presence of regulatory arbitrage (Boyer and Kempf (2016)). Macroprudential policy without coordination could lead to less effective policies as agents engage in regulatory arbitrage. Evidently, this could be seen as spillover effects. Conversely, this arbitrage might imply an increase in external risk factors. These effects can be seen as spillbacks.

Third, the implementation of risk management frameworks, such as the Basel capital requirements (Basel III), the liquidity coverage ratio (LCR), and the net stable funding ratio (NSFR) are central initiatives (BIS (2011, 2013 and 2014, respectively)). One could argue that financial stability is more certain as more economies implement adequate risk management frameworks.

In addition, evidence put forward by Rey (2013) and Borio (2012), among others, provide us with further reasons for macroprudential policy coordination. Both papers underscore the growing influence of global factors in economies' financial states. We believe that this is particularly relevant for small open economies, making common policy responses more likely and viable.

Final remarks pertaining the second part

There are a number of difficulties in achieving a welfare-enhancing equilibrium in games (Nash (1950)). The provision of global public goods is a particularly interesting

case. There are various circumstances under which coordination could be welfare-enhancing but agents acting rationally opt for not doing so. This could have dramatic implications. In a sense, Olson (1965) was less concerned about understanding how coordination took place than about its pervasive absence.

Understanding what characteristics and actions would make coordination more likely and less fragile is valuable. Of course, one general aspect of the games we described is that they are repeated. Thus, understanding how they are maintained is as important as understanding how they are achieved.

On a closely related note, we did not explicitly consider the temporal dimension of a financial crisis. This is important since financial crises are generally infrequent (Reinhart and Rogoff (2009)). While coordinating to minimise the probability of a financial crisis entails periodic costs, its key benefits occur in states of nature with a low probability of occurrence (ie avoiding a crisis).

This could have implications for the incentives faced by government officials with a relatively short planning horizon. Some might decide to “gamble” by not coordinating, hoping that no financial crisis would take place within their term. Hence, there might be a political economy dimension to coordination.

Crucially, international institutions and fora, such as the BIS, the G20 and the IMF, among others, play a key role in making coordination equilibria more likely. As our results highlight, achieving coordination is unlikely but doing so is in general socially optimal.

In sum, our contention is that for stronger coordination to strengthen global financial stability, we need to reassess the benefits of such coordination and, in tandem, the costs of a financial crisis. Macroprudential policy coordination has to be supported by the realisation that it is in our economies’ best interest to coordinate. Not doing so could eventually bring about significant and enduring costs.

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Implementation of macroprudential policy in Peru

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Abstract

This article reviews macroprudential measures implemented in Peru to counter the boom-bust pattern of the credit cycle and mitigate the risks associated with dollarisation, the main vulnerability of the Peruvian financial system.

Keywords: macroprudential policy, financial dollarisation

JEL classification: E58, F31, G11, G28

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Introduction

The Great Financial Crisis (GFC) brought the global banking and financial markets to a standstill, undermining consumer and business confidence, and severely impairing the world's real economy. It also highlighted the need for macroprudential policies to mitigate systemic risk and safeguard financial stability.

In the case of Peru, the importance of a macroprudential framework became evident from the start of the century. After the Asian and Russian crises of the late 1990s, the domestic banking system saw a collapse in credit and a series of bank failures. Thus, the pillars of the current macroprudential framework – of critical importance for the effectiveness of monetary policy in a financially dollarised banking system – were already in place before the GFC, and helped the economy cope remarkably well with the adverse external conditions that emerged after the collapse of Lehman Brothers on September 15, 2008.

The macroprudential policies that were introduced were designed to curb credit growth and housing price inflation, prevent liquidity shortages and mitigate the risks associated with dollarisation by closely evaluating the interaction between real and financial economic variables. In emerging market economies (EMEs), sudden stops of capital flows and abrupt movements of exchange rates pose risks that merit close monitoring.³

Institutional framework for macroprudential policies in Peru

The Constitution grants the Central Reserve bank of Peru (BCRP) independence to pursue its aim of preserving the stability of the currency through the regulation of the money market and of the credit of the financial system. The Superintendence of Banks (SBS) issues regulation and supervises banks. The SBS attends the BCRP's board meeting quarterly where information is exchanged. The SBS must also attend every quarter the board meeting of the securities market regulator.

Many of the macroprudential policies implemented since 2008 have been closely coordinated. However, a key difference between the instruments used by the SBS and the BCRP is the source of the systemic risk they seek to mitigate. The BCRP's instruments target mainly liquidity risk, both in domestic and foreign currency (FC), and excessive credit growth, whereas the SBS's instruments focus primarily on strengthening the financial system's loss absorption capacity. In addition, policy measures, oriented to dispel the gestation of cycles, are used to limit the spillover of capital flows to domestic monetary conditions, particularly since advanced economy central banks started quantitative easing.

³ See Bachetta and Van Wincoop (2006) for a discussion on non-fundamental exchange rate volatility.

Macroprudential policies implemented in Peru

Effective implementation of macroprudential policies enhance financial stability which, in conjunction with macroeconomic stability, will foster less volatile and sustained growth. Peru is a successful EME in terms of macroeconomic and financial stability, and the substantial dedollarisation of the economy. Since the adoption of inflation targeting in 2002, headline inflation was on average 2.7%, core inflation 2.1%, for the period 2002–16. During the same period, financial dollarisation has declined steadily from almost 80% to less than 30%.

By contrast to other economies with inflation targeting regimes, Peru's regime factors in the effect of financial dollarisation on the monetary policy transmission mechanism and financial stability. The target range of 1–3% for headline inflation aims to encourage local agents to dedollarise their assets and liabilities. The active use by the central bank of additional monetary tools has the objective of limiting financial risks created by dollarisation. Reserve requirement ratios (RRRs) and the accumulation of foreign exchange (FX) reserves for precautionary motives are employed to limit the liquidity and solvency risks associated with exchange rate fluctuations while at the same time FX market intervention is used to limit "non-fundamental" exchange rate volatility.

Besides delivering low and stable inflation, the current monetary policy framework has also contributed to providing an effective response to the GFC by limiting spillovers to the domestic financial system. During the GFC, therefore, banks continued to provide credit to the private sector – at an even faster pace than in 2008 – and no bank failure occurred. This stands in contrast to the experience of the Asian and Russian financial crises of the late 1990s, which severely affected the Peruvian banking system, with bank loans dropping sharply and several small banks failing in 1999–2000.

The accumulation of international reserves and the pre-emptive increase in RRRs, both in domestic currency (DC) and FC, prior to the GFCs, allowed the BCRP to promptly inject liquidity into the financial system. This prompt response swiftly reduced the pressure on domestic interest rates. Overall, between October 2008 and March 2009, the BCRP injected liquidity equivalent to 9.3% of GDP. A variety of instruments were used: reduction in RRRs on DC and FC deposits, repurchase agreement operations of up to one year, FX swaps and direct FX sales. The resilience shown by the Peruvian financial system during such an episode of stress boosted confidence in the system and further reduced dollarisation.

By virtue of their institutional arrangement for coordinated macroprudential policies, the BCRP and the SBS were able to introduce complementary measures with the aim of preventing a boom-bust credit cycle, mitigating the risks arising from currency mismatching, counteracting the effects of short-term capital flows, curbing non-fundamental volatility of the exchange rate and reducing dollarisation.

These measures are summarised in Table 1, which shows the Peruvian macroprudential framework following the classification proposed by Claessens et al (2013) along the lines of macroprudential policy goals, such as enhancing resilience and dampening the credit cycle, together with dedollarisation as an additional relevant goal for Peru and the BCRP. Tools are classified according to their implementation methods; that is, whether they are based on capital, liquidity, assets

or taxation. The following sections present the macroprudential measures implemented in Peru in order to mitigate each one of the discussed risks.

The Peruvian macroprudential framework

Classified by goal and method of implementation

Table 1

	Enhancing resilience	Dampening the cycle	Dispelling gestation of cycle	Dedollarising the economy	Preventing network contagion or shock propagation from SIFIs
Capital Based Instruments					
Capital requirements (CR) or capital buffers (CB)	Risk-weighted CR. SBS 1996	Countercyclical CB. SBS 2008	CB on foreign currency loans due to exchange rate-credit risk. SBS 2012		CB for systemic risk, CB according to individual, sectoral and regional concentrations. CB for risk- taking and interest rate risk. SBS 2011
Provisioning	General provisioning. SBS 1997	Cyclical additional provisioning. SBS 2008			
Limits on dividend distribution		50% profit capitalisation, when cyclical capital within 75–100%. 100% if <75%. SBS 2011			
Liquidity based instruments					
Reserve requirements ratios (RRRs)	Higher RRR on foreign currency liabilities, short- and long-term external bonds, and borrowings. BCRP 1992, 1997, 2012	Cyclical changes in RRRs. BCRP 2007	120% RRR on non-resident deposits. BCRP 2008	Additional RRRs conditional on growth of total, mortgages and car foreign currency loans, BCRP 2013. Additional RR conditional on FC loan balances reduction. BCRP 2015	
Liquidity ratios (LR)	LR in domestic currency 8%, LR in foreign currency 20%. SBS 1997				Liquidity coverage ratio 80% 2014, 90% 2018, 100% 2019. SBS 2014

The Peruvian macroprudential framework (cont)

Classified by goal and method of implementation

Table 1

	Enhancing resilience	Dampening the cycle	Dispelling gestation of cycle	Dedollarising the economy	Preventing network contagion or shock propagation from SIFIs
Asset-based instruments					
Limits on loan-to-value and debt-to-income (LTV and DTI)		Additional CB for domestic currency mortgage with LTV \leq 90% and LTV \leq 80% for foreign currency. Additional CB for consumption loans. SBS 2012			
Limits on exchange rate risk (LER)				FC long-position <50% of capital and FC short-position <10% of capital. SBS 2012.	Daily spot foreign currency transactions \leq 0.75% of pension funds (five-day foreign currency transactions \leq 1.75%). SBS 2010
Limits on derivatives (LOD)				Max of 20% of capital in foreign currency net derivative position, SBS 2012. Additional RR on short-positions in foreign currency derivatives. BCRP 2015	Daily derivative foreign currency transactions \leq 0.75% of pension funds (five-day transactions \leq 1.75%). SBS 2010
Taxation, Levies					
Levy/tax on specific assets and/or liabilities			4% commission on third-party transactions with central bank CDs. BCRP 2010		

Credit boom and bust

Credit helps firms to fund profitable projects and expand investment smoothly, while allowing households to smooth consumption over their life cycle. However, credit booms may pose the risk of excessive leverage, maturity mismatches and funding gaps, which may endanger banks.⁴ Moreover, excessive credit growth and lenient credit conditions may lead to an increase in credit delinquency ratios, undermining the financial system as a whole.

⁴ See Mendoza and Terrones (2008) for a discussion of the consequences of credit booms.

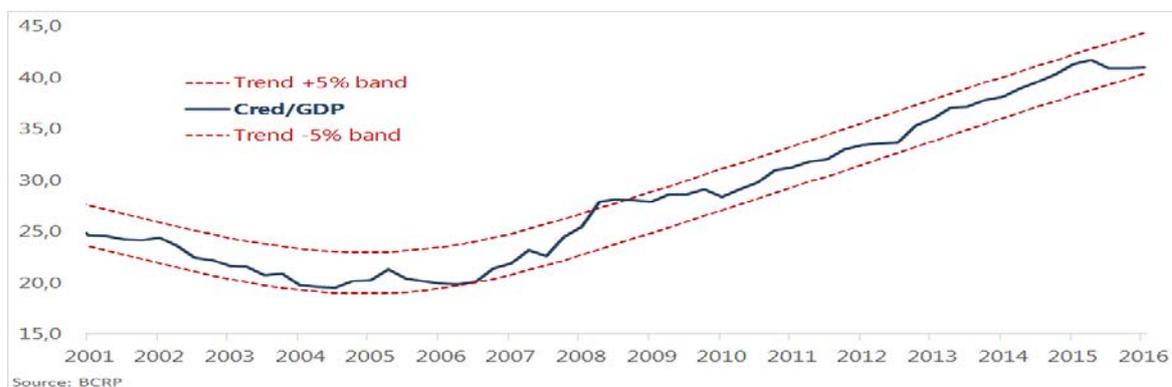
In Peru, the macroeconomic stability attained over the last 20 years has fostered sustained economic growth, primarily financed through domestic savings. Although the strengthening of the financial system through appropriate regulation and supervision that resulted in low loan delinquency ratios, Peru experienced an acceleration in credit growth from the second half of 2007. It reached levels above 20% annually between 2007 and 2011, pushing the credit-to-GDP ratio above its trend range by the first half of 2008 (Graph 1) and raising financial stability concerns.

To moderate credit growth, the SBS enhanced the solvency of the financial system by implementing a system of cyclical provisioning and higher capital requirements for consumer loans and mortgages, while the central bank managed the liquidity by introducing higher RRRs.

Bank credit to the private sector

Percentage of GDP

Graph 1



Dynamic provisions and countercyclical capital buffers

Dynamic provisioning seeks to moderate credit growth during credit booms. Excessive credit growth during economic expansions is associated with the procyclical behaviour of financial entities. During the bust, by contrast, financial entities cut back credit flows on the expectation of less favourable economic conditions and higher provisions against loan losses.⁵

In November 2008, against the background of strong credit growth, the SBS switched cyclical provisioning from voluntary (as it had been since 2003) to mandatory, and set up procedures for the evaluation and classification of borrowers. Mandatory procyclical provisioning went into force from 1 December 2008 (see Table 2 for details). Procyclical provisioning is applied to the stock of loans with a normal risk-category, and according to the type of loan and its required collateral. The required provision ranges from 0.3% to 1.5% of loan value.

In June 2009, as a consequence of the post-GFC economic slowdown, the SBS deactivated the rule for additional provisions, since the criterion "b" shown in Table 2 for its deactivation had been met when the 4.6% GDP annual average growth rate

⁵ Kyotaki and Moore (1997), and Bernanke, Gertler and Gilchrist (1999) formalised how the financial sector amplifies shocks to the economy, increasing the volatility of the business cycles.

during the last 12 months was 4 percentage points below the 10.3% GDP annual average growth during the previous 12 months (Graph 2).

Similarly, the economic recovery during the first half of 2010 determined the activation of the higher provisions rule according to situation “b” in Table 2.

In September 2014, average annual GDP growth during the previous 30 months switched from 5% or above to slightly below 5% (4.99%), prompting the deactivation of rule “a” for provisions. As of October 2014, the last month of activation of the dynamic provisions, it accounted for 12.5% of total provisions (or 0.6% of credits classified as normal risk). At present, while the 30-month annual growth average remains below 5%, none of the activation criteria have been met and the rule remains inactive.

In 2011, the SBS adopted the countercyclical capital buffer, additional to the minimum regulatory capital requirement, which is applied to every financial entity, including all internationally and domestically active banks. It has the same activation rule as for procyclical provisioning, with the aim of dampening the financial cycle. The additional capital required ranges from 1.2% to 5.5% according to the riskiness of the loan type.

Loan dynamic provisions rule

Table 2

	Activation	Deactivation
a.	Average annual GDP growth during previous 30 months from below 5% to 5% or above.	Average annual GDP growth during previous 30 months falls from 5% or above to below 5%.
b.	Average annual GDP growth during previous 30 months is above 5% and average annual GDP growth during the last 12 months is 2 percentage points above the average annual GDP growth of the previous 12 months.	Average annual GDP growth during the last 12 months is 4 percentage points below the average annual GDP growth of the previous 12 months.
c.	The average annual GDP growth during the last 30 months is above 5% in the 18 months since the deactivation based on item “b” of the deactivation rule.	

Activation and deactivation rules for dynamic provisions

Year-on-year percentages

Graph 2



Source: SBS, BCRP

Additional required capital for mortgage and consumer lending

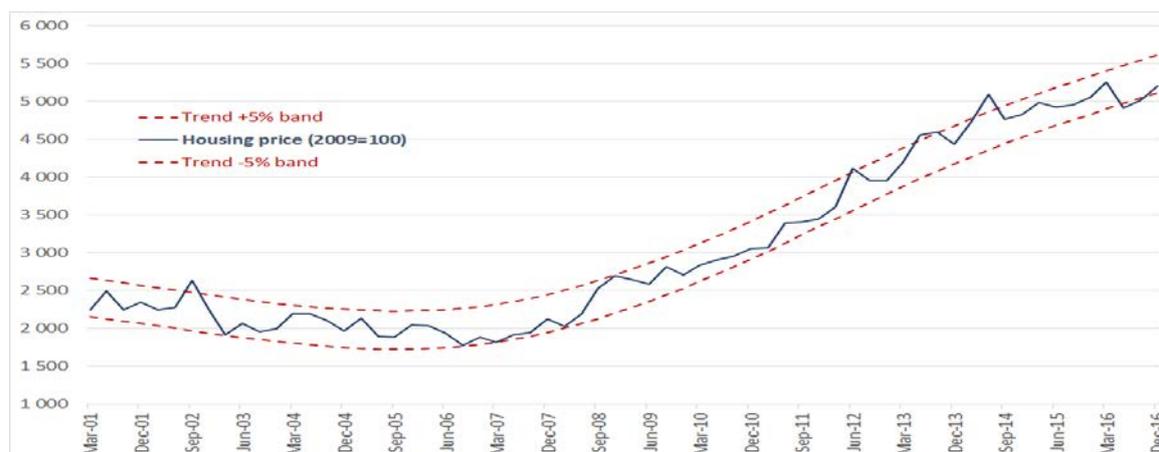
Growth in loans to households has been strong in recent years. From December 2002 to December 2012, mortgage and consumer lending grew at average annual rates of 17.3% and 19.3%, respectively; increasing their joint share of total lending from 20.5% to 35.2% and pushing house prices to the top of their trend range in the second half of 2012 (Graph 3). To tighten lending standards in the household sector, the SBS introduced in November 2012 higher capital requirements for household credit, with effect from January 2013.

The new regulation sets additional weighting factors for mortgage and consumer lending risks, in accordance with their type and characteristics (term, currency, interest rate etc). In the case of mortgages, the weighting factor depends on the loan-to-value (LTV) ratio, the term to maturity, whether the mortgage is for a first or second property, and whether it is at fixed or variable rate. For consumer lending, the weighting factors depend on the type of lending (agreement, car loans, revolving or non-revolving credit) and maturity.

Housing prices

Constant soles of 2009 per m²

Graph 3



As a result, consumer lending growth fell, while mortgage lending expansion remained relatively stable. The implementation of these macroprudential measures has meant that both lending categories have been backed by additional capital since January 2013.

Reserve requirement ratio

The RRR is the ratio of bank reserves to total liabilities. It represents funds that each bank must maintain in cash and deposits at the central bank to meet customer withdrawals. The RRR varies according to the type of liabilities and its maturity and may also be tailored to the behaviour of the asset side of the balance sheet. Indeed, one of the BCRP's recently introduced tools is a RRR on FC liabilities, set according to the evolution of bank credit to the private sector, with the aim of encouraging dedollarisation.

In the Peruvian case, the RRR has been raised countercyclically in order to moderate and stabilise credit growth. In September 2008, before the GFC deepened, RRRs were increased to dampen credit growth fuelled by capital inflows. However, during the crisis, the central bank responded by extending liquidity to the financial sector and reducing RRRs, among other measures. Given that overseas branches of financial entities were providing loans to domestic borrowers – particularly to corporations – the central bank extended RRRs to the liabilities of overseas bank branches in January 2011, preventing any circumvention of the RRR policy.

Financial dollarization and credit risk due to currency mismatch

In dollarised economies, there is a need to manage the risks associated to FC liquidity shocks and unexpectedly large exchange rate movements on financial liquidity and credit spreads. In the case of Peru, the liquidity and credit risks arising from exchange rate fluctuations are particularly relevant. FC liquidity risk is associated with the central bank's inability to print dollars, which significantly reduces its capacity to act as lender of last resort. On the other hand, credit risk arises from currency mismatches that increase the probability of default by agents borrowing in dollars but with cash flows in other currencies.

A currency mismatch on the balance sheet of domestic private agents may induce credit risk for the financial system because agents either do not properly internalise the currency risk or engage in moral hazard. A negative shock to the economy that leads the DC to depreciate increases the real debt of non-tradable firms (by reducing the net present value of dollar cash flows).⁶ The BCRP's dedollarisation programme, by generating incentives to diminish credit dollarisation, reduces bank asset exposure to currency risk arising from mismatches, and the spillovers and induced credit risks for financial stability that dollarisation generates.

Differentiated RRRs by currency denomination of liabilities

RRRs in FC are calibrated to increase the cost of lending and curb credit growth, or to increase the cost of using short-term external funding to expand local credit. In addition, since 2008 the BCRP has used RRRs in a more cyclical fashion by raising their average and marginal levels during capital flow surges, and cutting them during reversals. By increasing RRRs during periods of intense inflows, the BCRP reduces banks' incentives to lend in FC. At the same time, this creates buffers that reduce banks' vulnerability to reversals.

The GFC put the inflation target regime and financial risk control system to the test. Inflation ran above target during the first half of 2008, which called for higher domestic policy rates and a widening spread vis-à-vis foreign interest rates. The higher spread between the domestic policy rate and the US federal funds rate encouraged carry trades and short-run capital inflows in the run-up to the crisis. Growing bank liquidity levels arising from these capital inflows hindered the conduct of monetary policy and intensified appreciation pressures. In this context, in addition to raising the reference rate (from 4.5% in July 2007 to 6.5% in August), the BCRP increased RRRs on DC and FC deposits. The goal was to ensure an orderly expansion

⁶ These dynamics could potentially lead to a Fisherian deflation if balance sheet effects lead to fire sales of assets. For a discussion on the effects of fire sales on the financial system, see Shleifer and Vishny (2011).

of liquidity and credit. The BCRP also accumulated a significant amount of international reserves, through sterilized FX intervention.

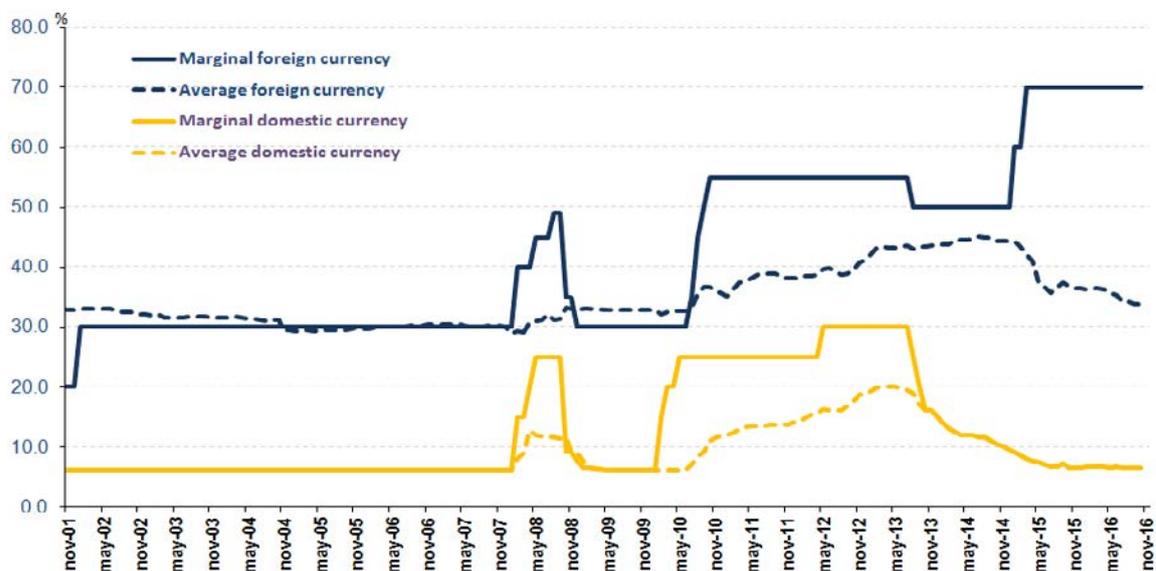
In September 2008, the BCRP responded immediately to the turbulence caused by the collapse of Lehman Brothers by injecting liquidity equivalent to a maximum of 9.3% of GDP through a wide range of instruments, including a reduction of RRRs to end-2007 levels, FX sales amounting to \$6.8 billion in the September 2008–February 2009 period, and the provision of liquidity through repo operations and currency swaps. These measures cushioned the domestic financial system from the effects of the crisis and facilitated a swift and sustained recovery of credit and economic growth from the second half of 2009. During the height of the GFC (October 2008–March 2009), access to credit was preserved and non-performing loans remained low.

The GFC provided policymakers worldwide with an important lesson: monetary policy needs to, and can, take greater account of financial stability concerns. During the crisis, central banks in advanced economies made innovative policy moves, including forward guidance in order to steer expectations of future interest rates and quantitative easing. These policies spilled over to EMEs, which faced unprecedented capital inflows. Under these circumstances, monetary policy in Peru had to sail against the wind and apply a sort of quantitative tightening (Rossini et al (2015)). This implied an increase in RRRs (Graph 4).

Reserve requirements in DC and FC

Percentages of total liabilities of banks

Graph 4



Source: BCRP

Capital requirements for exposures to credit risks due to currency mismatches

Since November 2012, with the purpose of coverage for credit risks associated with currency mismatches, the SBS increased the risk weights for identified and non-identified exposures to 102.5 and 108.0%, respectively. The additional capital requirements helped prevent the development of excessive credit risk exposures related to currency mismatches. They also hampered the gestation of cycles by

inducing banks to decrease the share of domestic FC credit and offering new loans in DC. During 2013, DC credit to the private sector increased by 24.8% while FC credit grew by 1.5%; implying a reduction in credit dollarisation from 42 to 39%.

Higher capital requirement for mortgages in dollars

In Peru, dollarisation of mortgages and car loans remains very high. The BCRP and the SBS implemented specific macroprudential policies in order to reduce the structural and cyclical currency exposures of households. Since January 2013, the SBS has differentiated the required capital for mortgage and consumer credit, demanding a higher capital ratio for FC loans. For FC mortgage to purchase primary residence, if the LTV ratio of a fixed interest rate loan surpasses 80%, the bank is subject to a higher capital requirement ratio (for variable interest rate, the LTV threshold is 70%). If the mortgage loan is in DC, the corresponding LTV thresholds are 90% for fixed interest rate and 80% for variable interest rate loans.

Capital flows and exchange rate volatility

Capital tends to flow to economies with macroeconomic stability and attractive interest rates, often in the form of carry trades. However, an excessive increase in such capital inflows may generate credit bubbles and non-fundamental exchange rate volatility. Banks may be encouraged to provide lenient credit conditions and, if the inflows then come to a sudden stop, this may undermine the financial system and the economy in general, particularly if it is highly dollarised.

Capital inflows put appreciation pressures to the domestic currency. This was the case for the Peruvian currency, except in 2008–09 when the exchange rate reacted quickly in anticipation of the reversal of capital flows triggered by the deepening financial crisis. However, QE policies in the advanced economies soon restored capital inflows and appreciation pressures in EMEs. Since 2013, however, the Federal Reserve's announcement and implementation of tapering has confronted EMEs with new reversals and heightened exchange rate volatility.

In response, the BCRP has stepped up FX intervention. Excessive exchange rate volatility, in the context of high dollarisation and currency mismatches, creates uncertainty and negatively affects investment and funding decisions. The BCRP's net dollar purchases have allowed it to accumulate international reserves as a liquidity cushion against sudden stops and reversals of capital flows.

Carry trade-related speculative capital flows can create instability in financial markets due to their volatile behaviour. In Peru, the carry trade returns may have risen to as high as 12.7% in March 2008. In most carry trades, the investors did not hedge their exchange rate risk; indeed, the domestic currency appreciation to maturity of the trades implies an exchange rate gain.

With the goal of preventing short-term speculative capital inflows and to curb non-fundamental exchange rate volatility, the BCRP implemented a combination of macroprudential policies ranging from additional RRRs on non-resident deposits and short-term external bank borrowing, to limits on banks' FX positions and on the FX transactions of pension funds.

Higher RRRs for non-resident deposits

In April 2008, the BCRP applied a 40% RRR to non-resident deposits in the DC, which was further increased to 120% in July. This countercyclical measure was combined with a 4% commission on third-party transactions with central bank certificates of deposit (CDs).

This RRR was quickly reduced to 35% in 2009 to prevent sudden outflows of short-term capital. However, in September 2010, when turbulence in international financial markets receded, the BCRP reinstated the 120% RRR for these deposits to discourage inflows of short-term speculative capital. At the end of 2014, the RRR was reduced and set to a level similar to that on the rest of deposits in DC.

Higher RRRs on external short-term debt of the financial system

To reduce the domestic financial system's exposure to international financial markets, the BCRP increased RRRs on the short-term external debt of banks from 30% in February 2008 to 49% in September 2008. As the crisis deepened, the BCRP removed RRRs in October 2008 to prevent any sudden stop of external credit lines for banks or to compensate for reversals in capital flows. However, the sound external liquidity position of banks allowed them to voluntarily pay back their short-term external debt or to terminate their external credit lines. As of September 2008, short-term external debt accounted for less than 35% of total bank funding.

Since February 2010, in a context of intensive capital inflows, the BCRP reinstated RRRs on short-term external debt to 35% and gradually increased the ratio to 75% in October 2010. In response, banks extended the maturity of their external debt. From January 2011 to July 2013, the RRRs on short-term external debt have been reduced to 60% and from August 2013 to 50%. As of December 2013, the long-term external debt of banks rose to 85% of total external borrowing, increasing the stability of their funding. Since May 2012, to discourage capital inflows and to further reduce banks' reliance on external debt funding, the BCRP introduced a 20% RRR on long-term external debt (external loans or FX bonds issued abroad of more than three-year maturity) when it exceeds 2.5 times a bank's capital.

Limits on exchange rate risk exposure

A bank's exchange rate risk exposure is usually defined as its net FC asset position (assets minus liabilities) or, more globally, as its overall net FC asset position, after accounting for its net FX derivatives position. Both indicators are usually measured as a proportion of a bank's capital. The net FX derivatives position may act as a hedge. But it may also increase FX exposure. To reduce banks' overall FX exposure, the SBS has reduced the limits on overall over-purchasing or over-selling of FC since February 2010. Consequently, since December 2012, the maximum overall long FX position limit is set at 50% of a bank's capital, which is consistent with the level of dollarisation, while the overall short FX position limit is set at 10% of a bank's capital.

The initial cut in the limits, in February 2010, caused banks to reduce their average exchange rate exposure from 25% of capital in January 2010 to 5% in December 2010. Furthermore, in January 2011, the SBS set a limit of 40% of capital, or a maximum of PEN 400 million, on the absolute value of a bank's net FX derivatives position. This limit, together with subsequent reductions in October 2011 and December 2012, indirectly restricted the net FX asset position, which encouraged

dedollarisation. The reduced limit indirectly curbed non-resident trading in the forward market, thus moderating the pressure on the exchange rate.

Limits on the FX operations of pension funds

Peruvian pension funds managed a portfolio equivalent to 20.5% of GDP as of December 2016. Their importance in domestic financial markets implies that their currency transactions can generate sizeable currency fluctuations. Since June 2010, the SBS introduced limits to the FX operations of pension funds with a daily maximum of 0.85% of total assets under management and a five-day maximum of 1.95%. Since January 2013, these limits have been reduced to 0.75% and 1.75%, respectively. Such a measure helps to prevent network contagion.

Macroprudential policies to prevent shock propagation from SIFIs

- In September 2010, the SBS introduced more stringent rules for the computation of bank capital, strengthened capital requirements, and imposed concentration limits and single counterparty limits.
- Implementing Pillar II of Basel III, the SBS has applied additional capital requirements. It established higher capital requirements for concentration risk (according to economic sector and region), variations in banking book interest rates, risk-taking propensity (Basel II), and cyclical fluctuations and market concentration (Basel III).
- Furthermore, in December 2012, the SBS introduced a Liquidity Coverage Ratio and a liquid investment coverage ratio for financial intermediaries, with a view to strengthening their liquidity management.
- The BCRP has gradually increased the operational limit for the overseas investments of pension funds, from 10.5% of funds in October 2006 to 36.5% in December 2013.

Dedollarising the economy

In 2013, the BCRP implemented additional RRRs with the objective of inducing a faster reduction of credit dollarisation. Financial institutions with growth of dollar-denominated loans above certain BCRP-established thresholds were subject to such requirements. Based on the dedollarisation policy evaluation of Castillo et al (2016), we now discuss the rationale for the application of these measures. We also look at their effectiveness in achieving the main objective of reducing dollarisation-related currency mismatches.

Main features of the dedollarisation programme 2013–16

As a permanent feature, the BCRP sets higher RRRs for FC than DC deposits. This difference increases the cost of financial intermediation in FC, thereby reducing the incentive for dollarisation.

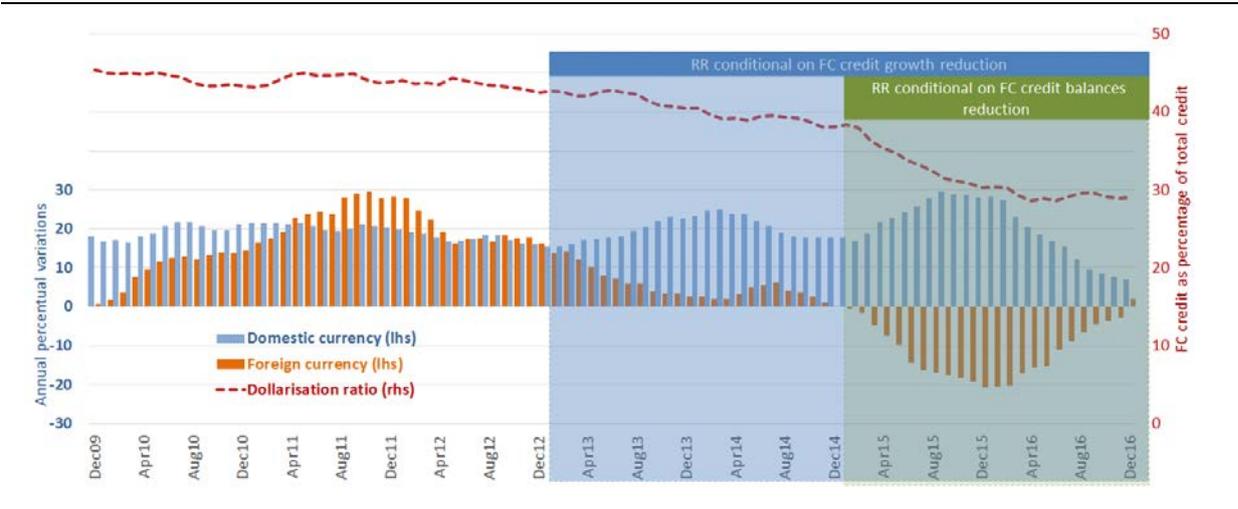
In March 2013, the dedollarisation programme started with the establishment of additional RRRs on FC liabilities tied to the evolution of FC mortgage and car loans. The stock of these loans as of February 2013 was set as a reference point and growth

rates of 10 to 20% above it led to additional RRRs. These were set to 0.75 percentage points for banks exceeding the first threshold, and 1.5 percentage points for those exceeding the second one. In October 2013, a similar additional RRR was established and linked to a broader definition of credit, including all loans to the private sector denominated in FC (except for those financing international trade). In this case, additional RRRs increased by 1.5 percentage points when total outstanding credit in FC (excluding credit for trade) exceeded 1.05 times the reference stock (which was set to September 2013), 3.0 percentage points when this definition of total foreign credit exceeded 1.10 times the reference, and 5.0 percentage points when it exceeded 1.15 times the reference.

In December 2014, the BCRP modified the previous framework pertaining to additional RRRs defined in terms of threshold levels to a new set-up requiring reductions in dollar-denominated loans balances. Under the new rules, banks had to reduce, by June 2015, the stock of total credit in FC (excluding foreign trade operations as well as operations with terms longer than four years and amounts over US\$10 million) to at least 95% of the comparable balance as of September 2013. Otherwise, banks faced additional RRRs on their total FC liabilities that were proportional to the gap between their current stock and the desired balance. This measure became more demanding in December 2015, since banks had to reduce their dollar loan balances to at least 90% of the September 2013 balance.

Banking FC credit, excluding trade loans

Graph 5



With these measures, the BCRP aimed to reduce potential systemic risks by providing incentives for banks to reduce their FC credit balances, without discouraging foreign trade operations and focusing on credit sectors that were more vulnerable to high dollarisation. As of December 2016, the reduction in total FC credit, excluding credit for trade operations, was significant, with levels below the threshold established by the BCRP for that month. Moreover, all individual banks achieved the reductions in total FC credit set by the BCRP.

Banks credit dollarisation

Percentages of total credit

Table 3

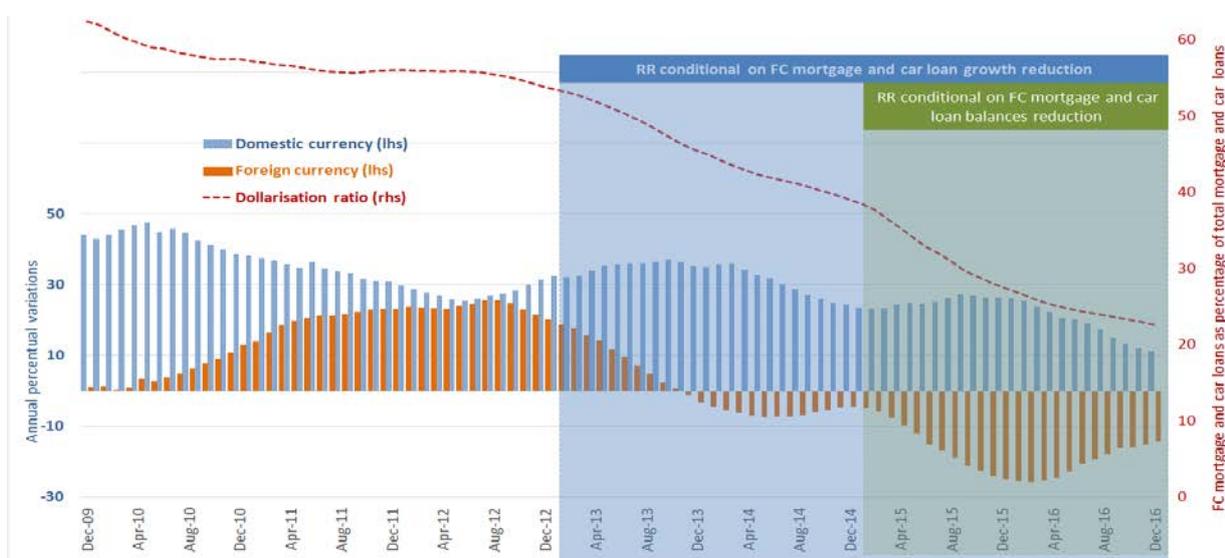
	Dec-11	Dec-12	Dec-13	Dec-14	Dec-15
Firms	55.0	53.8	51.1	48.4	38.7
Large firms	70.6	72.4	65.7	59.8	46.5
Medium Size firm	68.0	65.9	62.2	59.3	47.6
Small firms	16.6	14.6	12.3	11.5	8.8
Households	25.1	23.9	22.0	20.0	15.9
Consumer Loans	9.8	9.7	9.9	9.6	7.9
Vehiculares	69.7	76.5	74.8	68.9	44.6
Tarjetas de crédito	6.3	6.4	6.8	6.6	6.4
Resto	7.2	6.1	5.9	5.9	6.0
Mortgages	49.1	44.8	38.5	33.9	26.8
Total	44.7	43.0	40.7	38.3	30.5

Graph 5 shows the shift from FC to DC bank credit since 2013 with the implementation of the RRR conditional on the growth reduction of FC loans and balances. Total dollar credit dropped from 45 to 29% from December 2011 to December 2016

A similar set of rules applied for car and mortgage loans denominated in FC. In this case, by June 2015 banks had to reduce their stock of such loans to at least 90% of the balances held as of February 2013. In December 2015, the RRR was adjusted to reduce the stock of dollar-denominated car and mortgages loans to 85% of the balance held on February 2013.

Car and mortgage bank FC loans

Graph 6



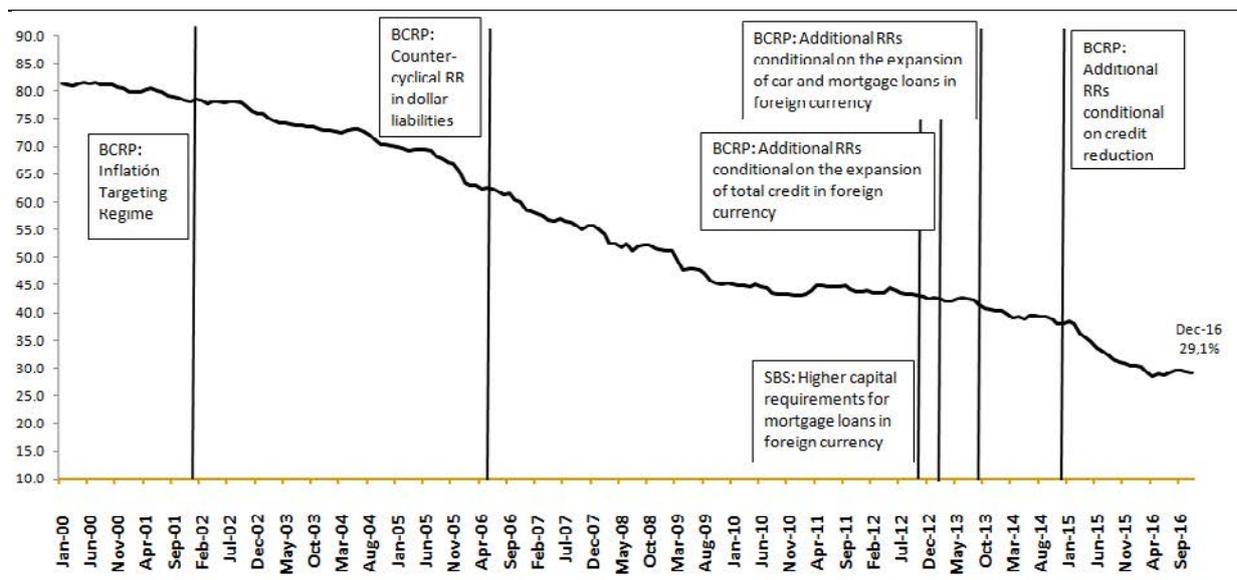
Graph 6 shows the substitution from FC to DC mortgage and car loans since 2013. The implementation of RRRs conditional on a reduction of growth these FC loans encouraged dedollarisation. Consequently, as of December 2015, aggregate FC mortgage and car loans were equivalent to 67% of the February 2013 balance. By November 2016, this figure had fallen even further to 58.8%, much lower than the level required by the BCRP for December 2016. Thus, the dollarisation of mortgage and car loans dropped from 53% in February 2013 to 23% in December 2016. The reduction of dollarisation was widespread across credit market segments, as Table 3 illustrates.

Graph 7, illustrates the evolution of credit dollarisation along with the dates of the three most important prudential policies adopted to foster dedollarisation: the counter-cyclical adjustment of RRRs in dollars by the BCRP; the increase in capital requirements set by the SBS in 2012; and the dedollarisation Programme of the BCRP. Credit dollarisation started to decline persistently after the adoption of the IT regime in 2002. Then, from 2010 to 2012, associated with very low international interest rates and an expected appreciation of the local currency, a moderating decreasing trend was observed. During this period, the BCRP increased average and marginal RRRs several times to counter the impact of external financial conditions on credit dollarisation. However, the most significant change in the dedollarisation trend was observed in 2015, after the BCRP adjusted its dedollarisation programme. As can be seen in Chart 7, the downward trend in credit dollarisation accelerated from 2013 (and with more intensity during 2015). This period coincided with the application of the dedollarisation programme and also with the increase in expected depreciation of the exchange rate, which increased the expected cost of borrowing in dollars.

Evolution of credit dollarisation in Peru

Percentages

Graph 7



Injecting liquidity in soles to support the dedollarisation of credit

- Banks that had their balance sheets matched by currency before the programme ended up with a short position in dollars after substituting (converting) dollar-

denominated loans already on their balance sheets for sol-denominated loans. This meant that banks needed a means of regaining their neutral position with respect to the dollar.

- Strong incentives to denominate all new loans in DC meant that banks needed long-term funding sources in soles in order to avoid a currency mismatch. These were particularly scarce given that private agents expected strong depreciation of the sol and thus preferred to save in dollars.

The BCRP realised that the first effect would imply more demand for dollar instruments. Banks would hedge their positions by purchasing dollars either in the spot or forward market, generating pressure on the exchange rate. Given the prudential objective of low FX volatility, the BCRP considered this scenario undesirable. Thus, it was decided that the dedollarisation programme would require a BCRP-provided hedge instrument.

Repos for credit substitution were introduced to support the conversion of loans in FC into loans in DC. In such operations, banks purchase dollars from the BCRP and simultaneously perform a currency repo using these dollars as collateral (a restricted deposit at the BCRP). As a result, banks' customers obtain loans in soles, while the banks maintain the same amount of assets in dollars. The repo for credit substitution provides banks with a dollar-denominated asset (the restricted deposit in dollar that serves as collateral for the repo) and a sol-denominated liability (the repo itself). Such operations cancel the effect of credit substitution (which increases soles assets and decreases dollar assets) on banks' dollar exposure.

Repos for credit expansion were designed to support credit growth in DC. Through this instrument, banks can use part of their RRRs in FC (up to an equivalent of 10% of their total liabilities subject to these requirements, which was extended to 20% in December 2015) to make currency repos with the BCRP, obtaining long-term funding in DC.

These new types of operation have been instrumental in facilitating a smooth reduction in credit dollarisation, particularly during 2015, when banks faced a shortage of DC funding as depositors increased their preference for saving in dollar-denominated deposits. In addition, banks faced excess FC liquidity, generated both by the substitution of dollar loans for soles loans and by the increase in dollar deposits. The repos for credit substitution and credit expansion contributed to swap the excess of banks' funding in FC into funding in DC, which allowed them to rapidly expand credit in DC without creating pressures on domestic interest rates. Credit expansion in 2015 was mostly financed by repo operations with the BCRP.

The dedollarisation programme achieved the goal of reducing credit dollarisation. However, deposit dollarisation did not follow. The reason is that agents' expectations of strong depreciation of the sol – associated with the normalisation of the Federal Reserve's monetary policy – led to a strong shift in deposits from soles to dollars. Depreciation favours dedollarisation of credit but has the opposite effect on deposits. Thus, the BCRP had to provide long-term funding instruments in DC to the financial system in order to maintain control over monetary conditions in DC. Most of these instruments relied on banks' dollar liquidity as collateral for currency swaps.

Looking forward, unwinding the instruments deployed by the BCRP in 2015 will require a decline in deposit dollarisation that corresponds to credit dollarisation. This will only be the case when depreciation expectations ease. However, this might not be enough. It is quite plausible that given the right conditions (appreciation of the

sol, for example), credit dollarisation could increase again if the measures implemented by the BCRP in the last three years are phased out. Low inflation and a stable exchange rate will provide incentives for private agents to dedollarise deposits but when the winds change again, particularly with regards to the exchange rate, policy will have to be in place to ensure the dedollarisation process.

Conclusions

The institutional arrangement for coordinated macroprudential policies in Peru allowed the implementation of reinforcing measures by the BCRP and the SBS, in a scenario of fiscal discipline enforced by the MEF. Such policies helped prevent boom-bust movements in credit, avoid balance sheet risks due to currency mismatches, counteract the effects of short term capital flows, prevent non-fundamental volatility of the exchange rate and reduce the economy's main vulnerability by inducing financial dedollarisation.

In economies affected by financial dollarisation, such as Peru, credit risk is heightened by the non-fundamental volatility of the exchange rate. Large DC depreciation can lead to higher default rates among firms with currency mismatches and affect borrowers' balance sheets by altering their income flows and loan repayment capacity. Therefore, macroprudential policies that can prevent any excessive risk-taking behaviour and limit its negative effects are central to an effective conduct of monetary policy. Implementing these tools while preserving monetary stability is possible and necessary. Furthermore, bolder measures aimed at reducing vulnerabilities, such as credit dollarisation, can significantly enhance financial stability, thereby creating space for traditional monetary policy to fulfil its primary role.

Peru's macroprudential policy toolkit includes liquidity-and asset-based instruments, combined with the accumulation of international reserves and FX-intervention in spot and forward markets as tools for enhancing resilience of the financial system, dampening the cycle, hampering the gestation of cycles, dedollarising the economy and preventing network contagion and shock propagation through SIFIs. These policies to limit systemic risks gained importance over the last decade, particularly given the current international context characterised by high uncertainty associated with the normalisation of the Federal Reserve's monetary policy and volatility in the terms of trade for emerging market economies (resulting in particularly from movements in commodity prices).

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Macroprudential frameworks, implementation, and communication strategies – The Philippines

Diwa C Guinigundo¹

Abstract

The Bangko Sentral ng Pilipinas (BSP) plays a key role in maintaining the financial system stability of the Philippines. While its primary objective is price stability, the BSP's clear monetary policy and financial stability frameworks have ensured that interactions between the two will remain complementary. The paper underscores that the use of macroprudential policy as well as various surveillance and analytical tools to promote financial stability has allowed the BSP to keep monetary policy focused on its primary objective of maintaining price stability. Furthermore, the paper emphasises that maintaining financial stability is not the sole task of the BSP, but is a shared responsibility by relevant segments of the financial system. As such, apart from establishing an internal Financial Stability Committee (FSC), the BSP has initiated the creation of an inter-agency body, the Financial Stability Coordination Council (FSCC), which involves the regulators of insurance companies and non-financial corporates, as well as the finance department and deposit insurance agency. Moreover, the paper highlights the importance of having a sound communication strategy, not only for monetary policy, but also for financial stability.

Keywords: financial stability, macroprudential policy, communication strategy, The Philippines

JEL classification: E52, E58, G18, G28

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Macroprudential framework

For the BSP, the use of macroprudential tools to promote financial stability has allowed it to keep monetary policy focused on its primary objective of maintaining price stability. This has helped enhance monetary policy's credibility in maintaining price stability. Indeed, in the past few years, the BSP has responded to inflationary pressures with measured changes in the policy rate, which have allowed the BSP to better manage expectations, avoid policy surprises, and signal the BSP's commitment to its price stability mandate.

Moreover, the BSP recognises that monetary policy and financial stability policy interact and influence one another. Monetary policy has side effects that can affect financial stability even when it pursues its own objective. For instance, accommodative monetary policy may give incentives for banks to over-leverage and take on more risk, while tight monetary policy may adversely affect borrowers' capacity to pay, which can lead to high default rates in the financial system. Experience has also shown that interest rate changes affect capital flows, which, in turn, can lead to excessive swings in the exchange rate and result in destabilising effects on the financial system.

Meanwhile, financial stability is essential for an effective monetary policy since the fragility of the financial sector can affect the transmission of monetary policy to the real economy. For instance, macroprudential measures that attempt to constrain borrowing in one or more sectors of the economy to prevent over-concentration of risk will affect expenditure in those sectors. Hence, even when monetary policy is accommodative, macroprudential measures can have an offsetting effect on economic activity on specific sectors and on overall economic output.

Such side effects imply that central banks need to take into account policy interactions. Claessens and Valencia (2013) argue that, if macroprudential policies have strong effects on output, more accommodative monetary policy can offset these effects as necessary. If changes in the monetary stance increase incentives to take too much risk, the relevant macroprudential policies should be tightened. Table 1 lists the appropriate conditions under which monetary policy and macroprudential policy should be used.

Summary of the appropriate use of monetary policy and macroprudential policy

Table 1

Scenario	Monetary policy	Macroprudential policy	Remarks
Maintaining macroeconomic stability	✓	✓	Should be complementary when there is financial instability During normal times, a combination of monetary policy and macroprudential policy will only provide modest benefits over monetary policy alone
Financial stability concerns following a financial shock	✓	✓	Use mainly macroprudential policy and less monetary policy
Productivity shock	✓	✓	Appropriate mix depends on strength and expected persistence of the shock, the riskiness of balance sheets, including buffers and leverage
Aggregate demand shock	✓		Monetary policy is optimal if it could stabilise both inflation and output
	✓	✓	Should be used together if stabilising inflation comes at the cost of lost output and when lending imposes a systemic risk externality
Only distortions are price rigidities or rigidities in non-financial (real) sector	✓		Ideal setting: policies are operating perfectly, no institutional or political economy constraints
Only financial distortions (eg boom in housing markets, high private sector leverage)		✓	Ideal setting: policies are operating perfectly, no institutional or political economy constraints

Sources: Angelini et al (2011); IMF (2013).

For the Philippines, inflation pressures and interest rates have remained relatively low and stable in recent years.² The economy has also expanded at a robust pace.³ The low and stable inflation, meanwhile, has fuelled credit growth, particularly in the real estate sector. While these developments are favourable for the economy, these factors could also possibly lead to financial market imbalances.

For instance, an upturn in the interest rate trend can adversely affect the debt-servicing capacity of real estate borrowers. With the growing exposure of the banking sector to the real estate sector, the BSP has employed macroprudential measures to guard against systemic financial stability risks that may arise from the sector.⁴ One of the most recent measures implemented is the Real Estate Stress Test (REST) limit for

² For the past three years, the inflation rate has averaged 2.4%.

³ For the past three years, real GDP growth rate has averaged 6.4%.

⁴ These measures include (a) expanded reporting requirements for banks on their exposure to the property sector; (b) a requirement for all universal/commercial banks and thrift banks to submit a Quarterly Report on Residential Real Estate Loans (RRELs) granted by banks to provide information for the generation of a residential real estate price index (RREPI), which is a valuable tool in assessing real estate and credit market conditions; and (c) the Real Estate Stress Test (REST) limit for real estate exposures.

real estate exposures,⁵ where banks are required to maintain a Common Equity Tier 1 capital ratio of 6% and a minimum risk-based capital adequacy ratio of 10%, assuming a 25% write-off of exposure to the real estate sector. The macroprudential measures implemented by the BSP are supported by its risk-based, consolidated supervision, sound regulatory framework and effective enforcement.

The BSP has a wide array of macroprudential measures to respond to the challenges of maintaining financial stability. Macroprudential policies are already in place (ex ante) to contain the risk-taking behaviour of financial intermediaries in “good times”.⁶ And, as in the real estate sector, the BSP also stands ready to deploy appropriately designed and targeted macroprudential measures to prevent excesses in specific markets that are prone to price misalignments. In addition, the BSP has predeployed macroprudential measures that can be adjusted in a countercyclical manner to prevent financial imbalances. Examples include caps on loan-to-value ratios, general loan loss provisioning, single borrower limits, concentration limits, limits on open FX positions, asset cover for banks’ FCDU liabilities, and liquidity measures.⁷

Apart from macroprudential tools, the BSP uses various surveillance and analytical tools to ensure the overall safety and soundness of banks and other financial institutions under its supervision. These tools consist of rating systems, early warning systems (for currency crisis and external debt crisis), stress tests, network analysis and various periodic reports and publications. The set of tools for measuring vulnerabilities serves as a complementary instrument that provides analytical discipline and rigour in the policy decision-making processes. These tools are also continuously being studied and reviewed to further improve the BSP’s tool kit in response to latest developments and emerging issues. Overall, these indicators are used to identify financial market vulnerabilities. They provide insights that lead to collective and rigorous discussions among decision-makers, giving them the basis for objective and informed judgments.

These macroprudential measures and the various surveillance and analytical tools are subject to careful study and calibration. While the choice of different tools has increasingly relied on quantitative methods, judgment maintains a primary role.⁸ For one, quantitative approaches may not be able to perfectly capture the influence of a policy on market participants’ behaviour and expectations. In addition, judgment is required as to when a gradual or rapid approach must be taken to manage risks in the financial system.

⁵ REST was activated on 27 June 2014.

⁶ Frait and Komárková (2011) identify the “good times” as the upturn in the financial cycle, when systemic risk tends to build up. In such a period, the response should be to strengthen the resilience of the financial system through the use of preventive measures (such as caps on open FX exposures and loan-to-value ratios) and the creation of buffers (such as increasing capital requirements).

⁷ During the 2008–09 global financial crisis, the BSP deployed liquidity measures, such as a US dollar repo facility promotion on the use of banks’ hedging facilities, and increased the budget for Exporters’ Dollar and Yen Rediscounting Facility (EDYRF) measures to address the dollar liquidity needs of banks and firms. In 2008, when the facility was introduced, a total of US\$ 43 million was made available at a rate of 4.79%. In 2009, only US\$ 34 million was made available at 4.5%. No funds were made available in subsequent years.

⁸ International Monetary Fund-Financial Stability Board-Bank for International Settlements (IMF-FSB-BIS) (2016).

In the BSP, the Monetary Board makes the final judgment as to what policy measures, whether monetary or supervisory, including macroprudential, should be implemented. The Monetary Board has seven members appointed by the President of the Philippines. Apart from the BSP Governor, who chairs the Board, it comprises five members from the private sector and a member of the Cabinet. All members of the Board have recognised competence in social and economic disciplines.⁹ This helps ensure that all policies implemented by the BSP are judiciously formulated.

Every week, the Monetary Board and the Deputy Governors of the BSP meet to discuss monetary, supervisory and macroprudential issues and other matters. Since the Deputy Governors of the Monetary Stability Sector and the Supervision and Examination Sector both attend the weekly meeting, any inconsistency in regulations can be discussed. Furthermore, a representative from the national government is also a member of the Monetary Board. Hence, any conflict with fiscal policies can be immediately raised during the meeting.

In addition, the BSP has an internal committee – the Financial Stability Committee (FSC), established in 2010 to adequately monitor and mitigate the build-up of systemic risks in the financial system. As such, the FSC has the authority to propose to the Monetary Board any macroprudential measures that it deems appropriate to maintain the robustness of the financial system. The Committee currently comprises five workstreams, namely, corporate leverage, shadow banking/real estate, capital flows, financial market infrastructures/intra-day liquidity, and regional integration. An offshoot of this committee is the Office of Systemic Risk Management (OSRM), recently set up as a distinct office in the BSP. The establishment of the OSRM strengthens the BSP's capacity to continuously monitor and assess financial system vulnerabilities. The workstreams and the OSRM regularly report to the FSC Executive Committee, which is chaired by the BSP Governor and comprises high-level BSP officials.

Coordination with financial system regulators. Aside from the BSP, there are other financial system regulators in the Philippines. The Insurance Commission (IC) regulates insurance companies, and the Securities and Exchange Commission (SEC) regulates corporates, capital market participants, the securities and investment instruments market, and the investing public. The division of responsibilities across different regulators allows for a more focused supervision of different types of financial institution. Nonetheless, the BSP recognises that systemic stability regulation needs to involve all major stakeholders, including the central bank, financial supervisor, finance ministry and deposit insurance agency. Thus, in 2011, at the initiative of the BSP, the Financial Stability Coordination Council (FSCC) was created.¹⁰ The FSCC brings together the BSP, IC, SEC, Philippine Deposit Insurance Corporation (PDIC) and the Department of Finance (DOF). Through the FSCC, the different agencies are able to take a more comprehensive view of the financial system, thus enhancing the understanding and implementation of macroprudential policies. Possible conflicts among the regulations of these agencies are resolved through discussion. The FSCC meets every quarter, which allows the agency heads to settle any disagreements over regulations in the financial system.

⁹ This is one of the qualifications of a member of the Monetary Board, as stated in Chapter I, Article II, Section 8 of The New Central Bank Act (RA 7653).

¹⁰ Nonetheless, the Memorandum of Agreement (MOA) formalising the creation of the FSCC was signed only on 29 January 2014.

Moreover, central bank coordination with other financial sector authorities is essential because regulators of different segments of the financial system may operate under different sets of rules, principles and standards, which may result in different qualities of supervision and appreciation of financial stability. In particular, the technical capacity of different regulators in assessing the economic and financial environment as well as detecting emerging risks may not be aligned. Thus, apart from information-sharing and capacity-building, coordination across financial sector authorities allows these differences to be aligned.

In addition, the FSCC has provided a venue where the BSP can motivate other regulators to carry out reforms and macroprudential policies to safeguard financial system stability. More importantly, the creation of the FSCC emphasised that maintaining financial stability is not the sole responsibility of the central bank, but is one that must be shared by all segments of the financial system.

The FSCC has five working groups (WG) that focus on specific concerns. The Corporate Leverage WG looks at domestic and cross-border debt exposures of non-financial corporations; the Shadow Banking-Real Estate WG focuses on real estate activities that are beyond the purview of the financial system regulators; the Capital Market Development WG looks at issues on pricing and valuation in capital and contingent markets as well as concerns on financial market infrastructure; the Financial Crisis Management and Resolution WG focuses on recovery and resolution strategies; and the Communication WG that manages financial stability-related issues.

The FSCC also collaborates with other industry sectors on a broad array of developments that may impinge on financial stability. For instance, in the real estate sector, developers have extended in-house financing to buyers through contract-to-sell agreements. Such a financial service is offered outside the formal banking sector, is not subject to regulatory oversight, and thus may be classified as a form of shadow banking. To address the possible adverse implications, the FSCC has signed a memorandum of agreement with the Housing and Land Use Regulatory Board to facilitate information-sharing among the agencies to better understand the interconnectedness and to mitigate the build-up of systemic risks arising from the activities of the real estate sector.

More forward-looking analytics to respond to prospective risks is needed. Given the greater efforts to enhance financial stability, there is scope to develop the construction of more forward-looking indicators to assess vulnerabilities well before the emergence of stress. For instance, a forward-looking index could be developed to assess potential stress in various financial markets (currency, equities, bonds etc). In addition, it would be useful to develop indicators to analyse developments in the banking sector alongside those among non-bank financial institutions as well as non-financial corporations. Likewise, with intensifying efforts towards further regional financial integration, there is a need to develop tools to monitor possible risks arising from operations of foreign banks' subsidiaries and branches in the domestic financial sector as well as from operations of local banks abroad. Indicators could also be developed to better assess how developments in the financial sector affect the outlook for the real sector. In short, being forward-looking and responsive to prospective risks is key to the timely and successful implementation of macroprudential measures.

Communication strategies

There is a broad consensus among economists that a clear and well communicated central bank monetary policy framework confers benefits (Levin (2014)). For one, clarity about the monetary policy framework strengthens the effectiveness of the monetary transmission mechanism by enhancing the public's understanding of how the policy stance is likely to evolve in response to economic and financial conditions. This facilitates informed decision-making by households and businesses and reduces economic and financial uncertainty. In addition, transparency about monetary policy is essential for maintaining the central bank's operational independence, thereby enabling its policy decisions to remain insulated from political pressures.¹¹ Moreover, communicating the policy stance through various communication tools (such as periodic reports, policy statements and meeting records) not only helps inform the public of the policy stance but creates a commitment to take action. This promotes the effective pursuit of the monetary policy objective. In some cases, communication tools have been required by law as accountability devices.¹²

Communication as a useful instrument in its own right (BIS (2016)). In recent years, the essential role of communication in the context of financial stability has gained more attention and thought. While there are parallels between monetary policy and financial stability communication, there are also some important differences that can make the design of an effective communication strategy for financial stability particularly challenging. In particular, using communication as a tool to convey risk assessments without disclosing a particular policy action could have greater impact but also poses greater challenges. Risk communication in early stages of a credit cycle is likely to have a small impact since agents are inclined to continue proven profitable strategies. However, an abrupt adjustment by stakeholders when warnings are issued in situations where risks are elevated may either alleviate or exacerbate financial stability concerns.¹³ In this case, communication would therefore appear to be easier to control and is hence a more useful instrument in its own right.

As with monetary policy, clear communication can enhance the impact of financial stability measures. Timely and effective central bank communication can help markets and the public anticipate the policy response to signs of developing risks and, thus, discourage behaviour that could imperil financial stability.¹⁴ It can also strengthen central bank credibility in macroprudential surveillance and policy.¹⁵ Furthermore, financial stability communication can help build political and public support for any actions that may be needed but at the same time, be unpopular with the public. It can likewise help manage public expectations about what can be

¹¹ Levin (2014).

¹² IMF-FSB-BIS (2016).

¹³ BIS Report of the Study Group on the nexus of objective-setting and communication of macroprudential policies and the relationship with monetary policy (2016).

¹⁴ Geraats (2009).

¹⁵ Credibility in macroprudential policy can reinforce credibility in monetary policy and vice versa. Absence of credibility in either policy area can be transmitted to the other.

achieved with macroprudential policies.¹⁶ Meyersson and Karlberg (2012) stressed that communication is an important tool that central banks can use to avert a crisis, specifically by providing information about its assessment of risks and about the measures it sees as necessary to reduce those risks.¹⁷

Nonetheless, there are challenges in central bank financial stability communication. There may be a case for limiting the extent of disclosure if the release of particular information may potentially be market-moving and harmful. For instance, improper communication of specific potential financial system vulnerabilities may trigger a panic. This suggests that the central bank's financial stability communication strategy needs to be well crafted and well timed. This requires a fine balancing act – keeping market participants and the public informed about potential financial stability risks, advising caution and promoting mitigating action, yet without causing panic. Moreover, central banks must avoid inadvertently disclosing private information that may cause unwarranted concern and speculation about the state of individual financial institutions.¹⁸

Another important challenge for financial stability communication is the absence of a single, quantifiable objective for financial stability that is as precise, clear and easily understood as that for price stability (Vayid (2013)). In addition, there is no primary instrument for limiting systemic risk, akin to the policy interest rate under conventional monetary policy. Instead, there is a wide range of financial stability indicators (for instance, non-performing-to-total loans ratio, credit-to-GDP gap, return on assets, foreign currency-denominated-to-total loans ratio, and capital adequacy ratio, among others) and regulatory tools (broadly classified as credit-, liquidity-, and capital-related).¹⁹ Moreover, financial stability responsibilities are often assigned to several different government authorities. Hence, unlike monetary policy where the central bank has sole responsibility, in financial stability, the responsibility is often shared with other national authorities.²⁰

For the BSP, clear, transparent and timely communication is considered an integral component of its monetary policy framework. Communication and interaction with the public, the media and the markets have enhanced the credibility, predictability and effectiveness of the BSP's monetary policy. Communication has served not only as a means to convey information about monetary policy but also as a policy tool for the central bank. Clearly conveying its monetary policy to the public has improved its predictability, and, in turn, the effectiveness of monetary policy. In addition, it has made the BSP more accountable for its actions and has ensured consistent policy decisions over time.²¹

The BSP has a wide array of monetary policy communication tools, including, regular media releases and briefings, meetings with stakeholders, press conferences, and publications. Highlights of the Monetary Board meeting on the monetary policy

¹⁶ IMF-FSB-BIS (2016).

¹⁷ Meyersson and Karlberg (2012).

¹⁸ Born, Ehrmann and Fratzscher (2011).

¹⁹ Lee, Asuncion and Kim (2015).

²⁰ Vayid (2013).

²¹ Fermo and Silva (2012).

stance, which is conducted every four weeks, is released publicly through the website of the BSP. The *Inflation Report* is also published quarterly, with an accompanying press conference, as part of the BSP's transparency mechanism under inflation targeting and to convey to the public the overall rationale and analysis behind the BSP's decision-making on monetary policy. The BSP Governor also issues an Open Letter to the President of the Philippines if the BSP fails to achieve the inflation target, outlining the reasons why actual inflation did not fall within the target, along with the steps that will be taken to bring inflation towards the target.²² Meanwhile, the *BSP Annual Report* is submitted annually to the President of the Philippines and the Congress highlighting the major developments in the Philippine economy and the key activities, policies and operations of the BSP during the year. An *Annual Report for the Layman* is also published, using more accessible terminology.

Similarly, the BSP considers clear, transparent and timely communication essential for its financial stability framework. Financial system vulnerabilities and BSP actions or responses to them are primarily communicated through media releases and interviews conducted by the media, credit rating agencies and investment houses. Supervisory and macroprudential regulations, procedural requirements, explanations, and interpretations of provisions of laws or of BSP circulars are made publicly available on the BSP website. While it is not the BSP's practice to communicate to the public the prudential tools that were considered but not chosen to address vulnerabilities, the Bank carefully studies every measure that it considers. For instance, in communicating the implementation of the REST limit, the BSP reached out to entities outside its regulatory purview such as real estate developers and government housing agencies to explain the need for such a policy tool as a pre-emptive measure to mitigate the impact of a real estate bubble on the economy. Speeches were also made by senior management before implementation to float the idea of the REST measure as a way to test industry/market reaction.

In addition to media releases, interviews and speeches, BSP prudential regulations are communicated through meetings with stakeholders and regular publications. The BSP-Bank Supervision Policy Committee regularly conducts meetings with 15 industry associations for the continuous rationalisation of regulations so that supervisory policy remains relevant and responsive. The publicly available *Quarterly Report on Economic and Financial Development* outlines the major developments in the real, monetary and fiscal sectors of the Philippine economy. In addition, the *Status Report on the Philippine Financial System* is published biannually to provide a comprehensive assessment of major developments in the Philippine financial system during the semester. The *Financial Stability Report*, which contains the BSP FSC's assessment of market risks and policy responses is currently only circulated among the top management and senior officials of the BSP but it too will soon be made available to the public.

Within the BSP, a communication work stream exists under the FSC to coordinate the communication approach for price and financial stability. A similar communication working group was also created under the FSCC to harmonise financial stability initiatives and messaging among the country's financial regulators and its fiscal authority. The BSP has likewise initiated within the FSCC a communication framework that is aimed at sensitising key stakeholders to financial

²² Open Letters to the President have been issued on 16 January 2004, 18 January 2005, 25 January 2006, 19 January 2007, 14 January 2008, 26 January 2009, 28 January 2016, and 20 January 2017.

stability issues. The framework is designed to convey financial stability matters in easily comprehensible language to staff of FSCC member agencies, financial sector participants, financial consumers and the general public. The communication framework is seen to enhance both the understanding and implementation of macroprudential policies.

The BSP also has an Enterprise-Wide Communication Plan that establishes its external communication policies and protocols. A central feature is a set of communication strategies to effectively engage stakeholders through a clear and transparent communication policy. To implement the strategies, the Plan has three tracks: Advocacy Management, Issue Management, and Media Management. The Advocacy Management Track handles various advocacies of the Bank that have target-specific audiences and unique goals such as financial inclusion, microfinance, anti-money laundering, financial education and consumer protection, and the remittance environment for overseas Filipinos. The Issue Management Track handles high-profile concerns that require expert handling because of their sensitivity to public opinion such as regional integration, FX liberalisation, monetary and inflation management, and financial stability. The Media Management Track handles the requirements of the media and guidelines on how to deal with the traditional channels (print, television and radio) and with the new media (social media).

Moreover, to some extent, macroprudential policy finds itself in the same situation as monetary policy a few decades ago when central banks began developing frameworks for making the formulation of inflation targeting more transparent and accountable. Designing a similarly “systemic” policy framework for financial stability is critically important.²³

Nonetheless, Filardo and Guinigundo (2008) emphasised that no matter how carefully a central bank has crafted its message with respect to substance and timing, scope will remain for some miscommunication. For example, signals by the central bank can be subject to misinterpretation by the recipients, especially when different groups of recipients are seeking different types of information. Moreover, differences in recipients’ abilities to absorb and interpret information and different levels of interest in the details of the policy may reduce the effectiveness of a one-size-fits-all communication strategy. In particular, the recipients of the messages are not all passive consumers and transmitters of information; some, such as the press, may have their own agenda when passing on the information to various audiences. Thus, increasing the level of economic and financial literacy in the population at large would definitely go a long way in helping central banks better communicate with the public. As such, the BSP has an Economic and Financial Learning Program (EFLP), which aims to promote economic and financial learning so that the public can acquire knowledge and develop skills needed to make informed economic and financial decisions. Since its launch in 2010, the EFLP has been conducted 44 times.²⁴ In this way, the public can become better partners of the BSP in ensuring the effectiveness of its monetary, financial and banking policies.

In conclusion, the BSP believes that it has a central role in maintaining financial stability. While its primary objective is price stability, the clear monetary policy framework and financial stability framework of the BSP have ensured that interactions

²³ BIS (2016).

²⁴ Data as of 7 March 2017.

between the two will not be discordant. In addition, the BSP emphasises that maintaining financial stability is not the sole task of the central bank, but is a responsibility that must be shared by all segments of the financial system. Finally, the BSP recognises the importance of having a well crafted and well timed communication strategy not just for monetary policy but also for financial stability.

Moving forward, essential issues remain. In the attempt to increase the resilience of the financial system and prevent the build-up of financial imbalances, various macroprudential tools have been deployed. In this process, macroprudential policy faces important trade-offs between systemic risk and financial intermediation, and ultimately economic growth. The mechanisms of the trade-offs are currently not well understood. Furthermore, the transmission mechanism of macroprudential policy is complex and therefore subject to considerable uncertainty. Uncertainties about the transmission channels may not only create difficulties in assessing the effectiveness of a particular macroprudential instrument, but they can also create the potential for unintended consequences. Moreover, the precise timing of activating or deactivating macroprudential instruments remains unclear. Theoretical, empirical and policy research on these issues, among others, is bound to provide a considerable amount of benefit to macroprudential policymaking.

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Institutional and operational aspects of macroprudential policy in central and eastern European EU member states

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Abstract

Challenges to macroprudential policy are mainly of a universal nature and encompass, in particular, difficulties in the pre-emptive identification of looming imbalances; interactions with the political cycle; asymmetry in the perception of costs and benefits of using macroprudential instruments; and inaction bias. However, in open central and Eastern Europe (CEE) economies that are hosts to foreign banks, some specific features should be taken into account when designing the architecture of the macroprudential institutional framework.

This note – drawing on the experience of Poland in this field – analyses important characteristics of effective macroprudential policy, with particular attention paid to the institutional conditions of Poland and other small, open and integrated EU economies that are not members of the EU banking union or the euro area. The author finds that, in some circumstances, CEE countries hosting large foreign banks may need recourse to instruments that are non-standard and non-harmonised in EU law. The note concludes that entrusting macroprudential policy to a committee with the leading role of the central bank could prove to be the most effective option, as it enables the smooth coordination of financial safety net institutions and facilitates the use of some non-harmonised or unorthodox instruments. Such an institutional arrangement provides for multifaceted know-how and superior capability compared with a single institution. A collegial body employed with soft powers also accommodates the phenomenon of fiscal dominance, as the inclusion of government representatives reduces the risk of divergent actions, shares accountability and allows for some scrutiny over the use of fiscal instruments.

Keywords: central bank, bank regulation, Basel Accords, capital requirements, macroprudential policy, policymaking, credit supply, financial crises, systemic risk

JEL classification: E02, E44, E58, F41, G21, G28

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Introduction

Prior to the Great Financial Crisis (GFC), macroeconomic management assigned pivotal roles to monetary policy and microprudential supervision. The main focus of monetary policy was on price stability and the prevailing regime was based on inflation targeting (explicit or implicit). The most common *modus operandi* was targeting a given level of the short-term interbank interest rate. At the same time, the main objective of supervision was to mitigate risks and prevent the failure of individual financial institutions (IMF (2013)). Intermittent, damaging episodes of boom and bust cycles in credit and asset markets should have sounded a clear warning signal to this consensus. Unfortunately, they did not challenge the prevailing paradigm. Instead, the cycles only triggered a rather academic discussion on the role of asset prices in monetary policy. By then, policymakers and academics encouraging measures that leaned against the wind (White (2006)) had been sidelined, while the mainstream consolidated its position by arguing that monetary policy should remain exclusively focused on price stability (Bernanke and Gertler (1999, 2001)).

As time passed, however, the shortcomings of the predominant paradigm – based on monetary policies aimed at maintaining price stability and on prudential policies that focused narrowly on the soundness of individual financial institutions – became ever more acute. The recent crisis showed that macroeconomic stability is not guaranteed even when these two objectives are achieved. Instead, it turned out that dangerous financial imbalances can also develop in an environment of low inflation, small output gaps and originally stable financial institutions (Sławiński (2009)). Since financial instability unveiled its potential to precipitate severe distortions in the level and composition of output, it has become clear that welfare maximisation requires the inclusion of financial stability as an intermediate goal for economic policy (Goodhart (2011)). In other words, to ensure sustainable economic growth, macroeconomic management must include financial stability as an additional objective (IMF (2013)).

New policies demand new institutions and a new toolkit – one that allow for leverage to be constrained and the balance sheet structures of banks and other financial intermediaries to be reshaped in order to mitigate risks *ex ante* and help build buffers against potential shocks. For macroprudential policy to work, a comprehensive analysis of systemic risk is needed, taking into account different kinds of financial imbalance, and followed by the smooth deployment of laser-cut macroprudential tools that precisely target particular sources of systemic risk. Prior to the GFC, central banks regularly monitored systemic risks and published the results of those analyses in their financial stability reports. Nevertheless, no institution was unequivocally mandated or empowered to use macroprudential tools that could have mitigated systemic risks. Macroprudential supervision was virtually non-existent (Szpunar (2014)).

In 2009, this deficiency was accurately identified in the de Larosière Group report on financial supervision in the EU. According to the report, the objective of macroprudential supervision is to limit the distress of the financial system as a whole to protect the overall economy from critical distortions in real output. Generally, risks to the financial system arise from the failure of a single local financial institution due its size (including subsidiaries in other countries) in relation to the GDP of the country of residence. However, in the light of the high interconnectedness of EU financial markets, many more important global systemic risks arise from financial institutions

being exposed to the same risk factors. Therefore, macroprudential analysis needed to incorporate a cross-border dimension and should pay particular attention to common or correlated shocks that could trigger contagious knock-on or feedback effects.²

As the follow-up to the recommendations outlined in the de Larosière Group report, the European Systemic Risk Board (ESRB) was established in 2010. The ESRB was tasked with the macroprudential oversight of the EU financial system, particularly in preventing and mitigating systemic risks. The ESRB was equipped with a toolkit of soft powers only, ie warnings and recommendations. In those days, the network of national macroprudential supervisors did not exist; therefore, the ESRB, in its capacity as an EU-wide macroprudential watchdog, issued the recommendation on the macroprudential mandate of national authorities.³ Member States were recommended to designate – by means of binding legislation – an authority entrusted with carrying out macroprudential policy. This authority could be either a single institution or a college comprising representatives of safety net authorities. In addition, the regulatory package that comprises the Capital Requirement Directive (CRD) IV and the Capital Requirements Regulation (CRR), enacted in 2013 also required designated authorities to be established at the country level. In response, all EU Member States established relevant macroprudential supervisory authorities. However, due to historical, political and legal circumstances, the institutional shape of macroprudential arrangements differs from country to country (Nier et al (2011)).

This paper shows that the efficient conduct of macroprudential policies in Poland and other small, open and integrated EU economies that are not members of the EU banking union or the euro area may differ from the model case (if there is, indeed, a jurisdiction which serves as a model case). This issue focuses on some central and eastern European (CEE) Member States. CEE countries face specific challenges; thus for macroprudential policy to prove effective they require tailored institutional arrangements and instruments.

This note refers to the example of Poland, as it is the biggest CEE Member State, although the resulting findings might also be useful for the other CEE countries. The note is structured as follows: Section I presents a historical background of macroprudential supervision in Poland; Section II describes the country's new macroprudential supervision framework; Section III highlights challenges for macroprudential policy, with a focus on CEE specificities and refers to an optimal institutional mix; Section IV addresses these challenges by trying to define an adequate toolkit for CEE countries; and Section V concludes.

Macroprudential supervision in Poland: a history

The establishment of macroprudential supervision in Poland was preceded by lengthy and lively discussions. Nevertheless, it must be noted that those discussions might have been based on experience of quasi-macroprudential policies that had previously been conducted by microprudential supervisors. Although not in a formal way, microprudential supervision in Poland had used many measures to mitigate systemic

² See de Larosière Group (2009), p 38.

³ European Systemic Risk Board (2011).

risks. This was not an easy task, especially given the structural changes in the institutional architecture of banking supervision. In 1998, banking supervision in Poland shifted away from the central bank to the Banking Supervision Commission (although Narodowy Bank Polski (NBP) retained its key role in the new body). Starting from 2008, that commission was completely separated from the NBP and placed in the hands of the newly created integrated Financial Supervision Authority (KNF). The latter move has since been heavily criticised – a broad consensus on bringing banking supervision back to the NBP seems to be gaining momentum.

At least three factors have contributed to Poland's hitherto effective supervision, also in regard to its macroprudential dimension. Two of them are related to the structure of the banking sector and one to the regulatory model itself. First, the broad presence of strategic investors in the banking sector, contrary to a fragmented shareholder structure, allowed for a single entry point and thus facilitated effective implementation of supervisory requests – at the end of the supervisory process, the strategic bank shareholder could always be approached for a corrective action. In this context, the position of the banking supervisor (since 2008 the Financial Supervision Commission, the KNF) was reinforced by some serious firepower enshrined in Polish banking law. For instance, the law enables the KNF to suspend ownership rights in cases where a bank shareholder cannot assure cautious and safe management of the bank. Secondly, the dominant role of foreign investors significantly reduced regulatory capture and supervisory forbearance, as there were no direct links between bank owners and local politicians. Finally, the way that the remit of supervision was defined in the law provided for broad discretion in pursuing financial stability – including a mandate for macroprudential actions.⁴

Under the banking law, the national banking supervisor had active recourse to a wide range of instruments, which were used to correct excessively risky behaviour or to protect the autonomy of management in local subsidiaries from excessively far-reaching, group-level interventions. The focus on soft powers was crucial for the efficacy of such activity. The banking supervisor (the KNF since 2008) developed a very efficient way of conduct, based mostly on recommendations. Interventions were made in two principal forms; either as informal advice (eg in the form of so-called pastoral letters⁵) or fully fledged recommendations – ie formal documents issued on the basis of the banking law.⁶

Notwithstanding that the recommendations were not legally binding, the reputation and credibility of the KNF made for widespread compliance on the part of banks. This has helped to improve market standards and introduce good practices without the need for sanctions such as administrative decisions addressed to individual banks or politically sensitive legislative changes. In addition, by means of soft power, some macroprudential measures were introduced via back-door

⁴ According to Article 2 of the *Act on financial market supervision*, one of the objectives of the supervision is “to ensure the proper functioning of the market, its stability, security and transparency, confidence in the financial market...”. This can be understood as a broader remit than a sole supervision over individual institutions.

⁵ The example list of such guidelines issued in 2014 can be found in the *Report on the activities of the Polish Financial Supervision Authority in 2014*, Warsaw, 2014, p 112 and following.

⁶ To date, there are 18 such sets of recommendations containing mostly detailed guidelines for bank risk management.

approaches – long before macroprudential authority was formally established.⁷ Recommendations usually addressed various dimensions of banks' risk management – including lending standards such as loan-to-value (LTV) or debt service-to-income (DSTI) limits. Before issuance, drafts of recommendations were subject to a consultation process with the banking sector and other safety-net institutions, including the central bank. This approach was and still is often welcomed by the banks, as it encourages peer review – which inhibits risky behaviour by competitors and secures a level playing field. Recommendations played an important role in reinforcing the stability of the Polish banking system in the past. They seem not to have gone out of fashion; while the adoption of EU rules has introduced changes, such recommendations, eg in the context of stricter harmonisation at the EU level, allow for more national flexibility.

Using its implicit authority, the KNF successfully obliged banks to hold strong capital positions (also with a view to quality, eg no hybrid instruments were accepted) and to keep leverage in check (through conservative risk weights). Credit institutions had to maintain high liquidity ratios and adopt prudent dividend policies. This mix of achievements contributed to the Polish banking system's high shock resilience. Some measures that had been put in place in Poland later appeared in the Basel III recommendations. For example, in 2007, the KNF set explicit liquidity requirements for banks, immunising the banking system against shocks – the well contained interbank market breakdown in late 2008 shows that these measures were effective and forward-looking. They were structured along the lines recommended in Basel III (ie the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR)). However, the Polish measures were more precise and, importantly, were implemented before the outbreak of the GFC. Moreover, despite its rigour, Poland's regulatory regime on liquidity appears to be more friendly to banks than the Basel III solutions, as it allows some flexibility on differences between business models and the liquidity profiles of individual institutions. The LCR and (yet to be finalised) NSFR, which will be introduced across the European Union, will narrow the scope for tried and tested domestic measures.

The new macroprudential supervision framework in Poland

The *Act on macroprudential supervision over the financial system and crisis management*, which came into force in 2015, has established for the first time a formal macroprudential framework in Poland. On the basis of the Act, the Financial Stability Committee (KSF) became the designated authority responsible for both macroprudential supervision and crisis management in Poland. The KSF is composed of the NBP Governor, the Chair of the KNF, the Minister of Finance and the President of the Bank Guarantee Fund (BFG) (which is responsible for operating the deposit guarantee scheme and resolution authority). The KSF has a dual mandate and dual chairmanship. The meetings devoted to macroprudential issues are called and chaired by the NBP Governor, while crisis management meetings are called and presided over by the Minister of Finance. In the former case, decisions are taken by majority voting

⁷ The relevant legislation for macroprudential supervision in Poland has been effective only since 1 November 2015.

with the casting vote of the NBP Governor; in the latter case, decisions are reached by consensus.

In regard to macroprudential supervision, the Act defines the tasks and powers conferred on the KSF, which include:

- the application of macroprudential instruments (including presenting statements and issuing recommendations);
- the identification of financial institutions posing significant systemic risks;
- cooperation with EU and national institutions; and
- the facilitation of a seamless flow of information between KSF member institutions.

The KSF has only soft powers at its disposal, ie it presents statements and issues recommendations backed by the “act or explain” mechanism. This means that the KSF can only indirectly influence the financial sector. The Act establishes a two-stage process of implementing macroprudential instruments. At the first stage, the KSF issues a recommendation either to the Minister of Finance, the KNF, the BFG or the NBP, indicating which legal instrument should be deployed in a particular setting. Then, in the second step, the addressee fulfils the KSF recommendation or explains the reasons for not taking the required action. Hard powers, ie those which are legally binding, rest only with individual KSF members. The Minister of Finance is responsible for implementing, via regulations, the countercyclical buffer, systemic risk buffer and measures provided in Article 458 of the CRR. The KNF has the power to set buffers for systemically important institutions by means of an administrative decision. The KNF has also maintained the power to issue formal recommendations to banks regarding a broad scope of risk management practices (eg LTVs).

The Act does not explicitly specify the frequency of the meetings; however, due to the obligation to calculate the reference value indicator for the countercyclical buffer, the meetings are held no less than once a quarter. The Act further requires the KSF to notify EU institutions (in particular, the European Commission and the ESRB) about the instruments used. The NBP is responsible for providing administrative services to the KSF and a variety of analytical activities, including the preparation and conveyance of notifications. The NBP also prepares the draft of the annual report to be presented by the NBP Governor to parliament.

The institutional setup of Poland’s macroprudential policy embodies most of the principles defined in international standards. First, the macroprudential policy is entrusted to a committee equipped with formal, guaranteed independence. Formal independence is imperative as the macroprudential policymaker is expected to lean against the wind by taking unpopular decisions (such as requiring banks to reduce risk in the upward phase of the cycle). Second, the central bank maintains a key role within the framework and carries weight with the conduct of macroprudential policy, as its Governor holds the prerogative to call meetings and propose measures, and also chairs the committee with the casting vote during majority voting. The KSF – in its capacity as a macroprudential supervisor – has also been granted a clear mandate, which is accompanied by an appropriate set of necessary instruments. The mandate ensures transparency and accountability. Moreover, the KSF has been given access to the information and data necessary to identify risks to financial stability, including data on individual financial entities. And last but not least, the KSF has access to expertise, as all member institutions are required to provide analytical resources on request.

Macroprudential policy and institutional setup: universal and specific challenges

The challenges for macroprudential policy derive mainly from its fundamental characteristics. These encompass, in particular, such heterogeneous factors as (i) difficulty in the pre-emptive identification of looming imbalances; (ii) interactions with the political cycle; (iii) asymmetry in the perception of costs and benefits of using macroprudential instruments; and (iv) inaction bias (Szpunar (2014)).

Even in the clear case of an economic boom, macroprudential authorities are prone to inaction bias. First, a boom is difficult to identify (Borio and Lowe (2002)). Even a sharp increase in asset prices is usually accompanied by factors that seem to justify it, such as persistent disinflation and low interest rates, demographic changes, catching-up processes etc. Second, due to the political cycle there is usually strong resistance to any attempts to limit credit expansion (Houben (2012)). Third, it is difficult, if not impossible, to estimate ex ante the cost/benefit balance of macroprudential action aimed at restricting credit growth. Fourth, the incentives to take costly actions are weak and questionable. A decisive action that really prevents a crisis can easily become the subject of strong criticism as the high costs incurred are clearly visible while the benefits are rather vague (a crisis avoided does not convince critics). Finally, in cases where such action is taken in a timely fashion, it could prove not to be effective due to circumvention (ie Goodhart's law) or simply bad luck.

Apart from these universal challenges, macroprudential policy often faces an idiosyncratic backdrop, such as the EU's financial and regulatory interconnectedness. This aspect is especially important for smaller countries, eg CEE Member States. The experience of many central banks demonstrates that monetary policy in small, open economies confronts different and additional challenges to those experienced in a large, closely tied economic block (Szpunar (2000)). The task of pursuing macroprudential policy, which operates along the lines of monetary, fiscal and supervisory (microprudential) policies, could be much more nuanced in such economies.

Poland's economy is relatively small (in terms of EU standards based on GDP and size), open and strongly integrated with the European Union. Additionally, the Polish banking system still (despite some recent significant changes to the structure of the market) remains strongly influenced by strategic EU investors, which frames Poland as a host country. Some specific challenges arise from this background, including:

- vulnerability to regulatory arbitrage, particularly in the context of only partial reciprocity and coordination in the European Union;
- group-level risk management, additionally encouraged by the creation of the EU banking union and the single supervisory mechanism (SSM) of the European Central Bank, which can result in an inadequate assessment of the situation of a subsidiary that is a systemic institution in the host country;
- the possibility of uncontrolled transfers of capital and liquidity within cross-border financial groups;
- ubiquity of risks stemming from the free movement of capital in the economy and its potential to cause destabilisation; and
- the corset of harmonisation provided for by the CRD IV/CRR package.

Smaller countries hosting foreign financial institutions remain more prone to the above-mentioned risks. At the same time, they are characterised by less developed financial intermediation. On the one hand, this means that their financial systems generate limited systemic risk – but on the other hand, it makes them more vulnerable to regulatory arbitrage and the propagation of shocks induced by the business models and strategies of international financial groups. Moreover, the financial entities from host countries do not have a significant presence in the EU single market, which means that regulatory arbitrage is being exercised in a one-way direction. The risks stemming from the activity of subsidiaries could also be under a lesser degree of surveillance on the part of the SSM, which has a natural focus on risks developing at the group level. This approach can be derived from *Council Regulation (EU) No 1024/2013*, where Article 4 (paragraph 1(g)) states that the SSM is responsible for carrying out supervision on a consolidated basis over credit institutions' parents established in the Member States participating in the banking union. Such a framework may result in pressure on capital and liquidity transfers within banking groups in distressed situations. Smaller economies also remain more vulnerable to capital flows, which can be illustrated by, for example, the case of Spain and its real estate market crisis (Spanish banks financed mortgage loans on the EU financial market). Finally, the CRD IV/CRR package constrains the leeway of macroprudential policies at the level of particular Member States. The limitations resulting from the harmonisation process apply to all countries; however, they affect host countries to a greater extent. This is because small, open economies may need to conduct a more active macroprudential policy due to higher risks stemming from volatile capital flows or credit booms etc. These issues also relate to Poland and its financial system.

Due to the universal challenges described above (present in virtually all countries, regardless of their home or host status), the authorities responsible for macroprudential supervision should remain independent from the political cycle and demonstrate a high level of economic expertise and market insight. The central bank is well suited to this role – it is independent, effective, credible, has the appropriate capabilities (in terms of economic and market expertise) and is active on the financial markets. With regard to the particular challenges facing small and open economies, the importance of regulatory and fiscal policy should not be ignored, however. There are at least three reasons why this angle should be included, with equal weighting.

First, there may be a need to use fiscal tools for macroprudential purposes. Circumstances specific to small, integrated economies may require the deployment of non-standardised and non-harmonised instruments, including taxation (eg thin capitalisation, regulatory charges, transaction taxes, taxes on assets etc). This means that effective coordination between macroprudential and fiscal policies must be established. To define this more clearly, we should not focus on fiscal policy, but rather the fiscal actions needed for the macroprudential purpose (which is nothing unusual, since macroprudential policy often has recourse to measures that are not strictly macroprudential).

Second, for legal reasons, the use of hard powers may require the involvement of government – this is the case in Poland, where the constitution defines a closed catalogue of commonly binding legal acts and the list of bodies that can enact them.

Lastly, should fiscal and macroprudential policies conflict, the effectiveness of the latter could be substantially impaired in the case of diverging goals. Along with the concept of unpleasant monetarist arithmetic, fiscal domination hinders monetary

policy in pursuing its inflation target (Sargent (1981)). Likewise, the same dependency can be expected to hold for macroprudential policy. In this context, fiscal domination would have a clearly destructive dimension, as it could prove immensely effective in destabilising the financial system. Excessive fiscal imbalances may rapidly send ripples across even a healthy banking system, leading to liquidity drainage and insolvency.

These are the reasons why cooperation, common understanding and the broad acceptance of financial stability goals by the fiscal authorities are so crucial. The best way to achieve all these desiderata is to establish a collegial body that includes the Ministry of Finance. Such an arrangement will not automatically guarantee the body's effectiveness, but it will definitely enable a proper exchange of information, better understanding and seamless cooperation between the safety-net authorities. Thus, the inclusion of the Ministry of Finance allows the issue of fiscal dominance to be addressed in two ways – on the one hand, the risk of divergent actions is reduced, and on the other, the Ministry of Finance's participation makes it accountable for the decisions undertaken by the macroprudential committee (reducing the risk of political recriminations at a later stage).

Instruments: defining the optimal mix

The ultimate goal of macroprudential policy is to safeguard financial stability. To achieve this objective, macroprudential policy strives to constrain the build-up of systemic risk. The powers of macroprudential policy may be labelled as soft or hard. Although soft tools such as recommendations based on the “comply or explain” principle may prove useful, it is sometimes necessary to exercise hard powers.

Macroprudential instruments can generally be classified in terms of two dimensions of systemic risk. The first is the time dimension, in which authorities concentrate on limiting the build-up of financial risk. The second is the structural dimension, where emphasis is placed on promoting financial system resilience (CGFS (2010)). Instruments in the first group need to be adjusted to different phases of the financial cycle with the aim of smoothing it out (Lim et al (2011)), whereas structural measures remain fixed over time and are meant to strengthen resilience to systemic shocks in the long run. This distinction is, however, rather blurred, as many other ways of classification have been suggested. As an example of a different approach, the ESRB groups specific instruments in relation to the intermediate objectives of macroprudential policy. This approach can be derived from the *ESRB recommendation on intermediate objectives and instruments of macroprudential policy* (ESRB/2013/1), which advocates that macroprudential authorities should specify particular objectives and match them with concrete instruments.⁸

Taking stock of the many approaches, let us distinguish the four most fundamental intermediate objectives of macroprudential policy:

- preventing excessive credit growth and leverage – in this regard, several instruments might be applied including, among others, the countercyclical capital buffer, higher risk weights and caps on the leverage, LTV and debt-to-income (DTI) ratios;

⁸ European Systemic Risk Board (2013).

- securing ample liquidity and reliable funding models – the objective here is to prevent episodes of market illiquidity and excessive maturity mismatch via liquidity ratios such as the LCR and NSFR, as well as the loan-to-deposit ratio;
- constraining excessive concentration of direct and indirect exposures – additional requirements on the disclosure of information, limits on large exposures or central counterparty clearing requirements are examples of macroprudential instruments that might target this problem; and
- strengthening the resilience of the financial infrastructure – this can be achieved by imposing additional capital requirements, including those on systemically important financial institutions, and establishing resolution regimes and deposit guarantee schemes financed with ex ante risk-based contributions.

What is apparent from the classification above is that most macroprudential instruments have so far been included in the microprudential toolkit (Osiński (2013)). However, in the conduct of macroprudential policy, those instruments are used in a systemic perspective, and thus they also need to be calibrated differently. Macroprudential authorities should look at the consequences of applying certain instruments for the whole financial system, not just for an individual institution. Some of those instruments are known and have already been used, like risk weights or LTV and DTI ratios. Some instruments are new and purely macroprudential in nature, like the Basel III countercyclical capital buffer.

Moving forward, let us now turn our attention to some already tested macroprudential tools. The most popular ones are LTV and DTI caps, which have been used, for example, in Asian countries to address imbalances in mortgage lending (Lim et al (2011)). Restrictions on the LTV ratio limit the loan amount relative to the value of the property, while caps on the DTI ratio are aimed at constraining the debt servicing cost for the borrower relative to disposable income. These instruments impact the supply and demand for housing loans. As LTV and DTI restrictions translate into lower loss-given-default (LGD) and probability of default (PD), they can contribute to an improvement in the quality of banks' housing loan portfolios and, consequently, to banks' resilience to negative shocks stemming from real estate sector developments (Crowe et al (2011)). An interesting example of a country that actively applied restrictions on LTV and DTI ratios is Korea, where LTV and DTI ceilings have been tightened and relaxed several times. In 2002, due to rising house prices, Korean authorities introduced an LTV cap that was later supplemented by a DTI cap in 2005 (İgan et al (2011)). The specific levels of the LTV and DTI caps were contingent on the type of property (house or apartment), the location of the property (speculative zone or not), loan maturity and collateral value. These well-tailored measures helped to stabilise house prices and proved effective in preventing price bubbles. LTV and DTI restrictions have also been used by a number of other Asian countries, including Hong Kong SAR, Malaysia, Singapore, Turkey and several advanced economies such as Canada, the United States, Norway and Sweden (Lim et al (2001)).

A completely new instrument, designed specifically for macroprudential purposes, is the countercyclical capital buffer. This buffer is meant to inhibit the build-up of systemic risk connected with credit booms. The imposition of the buffer should increase the cost of credit and thus constrain its supply. The buffer proposed by the Basel Committee on Banking Supervision (BCBS) in its standard version varies from 0% to 2.5%. One might question whether the maximum level of this buffer, set at

2.5%, would be sufficient to prevent a credit boom, taking into account the differences in economic dynamics in EU countries. Therefore, to ensure that national authorities can react to the threats arising from excessive credit growth properly, the CRD IV/CRR package allows a higher buffer rate to be set. Such augmented measures will not, however, be subject to the reciprocity rule and thus might offer some room for regulatory arbitrage. Notwithstanding the novelty of this instrument, there is already some experience in its deployment. Switzerland and Norway imposed the buffer on banks operating in their jurisdictions in 2012 and 2013, respectively. In both cases, the buffer rate was set at 1%. But the outcome of these decisions and the effectiveness of the countercyclical buffer are still difficult to evaluate.

Another new instrument, also introduced by the BCBS, is the leverage ratio, ie the ratio of bank's capital to its total non-risk adjusted exposure. The GFC showed that the risk-based capital adequacy ratio had not prevented the build-up of risks within banks. It showed too that banks may have strong capital ratios and, at the same time, be highly leveraged, making them vulnerable even in cases of only marginal losses. The outbreak of the GFC forced banks to deleverage, which had a destabilising effect on the financial system and the real economy as banks' capital positions weakened and credit availability deteriorated (BCBS (2014)). Therefore, the basic idea behind this new measure is to limit banks' assets in relation to their capital. It is meant to complement, not substitute for, the existing capital risk-based ratios. As initially proposed by the BCBS, the leverage ratio limit should not be lower than 3%; however, its ultimate calibration will be finalised only in 2017. Starting from 2018, the ratio will become a Pillar I measure.

The revolutionary proposal of Basel III to incorporate specific, purely macroprudential instruments into the framework of capital regulations seems to properly address the needs identified in the aftermath of the GFC. The CRD IV/CRR package also appears to provide an extensive set of macroprudential instruments, which could potentially be efficient in counteracting systemic risk. However, the operational aspect of this harmonised toolkit leaves room for improvement once analysed in depth. Looking more diligently at the regulatory framework in the European Union, one can identify some substantial flaws. The effectiveness of capital buffers is narrowed as the reciprocity mechanism is limited. In the case of the countercyclical buffer, the reciprocity is guaranteed only up to a level of 2.5% (national authorities are allowed to set it higher). The systemic risk buffer may be set unconditionally only up to 3% – the possibility to set it higher is restricted by the complicated validation procedure requiring the involvement of EU institutions. It also needs to be noted that the implementation of capital buffers may cause some overlapping, as they can consume banks' voluntary capital above the regulatory required capital stipulated in some jurisdictions due to soft suggestions from local supervisors or in connection with the outcomes of the European Banking Authority's (EBA) stress tests.

The CRD IV/CRR package also allows the use of Pillar II measures for the purpose of addressing systemic risk. As the scope of Pillar II is very broad (it covers the level of own funds, provisioning policy, business lines, dividend policy and liquidity), it is often perceived as useful in mitigating macroprudential risk. This, however, can be misleading. Pillar II measures can only be imposed on an individual basis in the form of an administrative decision and must be preceded by comprehensive risk-mapping in the framework of the supervisory review process. Legal hurdles may emerge in such cases, as these individual decisions may be contested in court and their fast implementation may prove challenging. The issue is even more acute with regard to

cross-border banking groups, as any increase in capital requirement via Pillar II should be discussed within the joint supervisory college (in the case of disagreements, the EBA may make the ultimate decision via a binding mediation process). This procedural complexity makes the whole process unduly risky and time-consuming. Moreover, the Pillar II instruments rest in the hands of microprudential authorities, who tend to be more focused on the stability of an individual institution than the system as a whole.

Article 458 of the CRR also needs to be mentioned. This article defines the list of additional measures that may be applied to limit systemic risk by supplementing requirements set within Pillar I and II (ie the level of own funds, requirements for large exposures, public disclosure requirements, the level of the capital conservation buffer, liquidity requirements, risk weights for targeting asset bubbles in the residential and commercial property sector and intra-financial sector exposures). In principle, the competent authority of a Member State is responsible for activating these macroprudential measures; however, the final word in this area stays with the Council of the European Union, which may de facto reject the draft national measures with a view to single market stability. That is because the relevant domestic authority has to notify planned measures to the European Parliament, European Commission (EC), EU Council, ESRB and EBA, and provide an appropriate and thorough justification (outlining why the measures are relevant to counteracting the systemic risk and why other harmonised measures are not sufficient). All the institutions have the right to issue opinions, which are later put together by the EC, which makes a proposal to the EU Council to either accept or reject the submitted draft measures. The final clearance comes from the EU Council and, in the event that the assessment is positive, the country may apply the measures for a period of up to two years. This procedure, requiring the involvement of many high-level European institutions, makes the whole process highly complicated and discouraging. In addition, as applicants must first explain why all other measures included in the CRD IV/CRR package are not sufficient to tackle the macroprudential risks, the tools envisaged in Article 458 of the CRR can be de facto described as the last resort. Ironically, when first proposed, Article 458 was described as a flexibility mechanism. In practice, despite some rare cases of the use of Pillar II or Article 458, these instruments are difficult to use effectively.

To summarise, the corset of harmonisation, limited reciprocity, legal constraints on Pillar II and complex authorisation procedure for the use of Article 458 measures appear to make the CRD IV/CRR framework too rigid for the proper and effective control of systemic risk arising in EU Member States. To make the framework more effective, reliance on non-harmonised microprudential instruments used for macroprudential purposes should be taken into consideration. This holds especially for CEE Member States. Having at one's disposal a comprehensive set of supervisory tools and ample leeway in their use seems to be an essential prerequisite. Frait (2012) points out that, in the Czech Republic, for example, the set of instruments which can be employed to reduce the systemic risk is relatively narrow. Many analyses also support the idea of a preferred use of a few tested instruments that are well tailored to the specificity of local risks (Claessens (2014)). As such, it can be noted that in the case of Poland, particular attention should be drawn to the risks of a credit boom and capital flows, as these risks seem to be particularly acute for a small and open economy. The best way to address these risks should include, in particular, the use of the following:

- capital buffers accompanied by leverage limits;
- selective setting of conservative risk weights for exposures to real estate;

- liquidity requirements (including non-harmonised ratios of loans to deposits);
- LTV and DSTI limits; and
- fiscal measures.

Further research is needed into an effective combination and calibration of the above-mentioned instruments in actual economic conditions; nevertheless, such a defined supervisory mindset would appear to be the most promising forward-looking response.

Conclusions

This note reviewed some important characteristics of effective macroprudential policy, with particular attention to the institutional conditions of Poland and other CEE Member States that are small, open and integrated EU economies outside the EU banking union and the euro area. In such economies, there might be a need to have recourse to some instruments that are non-standard and non-harmonised in EU law. These considerations lead to the conclusion that entrusting the macroprudential policy to a committee with the leading role of the central bank could be a relatively more attractive option, as it enables better coordination of financial safety-net institutions and facilitates the use of some non-harmonised or unorthodox instruments.

Such an institutional arrangement also accommodates the issue of fiscal dominance, as the inclusion of government representative reduces the risk of divergent actions, shares accountability and allows for some scrutiny over the use of fiscal instruments. These benefits are usually contrasted with the costs, ie a weakening of the central bank's role, increased vulnerability to the political cycle, or even a stronger temptation to refrain from any action at all (ie inaction bias). On closer analysis, however, it can be shown that these costs are more of a potential than an actual character. Putting the responsibility for macroprudential policy solely in the hands of the central bank would not guarantee immunity from political influences, as its autonomy in this regard would still remain exposed to potential fiscal dominance. Obviously, macroprudential supervision has to prove itself in action and work out the culture of autonomy, which in the case of monetary policy took decades to mature.

Challenges for macroprudential policy are of a universal nature and may result in an inaction bias. In small, open CEE economies that host foreign banks, some additional specific challenges to macroprudential policy may also arise. These challenges boil down to, among others, regulatory arbitrage (due to only partial reciprocity and deficient coordination of macroprudential policies in the European Union), preference for risk management at a group level (exacerbated by the creation of the SSM), volatile capital flows and the corset of harmonisation (the CRD IV/CRR package limits the discretion of national competent authorities). A collegial committee such as the macroprudential authority appears to be a more suitable solution for such a case. First of all, it is more conducive to the targeted use of fiscal tools, which may be a last resort in the context of the CRD IV/CRR corset. In addition, due to legal constraints (as is the case in Poland), exercising hard powers may necessitate the involvement of the Ministry of Finance in any case. This is why the most appropriate choice seems to be to set up a committee equipped solely with soft powers. Soft powers – in the form of “comply or explain” recommendations – can

paradoxically prove more effective, as they reduce the inaction bias given that the implementation of concrete measures rests with individual committee members, not with the committee itself.

The complex nature of systemic risk requires complex pre-emptive action to be taken by competent decision-makers with a view to the economy's long-term sustainable growth. It cannot be guaranteed that the authorities will always successfully fulfil their mandates. However, the scope for mishaps can be effectively narrowed by providing a wide range of instruments and a proper decision-making structure. It would seem that establishing a collegial authority and entrusting it with soft powers allows this issue to be addressed adequately. A collegial body disposes of multifaceted know-how and a wider range of capabilities than a single institution, while the risk of unilateral action from the Ministry of Finance or fiscal domination remains inherent to all potential organisational compositions.

To conclude, it can be said that the Polish model of macroprudential supervision draws on successful outcomes and fulfils specific requirements while keeping the risk of inaction or ineffective responses to a minimum. In the past, Poland's supervisory authorities often overreached their microprudential mandate, and this proved to be effective. Therefore, the recent restructuring can be regarded rather as a formalisation and legitimisation of their activity in this area in compliance with new EU standards. It should be complemented by shifting microprudential supervision to the control of the central bank with the aim of establishing a solid and coherent institutional setup for even better co-ordinated prudential policy.

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The macroprudential policy framework in Russia

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Abstract

The note discusses the main features of Russia's current macroprudential policy framework. In particular, it describes the Central Bank of the Russian Federation's legal mandate to ensure the stable functioning of the financial markets, explains the inter-agency coordination between Russian authorities, and outlines the functions of National Council on Ensuring Financial Stability as a high-level inter-agency advisory body on financial stability issues, which serves as an effective platform for policy coordination.

The note focuses on the practical aspects of the the central bank's financial stability objectives and powers, detailing the Bank of Russia internal structures and procedures for the formulation and implementation of macroprudential policy, and for communication and transparency issues. The central bank's experience of using macroprudential instruments to curb systemic risks is reviewed, with practical examples of how financial stability issues were addressed via macroprudential policy measures, together with details of the Bank's plans for further macroprudential policy development.

Keywords: macroprudential policy, macroeconomic and financial stability, financial system regulation, macroprudential instruments, systemic risks, banking system

JEL classification: E44, E58, E60, E61

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Before the Global Financial Crisis, the general consensus among regulators was that the prevailing mix of monetary, fiscal and prudential policies would ensure macroeconomic and financial stability. Macroprudential policies were predominantly used by emerging market economies (EMEs), which had taken various ad hoc measures to counter procyclical trends and asset bubbles.

The crisis has demonstrated that developments in the financial system can threaten macroeconomic stability both in advanced and emerging economies, even in the case of low and stable inflation and sound fiscal policy. Financial stability cannot be assured exclusively by a focus on the soundness of individual institutions; it also depends on the complex interactions and interdependencies between institutions and components of the system. As a result, regulators came to appreciate the need for a new approach to the financial system regulation, one that would include a macroprudential perspective.

Many countries have started to adopt macroprudential policies in recent years to deal with macro-financial risks. Nevertheless, macroprudential policy is still a relatively new policy field and many issues remain unresolved at both the national and global levels.

In the past few decades, the Central Bank of the Russian Federation (CBR) has also gained experience in using macroprudential instruments to counter systemic risks. Drawing lessons from the Global Financial Crisis, the Russian authorities have incorporated financial stability as an objective of the CBR and defined the institutional setup for macroprudential policy.

This note elaborates on the Russian experience of using macroprudential policy tools to curb systemic risks and setting up a systemic approach to macroprudential policy.

Legal mandate

The foundation for the current financial stability framework in Russia was laid in 2013 by substantial amendments to the 2002 Federal Law No. 86-FZ "On the Central Bank of the Russian Federation (Bank of Russia)". In September 2013, the Federal Service for Financial Markets (FSFM) was merged into the CBR, with the latter becoming a mega-regulator empowered to regulate, control and supervise the Russian financial market.

The amended law also incorporated a formal financial stability mandate, as the CBR was tasked with ensuring the stability of the financial markets. To this end, the law authorises the CBR to monitor the state of the Russian financial markets, including for the purpose of detecting situations that might endanger the Federation's financial stability. To prevent such situations, the CBR is authorised to take measures with the aim of reducing any threats to financial stability. The law also stipulates that the Bank of Russia publishes its Financial Stability Review at least twice a year.

Inter-agency coordination

In July 2013, the Russian government set up the National Council on Ensuring Financial Stability (FSC). Chaired by the Minister of Finance, the FSC was created primarily as a high-level inter-agency advisory body on financial stability issues and served as an effective platform for inter-agency coordination. It was entitled to make non-binding recommendations, albeit not disclosed publicly, to government bodies and CBR on systemic risk issues and mitigating measures.

In February 2015, following the recommendations of the Financial Stability Board Peer Review, the government issued a revised decree to strengthen the FSC, especially in terms of its membership and functioning. The FSC has since become a high-level inter-agency committee, chaired by the First Deputy Prime Minister and comprising the CBR's Governor, the Ministers of Economic Development and Finance, and the General Director of the Deposit Insurance Agency, as well as senior officials from these agencies including Deputy Governors of the CBR responsible for financial stability, banking supervision, and non-bank financial institutions and market oversight. A new secretariat was created to support the FSC's work, with responsibility for preparation of FSC meetings, including the distribution of information/documents to be discussed at the FSC meetings. It is staffed by appointees from the CBR, the First Deputy Prime Minister's Office and the Ministry of Finance. The FSC now makes its recommendations (not disclosed publicly) to the Ministry of Economic Development, the Ministry of Finance and the CBR on a comply-or-explain basis. This mechanism serves primarily as a means to monitor progress on action taken by the relevant agencies.

Discussions at the FSC cover a wide range of inter-agency macro-financial issues that may affect financial stability, while recommendations on mitigating measures do not typically involve macroprudential policy. Examples of issues discussed at the FSC include external corporate debt and associated refinancing risks, the volatility of capital flows, a review of the regulatory perimeter (prudential regulation of leasing activities) and legislative initiatives (ie regarding oversight of CCPs and the bankruptcy regime).

The FSC is not engaged in making decisions on matters which are within the CBR's direct authority. The FSC usually discusses issues which lie within the overlap between the mandates of the federal executive authorities and the CBR. As the CBR is not empowered to initiate legislation, the FSC is efficiently used as a means of aligning the positions of the authorities concerned before an authorised federal executive body (eg the Ministry of Finance) embarks on the formal procedure of submitting draft legislation. Implementation of FSC recommendations is discussed at every subsequent FSC meeting. Long-term measures are periodically discussed in accordance with their implementation schedule.

Operational framework

Given its role as the single financial regulator and supervisor, and in the light of its financial stability mandate, the CBR plays the central role in the country's macroprudential policy framework.

The CBR has broad powers to obtain data for macroprudential oversight purposes. In addition to the power to collect data from regulated financial entities, the CBR is responsible for compiling banking and monetary statistics, balance of payments statistics, and the financial account component of the national account statistics. The CBR is the competent authority responsible for exchanging information with foreign counterparts. If the required information is beyond the CBR's mandate, there is an option to obtain it through the FSC, which has the right to request it from any entity (in this way, the CBR has set up a special arrangement to obtain information from significant non-financial corporates, on a confidential basis).

Following the creation of the Financial Stability Department in March 2011, which plays a leading role in carrying out macroprudential surveillance (including risk assessments of banks, non-bank financial institutions and non-financial corporates), the CBR established an internal Financial Stability Committee (FSCoM) in November 2014 to play a coordinating role in macroprudential oversight, crisis management, and other financial stability issues.

The FSCoM is responsible for conducting systemic risk monitoring and assessment, evaluating systemically important financial market infrastructures (FMIs), assessing the financial soundness of significant non-financial corporates, and reviewing the draft Financial Stability Review. The FSCoM can make recommendations on matters related to financial stability to the CBR Board, as well as to other relevant specialised committees within the CBR (the Banking Supervision Committee, the Financial Supervision Committee and the Monetary Policy Committee).

The FSCoM is not specified in the central bank law and has no formal power to make policy decisions. The CBR's Board of Directors is responsible for all key decisions, including those on monetary policy and financial regulation. The law does establish two specialised committees — the Banking Supervision Committee and the Financial Supervision Committee — to carry out day-to-day regulatory and supervisory functions. Within the current decision-making structure, the FSCoM facilitates internal coordination, given that financial stability involves several departments and interacts with other policies.

The FSCoM is chaired by the Bank's Governor to ensure adequate internal coordination, as prudential tools come under the responsibility of various departments and also in view of the link between monetary and macroprudential policies. Deputy Governors – those responsible for financial stability, banking oversight, and non-bank financial institutions and market oversight – are also members of the FSCoM. The Director of the Financial Stability Department is a member of the Banking Supervision Committee, the Financial Supervision Committee, and the Monetary Policy Committee. Taking into account the membership of the FSCoM, it is able de facto to take major decisions on macroprudential policy, which are then formally and technically implemented through other internal committees and departments with subsequent approval for the Bank's Board.

As an example of macroprudential decision-making, the FSCoM would first take a strategic decision, initiating an inter-departmental consultation to prepare draft regulations and make other necessary arrangements. The relevant specialised committee would then discuss and decide how to implement the measure, with a recommendation (including draft regulation) for consideration by the Board. The Board is then responsible for the final approval of the measure.

In the current legislative framework, the Bank's macroprudential policy consists mainly in the use of prudential tools (see Annex) to limit systemic risk, which is the

risk that the financial system becomes dysfunctional, with potentially serious negative consequences for the real economy. Whereas several purely macroprudential policy tools – countercyclical capital buffers (CCBs), capital surcharges on systemically important banks – were implemented at the beginning of 2016, the central bank law currently provides for only a limited number of macroprudential tools, and does not provide any legal foundation for the use of the full set of commonly recognised macroprudential tools, such as loan-to-value limits or debt-service-to-income ratios, as well as limits on the growth of particular credit segments. The CBR is currently overhauling its macroprudential approach to ensure a prompt decision-making process with the aim of avoiding long periods of legislative amendments.

Communication

A systematic policy framework to communicate financial stability policy and considerations to stakeholders is indispensable. In most countries, a financial stability report is a key way of explaining the regulator’s policy to financial institutions and the general public. Such a report should contain both an assessment of systemic risks and the regulator’s approach to dealing with them (through recommendations, macroprudential measures and forward guidance). In the interests of accountability, the report should also include a review of the efficacy of macroprudential measures that were previously implemented.

If communication is considered as an instrument in its own right, its effectiveness may depend on the stage of the financial cycle. However, it becomes a really efficient tool only when complemented by adequate powers and resources on the part of the authorities. Before the Global Financial Crisis of 2007–09, several central banks warned about systemic risks in their reports. However, this was not sufficient either to avert the financial bubble or to make financial institutions more resilient.

During a boom, regulators should pre-emptively explain their actions to preserve financial stability in order to balance industry lobbying and political pressure. Transparency is also needed in any period of enhanced risks, although the regulator should be particularly careful about the content and timing of its communications given the risk of raising market uncertainty. Communication should be accompanied with a clear toolkit to deal with potential shocks.

The CBR started publishing its Financial Stability Review (FSR) in 2003. Since 2012, an improved FSR has been published twice a year. Serving as the Bank’s main channel for communicating its views on systemic risk, the FSR contains an assessment of risks in different segments of the financial system, as well as a review of fiscal policy sustainability and the risk profile of non-financial corporations. The document discusses approaches to dealing with identified risks and reviews previously implemented measures.

Regular press releases on the Bank’s decisions on the countercyclical capital buffer (CCB) rate (currently set at zero) represent another regular macroprudential communication channel. The Bank of Russia evaluates possible changes to the CCB rate each quarter based on the analysis of a wide range of credit cycle indicators. This assessment is communicated through scheduled press releases. If a decision is made to set the CCB rate at above 0% of risk-weighted assets, the requirement becomes effective no sooner than six months and no later than 12 months from the decision

announcement, allowing banks sufficient time to plan their capital management, including dividend and compensation policy.

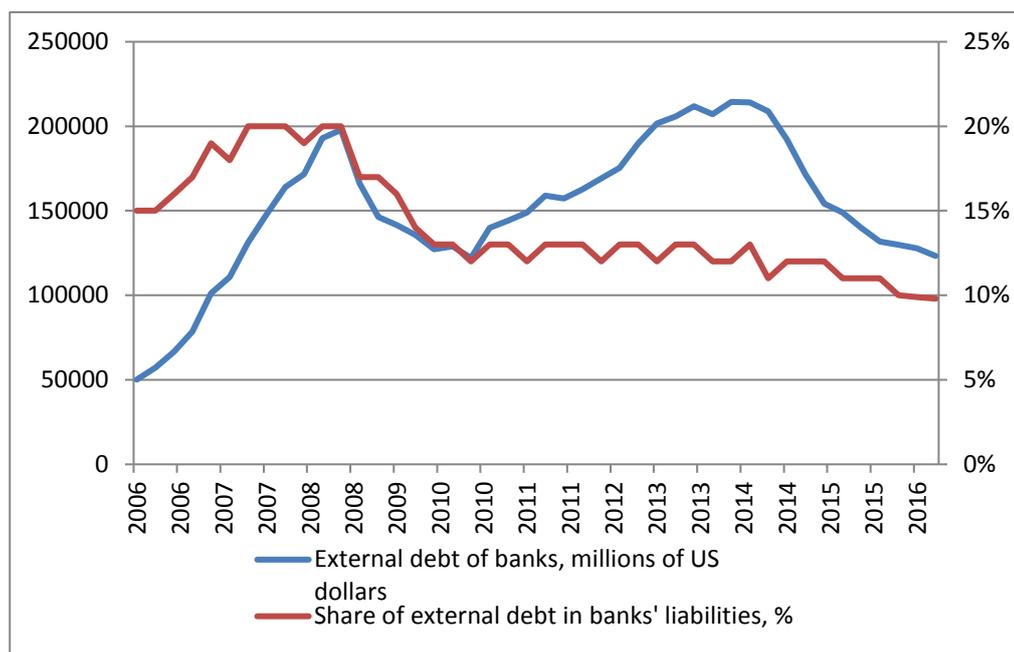
Experience and effectiveness

The CBR has deployed macroprudential policy measures on three major occasions.³ The first use was in 2007–08, a period characterised by considerable inflows of foreign capital and a growing share of foreign debt in the banking sector’s liabilities. The second case was observed in 2013–14 amid a boom in the unsecured consumer lending market. The third episode is related to the use of measures in 2016 to restrain the dollarisation of the banking sector’s assets and liabilities.

Episode of 2007–08. In 2006–07, net private capital inflows into Russia amounted to \$131.5 billion, which intensified the risk of inflation and also increased the dependence of Russian banks on foreign debt (in the form of Eurobonds and foreign bank lending). The share of foreign borrowings reached 20% of banks’ liabilities, representing a considerable dependence on external resources.

External debt of Russian banks in 2006–16

Graph 1



Source: CBR.

To limit the negative consequences of capital inflows, the CBR took steps in 2007–08 to consistently change reserve requirements for credit institutions (Table 1).

³ See Annex Table on Timeline of macroprudential measures in Russia since 2006.

Given that obligations to non-resident banks were potentially the most volatile component of liabilities, required reserve ratios were increased for this item (by a maximum of 4 percentage points). Amid the deteriorating liquidity situation in the Russian banking sector after the Lehman Brothers bankruptcy, the required reserve ratio for all categories of liabilities was set at 0.5%.

Required reserve ratios for credit institutions in 2007–08 (%)

Table 1

Date	Liabilities		
	to non-resident banks	to private individuals in roubles	other liabilities
January 2008	4.5	4.0	4.5
March 2008	5.5	4.5	5.0
July 2008	7.0	5.0	5.5
1 September 2008	8.5	5.5	6.0
18 September 2008	4.5	1.5	2.0
October 2008	0.5	0.5	0.5

Capital inflows gave way to a sharp outflow in September 2008, making it impossible to assess whether the increased reserve requirements were sufficient to prevent a further build-up of systemic risks. However, these measures obviously increased the banking sector's sustainability: the higher reserve ratios made for a "cushion" of liquid assets, which could be used by the CBR in a period of an acute shortage of banking sector liquidity. The lowering of the ratio allowed banks to immediately access about 400 billion roubles of liquid assets, thus maintaining banking sector stability before additional special measures were introduced, in particular, unsecured lending.

The share of foreign debt in liabilities never reached a critical level and the proportion of non-residents' funds in banks' liabilities was observed to ease steadily. The quality of foreign currency loans to non-financial organisations also gradually recovered. The share of overdue debts on such loans peaked by September 2009 (5.5%) and varied between 2% and 3% in the post-crisis years.

Episode of 2013–14. Credit growth was excessive in unsecured consumer lending in 2011–12. The annual growth rate in unsecured consumer loans reached 60% in mid-2012, considerably exceeding the growth in loans to non-financial organisations (24.4%). At the same time, the total cost of unsecured consumer loans exceeded 50% amid inflation at 6.6% in 2012, which negatively affected the low-margin segments of lending. In particular, banks specialising in mortgage and corporate lending found it problematic to attract household deposits to finance their activities, as households more frequently gave preference to high-yield deposits at retail banks. Banks had little scope to focus on mortgage and corporate lending to increase yields on deposits owing to the relatively low level of interest rates on these products as compared with unsecured consumer loans.

Confronted with these challenges, the CBR took a number of measures to curb risks in the segment of unsecured consumer lending. Loan-loss provisions for unsecured consumer loans without overdue payments and with overdue payments of one to 30 days were doubled in 2013. Also, risk weights for consumer loans were raised depending on the currency of the loan and the level of the loan total cost

(Table 2). From the beginning of 2014, the CBR additionally raised loan-loss provisions for unsecured consumer loans by 50%, and also increased risk weights.

Change in risk weights for unsecured consumer loans in 2013–14*

Table 2

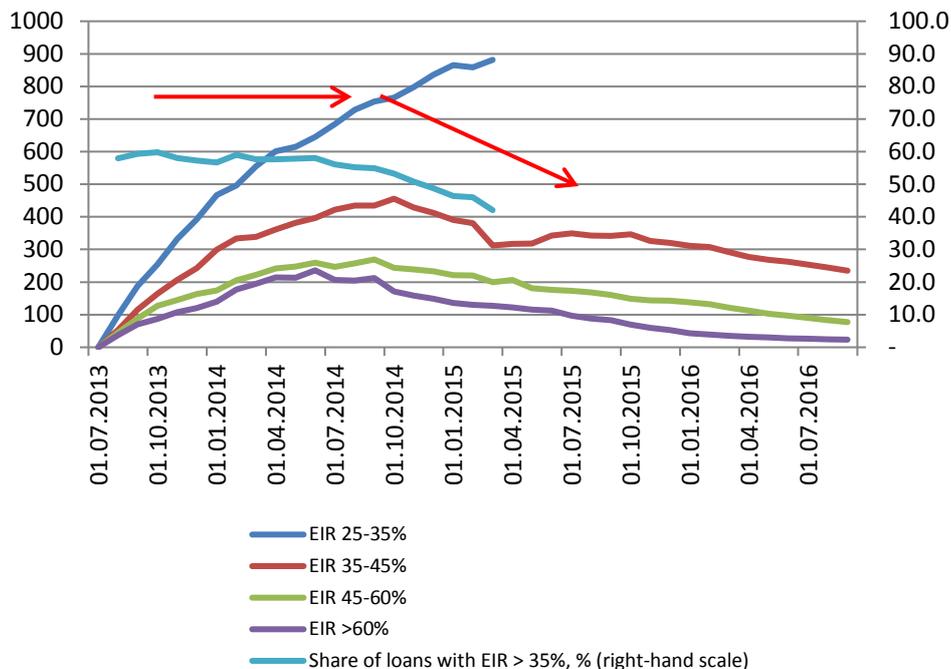
Date of changes	Loan currency	Loan total cost	Risk weight, %
1 July 2013	Roubles	from 25% to 35%	110
		from 35% to 45%	140
		from 45% to 60%	170
		over 60%	200
	Foreign currency	from 20% to 25%	170
		over 25%	200
1 January 2014	Roubles	from 45% to 60%	300
		over 60%	600
	Foreign currency	from 20% to 25%	300
		over 25%	600

* Prior to 1 July 2013, the risk weight for unsecured consumer loans was 100%.

The excessive growth of consumer lending led to the accumulation of credit risks that materialised in the recession of 2014–15. Nevertheless, the CBR’s measures helped reduce systemic risks in the segment of unsecured consumer lending.

Debt on unsecured consumer loans not subject to increased risk ratios, billions of roubles

Graph 13



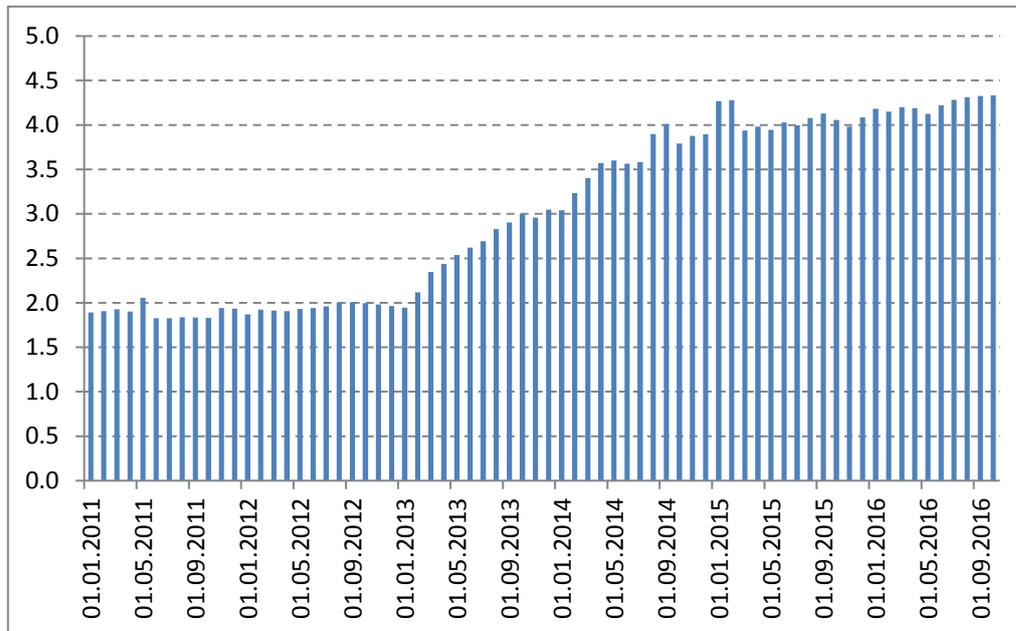
Source: CBR.

The structure of the banking portfolio of unsecured loans underwent changes. Banks were gradually reducing the share of loans with a loan total cost of over 35% in the portfolio of loans, which were subject to increased risk weights (on loans with a loan total cost of more than 25%), although these macroprudential measures took time to take effect. The share of loans with a loan total cost of over 35% started to decline only about 12 months after the restrictive measures were introduced, remaining actually unchanged during the first 12 months, ie the measures had only a limited effect over this period (Graph 13).

Nevertheless, the CBR's measures induced banks specialising in unsecured consumer loans to build up their provisions, which finally improved their financial sustainability. The provisioning coverage ratio for unsecured consumer loans without overdue payments and with overdue payments of one to 30 days increased for retail banks⁴ from 1.9% as of 1 January 2013 to 4.3% as of 1 January 2015 (Graph 14).

Reserve coverage ratio for performing unsecured loans and for unsecured loans with up to 30-day overdue payments (%)

Graph 14



Therefore, the CBR's experience of using macroprudential measures in the segment of unsecured consumer lending is generally positive. However, the effectiveness of these measures could have been even greater. Measures based on increased risk weights cannot always produce an immediate effect on banks' credit activities. Many retail banks had a sufficient capital stock in the segment of unsecured lending in 2013, which allowed them to continue building up lending volumes with only a limited effect on their capital adequacy ratios. The high level of the total cost

⁴ The following criteria are used for inclusion in the group of banks specialising in unsecured consumer lending: unsecured loans of over 10 billion roubles; an unsecured loans-to-assets ratio of over 20%; and a share of interest income on household loans in total interest income of more than 35%.

on loans and the relatively low level of credit risks allowed retail banks to cover costs from the increased risk weights through their interest rate margin for some time.

A law directly restricting the provision of loans with a given level of loan total cost could have been more effective in limiting high loan total cost levels in unsecured consumer lending during 2012–13. Such a law came into force in July 2014 (Federal Law No. 353-FZ of 21 December 2013 “On Consumer Credit (Loan)”), while actual caps on loan total cost were introduced only from July 2015 due to a considerable change in the market conditions influencing loan total cost, which occurred in late 2014.

Episode of 2016. The high dollarisation of the banking sector’s assets and liabilities increased volatility in financial markets in the second half of 2014, the negative effects manifesting themselves in two areas:

- the high volatility of credit institutions’ required capital ratios, given that capital is largely denominated in roubles. The revaluation of assets as a result of the rouble’s weakening exerted considerable pressure on these ratios. To address this problem, the CBR allowed credit institutions in the period of 1 January 2015 to 1 January 2016 to use special foreign exchange rates to calculate required ratios. In Q1 2016, banks were allowed to re-calculate their assets denominated in five foreign currencies at the exchange rates set by the CBR as of 1 January 2016 for the calculation of two required ratios: the maximum risk per borrower or per group of related borrowers (N6) and the maximum risk per borrower or per group of related borrowers of a banking group (N21); and
- increased credit risks related to the provision of foreign currency-denominated loans to companies without sufficient foreign currency revenues. Organisations engaged in construction and real estate operations and airlines are especially exposed to this kind of risk. The share of overdue debts in these sectors increased from 2.1 to 6.2 percent from 1 January 2015 to 1 October 2016. Wholesale and retail trading companies also saw a considerable increase in the share of overdue debt on foreign currency loans in this period (1.8 percentage points).

Considering the experience of 2014–15 and to curb the build-up of risks arising from the high level of dollarisation, the CBR took a number of measures aimed at both the asset and liabilities sides of the banking sector’s balance sheet.

In 2015, the CBR introduced increased risk weights for foreign currency claims on households.⁵ From 1 May 2016, the CBR also raised the risk weight for foreign currency loans provided to corporate entities with insufficient foreign exchange earnings to service debt obligations from 100% to 110%.⁶ A similar measure was applied to investments in securities denominated in foreign currency. The risk weight

⁵ To 300% for foreign currency mortgage loans from 1 April 2016; 300% for consumer loans with the loan total cost of not more than 20% from 1 August 2015; 300% for other household foreign currency loans from 1 August 2015.

⁶ An exception was made for loans to borrowers among Russian residents that posted foreign currency revenues of no less than 60% of their total earnings for the latest completed financial year and no less than 120% of aggregate loan payments for the current calendar year in the same foreign currency as the currency of the revenues. The requirement for a match between the currency of the loan and the currency of revenues does not apply to international reserve currencies used by the IMF for valuing SDRs.

for foreign currency loans to corporate entities for the purchase of real estate was also raised from 100% to 130%.

To curb the growth of foreign currency-denominated obligations in credit institutions' liabilities, the CBR increased the mandatory reserve requirements for credit institutions' liabilities denominated in foreign currency in three phases (in total, by 1.75 percentage points for foreign currency liabilities to households and by 2.75 percentage points for other foreign currency liabilities⁷).

These measures helped limit the growth of foreign currency obligations in the structure of banks' liabilities and reduce the supply of foreign currency loans in favour of growth in rouble lending. Foreign currency loans to non-financial organisations contracted by \$12.3 billion between 1 April and 1 October 2016 while rouble lending increased by 225.4 billion roubles. The share of household and corporate foreign currency deposits in banking sector liabilities rose by 7.5 percentage points in 2015 (from 17.2% to 24.7%) whereas in the first nine months of 2016 it fell by 5.9 percentage points to 18.8% (excluding the effect of revaluation from a change in the rouble exchange rate).

This was caused partially by the continued contraction in corporate deposits, which shrank by \$6 billion in 2015 and by \$15 billion in January–September 2016. The decrease in non-financial organisations' foreign currency deposits was also prompted a reduction in the external debt of major corporates and by lower oil prices in 2016. At the same time, the volume of funds raised by firms in roubles increased by 10.1% from the beginning of 2016 (by 4.7% in 2015), which allows for a general conclusion about the effectiveness of the Bank of Russia's measures for a gradual reduction in dollarisation.

Plans for macroprudential policy development

The CBR's experience in the use of macroprudential instruments to influence the unsecured consumer loans market suggests that such tools are indispensable. At present, although the consumer lending market shows no signs of overheating, the Bank is working on new ways of responding to potential systemic risks.

Low interest rates on consumer loans could potentially foment a new boom in this market. Should this materialise, the debt burden indicator for borrowers and, in particular, the borrower's debt-to-income (DTI) ratio, looks promising as an element of macroprudential regulation to differentiate risky loans.

The Bank of Russia already applies differentiated risk weights to mortgage loans, depending on their loan-to-value and payment-to-income levels. It is currently studying the possibility of switching over to risk limitation in the segment of unsecured consumer lending based on the debt-to-income indicator, although there are no plans to introduce it into the banking sector in the short term. This change would require the development of infrastructure that would reflect banks' need to make rapid loan approvals. Thus, banks would need to promptly receive data on both the loan applicant's income and aggregate debt through the Credit History Bureau.

⁷ In August 2016, required reserve ratios were also raised for rouble liabilities for the purposes of monetary policy implementation (the absorption of a liquidity inflow through the budgetary channel).

Work is currently under way on an electronic facility for banks to promptly receive data on the incomes of loan applicants. A draft law has been submitted that would require Russia's Government Pension Fund to provide information to insured persons regarding the salaries or income on which insurance contributions are based. This information would be sent to credit institutions so that private customers could obtain commercial loans. Borrowers would therefore be able to promptly provide information on their income to banks in support of a loan application. For their part, banks will be able to rapidly and thoroughly assess the borrower's risk.

The CBR will continue reviewing the effectiveness of macroprudential tools that have been already been deployed, and it will continue to assess the effect of proposed measures on the financial sector's functioning, including that of monetary policy implementation.

Annex

Timeline of macroprudential measures in Russia since 2006

Annex Table

Differentiated reserve requirement

October 2006	<p>The reserve requirement on liabilities to non-resident banks in all currencies was increased to 3.5% (from 2%).</p> <p>This particular reserve requirement was introduced at 2% in August 2004. At that time, the reserve requirements on individual deposits in local currency and on other deposits (for example, corporate deposits in all currencies and individual deposits in foreign currency) were at 3.5% (since July 2004).</p>
July 2007	<p>The reserve requirement on liabilities to non-resident banks in all currencies was increased to 4.5%.</p> <p>The reserve requirements on individual deposits in local currency and on other deposits were raised to 4% and 4.5%, respectively.</p>
October 2007	<p>The reserve requirement on liabilities to non-resident banks in all currencies was reduced to 3.5%.</p> <p>The reserve requirements on individual deposits in local currency and on other deposits were lowered to 3% and 3.5%, respectively.</p>
January 2008	<p>The reserve requirement on liabilities to non-resident banks in all currencies was increased to 4.5%.</p> <p>The reserve requirements on individual deposits in local currency and on other deposits were raised to 4% and 4.5%, respectively.</p>
March 2008	<p>The reserve requirement on liabilities to non-resident banks in all currencies was increased to 5.5%.</p> <p>The reserve requirements on individual deposits in local currency and on other deposits were raised to 4.5% and 5%, respectively.</p>
July 2008	<p>The reserve requirement on liabilities to non-resident banks in all currencies was increased to 7%.</p> <p>The reserve requirements on individual deposits in local currency and on other deposits were raised to 5% and 5.5%, respectively.</p>
September 2008 (From 1st)	<p>The reserve requirement on liabilities to non-resident banks in all currencies was increased to 8.5%.</p> <p>The reserve requirements on individual deposits in local currency and on other deposits were raised to 5.5 and 6%, respectively.</p>
September 2008 (From 18th)	<p>The reserve requirement on liabilities to non-resident banks in all currencies was reduced to 4.5%.</p> <p>The reserve requirements on individual deposits in local currency and on other deposits were lowered to 1.5% and 2%, respectively.</p>
October 2008	<p>The reserve requirements were uniformly reduced to 0.5%.</p> <p>The reserve requirement was subsequently raised to 1% in May 2009, to 1.5% in June 2009, to 2% in July 2009, and to 2.5% in August 2009.</p>
February 2011	<p>The reserve requirement on liabilities to non-resident legal entities in all currencies was increased to 3.5%.</p> <p>The reserve requirement on deposits was raised to 3%.</p>
March 2011	<p>The reserve requirement on liabilities to non-resident legal entities in all currencies was increased to 4.5%.</p> <p>The reserve requirement on deposits was raised to 3.5%.</p>
April 2011	<p>The reserve requirement on liabilities to non-resident legal entities in all currencies was increased to 5.5%.</p> <p>The reserve requirement on deposits was raised to 4%.</p>

March 2013	The reserve requirements were uniformly imposed at 4.25%.
April 2016	The reserve requirement on liabilities in foreign currency, except individual deposits, was increased to 5.25%. The reserve requirement on other liabilities remained at 4.25%.
July 2016	The reserve requirement on liabilities in foreign currency, except individual deposits, was increased to 6.25%. The reserve requirement on individual deposits in foreign currency was increased to 5.25%. The reserve requirement on liabilities in roubles remained at 4.25%.
August 2016	The reserve requirement on liabilities in foreign currency was increased to 6% for individual deposits and 7% for other liabilities. The reserve requirement on liabilities in roubles was raised to 5%.
January 2017	The structure of credit institutions' reservable liabilities included in the calculation of required reserves will be updated. Differentiated reserve requirements imposed on long-term liabilities to non-resident legal entities and other liabilities, which had been previously exempt from the rule. The reserve ratios for long-term liabilities equal the previously existing reserve ratios for respective liabilities.

Provisioning

June 2009	The loan classification and the provisioning requirement were eased (in response to a banking crisis). Restructured loans were allowed to remain in the original classification.
March 2013	The minimum provisions for newly extended unsecured consumer loans were increased to 2% for loans without overdue payments (from 1%) and to 6% for loans with overdue payments for no more than 30 days (from 3%). The tighter provision requirements were only applicable in the case that borrowers did not have deposit accounts with the banks. Unsecured consumer loans with overdue payments for more than 360 days must be fully provisioned (that is, 100%).
January 2014	The minimum provisions for newly extended unsecured consumer loans were increased to 3% for loans without overdue payments and to 8% for loans with overdue payments for no more than 30 days. The tighter provision requirements were only applicable in the case that borrowers did not have deposit accounts with the banks.
December 2014	The loan classification and the provisioning requirement were eased (to increase flexibility in the management of credit risk).

Sectoral Capital Risk Weights

May 2009	The risk weight for relatively low-risk newly extended mortgage loans in roubles was reduced to 0.7 (from 1). These mortgage loans meet the following requirements: <ul style="list-style-type: none"> - The size of loans is less than RUB 50 million. - The LTV ratio is less than 70%; the DSTI ratio is less than 33⅓% (for calculating the DSTI ratio, income of spouse and children is also included). - The property used as collateral must be insured for an amount of at least the size of loans.
October 2011	The risk weight for relatively high-risk newly extended mortgage loans in roubles was increased to 1.5 (from 1). These mortgage loans meet the following requirements: <ul style="list-style-type: none"> - The size of loans is more than RUB 50 million. - The LTV ratio is more than 80%.
July 2013	The risk weights for newly extended unsecured consumer loans increased based on risk profiles: <p>Loans in local currency</p> <ul style="list-style-type: none"> - Risk weight of 1.1 for loans with effective lending rates of 25–35% - Risk weight of 1.4 for loans with effective lending rates of 35–45% - Risk weight of 1.7 for loans with effective lending rates of 45–60% - Risk weight of 2 for loans with effective lending rates of more than 60%. <p>Loans in foreign currency</p> <ul style="list-style-type: none"> - Risk weight of 1.7 for loans with effective lending rates of 20–25% - Risk weight of 2 for loans with effective lending rates of more than 25%.

January 2014	<p>The risk weights for newly extended unsecured consumer loans were increased based on risk profiles:</p> <p>Loans in local currency</p> <ul style="list-style-type: none"> - Risk weight of 3 for loans with effective lending rates of 45–60% - Risk weight of 6 for loans with effective lending rates of more than 60%. <p>Loans in foreign currency</p> <ul style="list-style-type: none"> - Risk weight of 3 for loans with effective lending rates of 20–25% - Risk weight of 6 for loans with effective lending rates of more than 25%.
May 2014	<p>The criteria for mortgage loans subject to the risk weight of 0.7 changed:</p> <ul style="list-style-type: none"> - The DSTI ratio is less than 50% (previously, 33⅓%); other criteria remain unchanged.
December 2014	<p>The risk weight for relative low-risk newly extended mortgage loans in roubles was further reduced to 0.5. These mortgage loans meet the following requirements:</p> <ul style="list-style-type: none"> - The size of loans is less than RUB 50 million. - The LTV ratio is less than 50%; the DSTI ratio is less than 40%. - The property used as collateral must be insured for an amount of at least the size of loans.
January 2015	<p>The risk weight for relatively high-risk newly extended mortgage loans in roubles was increased to 1.5 (from 1). These mortgage loans meet the following requirements:</p> <ul style="list-style-type: none"> - The LTV ratio is more than 90%.
February 2015	<p>The risk weight for newly extended unsecured consumer loans was reduced to 1. Loans must have the following risk profiles:</p> <ul style="list-style-type: none"> - In local currency - With effective lending rates of 25–35%.
April 2015	<p>The risk weight for newly extended mortgage loans in foreign currency was increased to 3 (from 1).</p>
August 2015	<p>The risk weight for newly extended unsecured consumer loans was increased to 3. Loans must have the following risk profiles:</p> <ul style="list-style-type: none"> - In foreign currency - With effective lending rates of less than 20%.
January 2016	<p>The risk weight for relatively low-risk newly extended mortgage loans in roubles was further reduced to 0.35. These mortgage loans meet the following requirements:</p> <ul style="list-style-type: none"> - The size of loans is less than RUB 50 million. - The LTV ratio is less than 50%; the DSTI ratio is less than 33%. - The property used as collateral must be insured for an amount of at least the size of loans.
May 2016	<p>The risk weights for new exposures to legal entities in foreign currency were increased to 1.1-1.5 (from 1), depending on transaction types and investment purposes. Main features are:</p> <ul style="list-style-type: none"> - The risk weight for the above-mentioned foreign-currency exposures (both loans and debt securities) would be at least 1.1, except for exposures to corporates with sufficient foreign-currency earnings for debt servicing and exposures that are guaranteed by the government. - The risk weight for foreign-currency lending for purchasing commercial real estate would be 1.3. - The risk weight for foreign-currency debt securities held in certain securities depositories would be 1.5.

Source: *IMF Country Report No. 16/307, updated by the CBR.*

Macroprudential policies: A Singapore case study

Monetary Authority of Singapore

Abstract

Macroprudential measures in Singapore have centred on the property market, as its stability is closely linked to that of the macroeconomy and the financial sector. Residential property is the single largest component in household balance sheets – it represents about half of total household assets, and housing loans account for three-quarters of total household liabilities. Property-related loans also account for a considerable share of bank lending. Adverse developments in the residential property markets could consequently have serious implications for the soundness of household finances, the banking system and the broader economy. Macroprudential measures have therefore been implemented in Singapore to safeguard financial stability and encourage financial prudence. This note outlines the macroprudential framework in Singapore and discusses the scope for cross-border coordination of macroprudential policies.

Keywords: macroprudential policy, financial stability, central banking, financial prudence, households, real estate, mortgages

JEL classification: R21, R31, R38

Introduction

Macroprudential measures in Singapore have focused on the property market, as its stability is closely linked to that of the macroeconomy and the financial sector. Residential property is the largest component in household balance sheets – it represents about half of total household assets and housing loans account for three-quarters of total household liabilities. Property-related loans also account for a considerable share of bank lending.¹ Adverse developments in the residential property market could therefore have serious implications for the soundness of household finances, the banking system and the broader economy.

The objectives of macroprudential measures in Singapore are to:

- (i) safeguard financial stability: unsustainably high and rising property prices could create financial stability risks, given both households' and the banking system's exposure to property.
- (ii) encourage financial prudence among households: the combination of low global interest rates and elevated house prices have led to some households over-extending themselves financially when purchasing property without sufficient regard to their longer term debt-servicing ability.

This note outlines the macroprudential framework in Singapore and discusses the scope for cross-border coordination of macroprudential policies.

Institutional setup and the complementarity of policy mandates

The Monetary Authority of Singapore (MAS) is the central bank and integrated financial regulator in Singapore. Placing both functions under the same authority provides multiple vantage points for both the soundness of the financial system as well as individual institution in identifying potential risks that could arise from developments in the global and domestic financial systems. The synergies inherent in such an institutional arrangement provides a holistic perspective in tracing their transmission channels to the financial sector in Singapore, assessing the potential impact on macroeconomic and financial stability, and considering policy responses. The aim is to have the different arms of policy – macroprudential, microprudential and monetary – working together to secure overall macroeconomic and financial stability objectives through an integrated institutional setup that facilitates information-sharing and overlapping membership of decision-making forums.

Macroprudential and monetary policies

Monetary and macroprudential policies can affect price and financial stability conditions simultaneously. MAS formulates its exchange rate-centred monetary policy based on overall macroeconomic and price stability considerations. Given

¹ Including housing loans and building and construction loans, these stand at about 30% of total non-bank loans as at Q3 2016.

Singapore's open economy, changes in the exchange rate have been found to have a larger impact on aggregate demand and prices than credit or interest rates have. In comparison to changes in the exchange rate, changes in macroprudential policies have a significant impact on credit, particularly in specific sectors including the property market, but only a modest and indirect impact on overall aggregate demand. Accordingly, macroprudential policy is formulated to complement monetary policy.

In practice, this complementarity calls for close coordination and information exchange among MAS staff. Such collaboration takes place informally at the staff level, as well as through formal channels such as the regular Financial Stability Committee (FSC), which provides a platform for joint assessments of the economy and the financial system. The FSC, chaired by the Managing Director of MAS, comprises members of senior management who oversee the monetary policy, financial stability and reserve management functions. The wide representation on the FSC facilitates policy coordination. Conversely, monetary policy decisions are taken at the Monetary and Investment Policy Meeting (MIPM), which could bring to bear relevant considerations of economic and financial stability issues discussed at the FSC.

Macroprudential and microprudential mandates

Macroprudential and microprudential mandates complement each other. For instance, while loan-to-value (LTV) limits aim to address the top-down systemic risks associated with rapid increases in property prices and housing loans, they also support microprudential supervision by mitigating credit risk at the level of individual financial institutions. At the same time, active supervision provides useful bottom-up insights that inform macroprudential policy making and helps with effective enforcement of macroprudential policies across financial institutions.

Nonetheless, there could be occasions where priorities diverge. For example, housing loans are typically regarded as lower risk exposures and may not receive as much supervisory attention as other loan portfolios such as corporate loans, which are generally larger in size and pose greater risks. Yet, poor housing loan underwriting standards by banks could be a source of systemic risk. In MAS, the Management Financial Supervision Committee (MFSC) is charged with both the macroprudential and microprudential mandates, so as to help balance these differing perspectives.

Coordination among various public agencies

Given the systemic risks posed by the property sector, the conduct of macroprudential policy requires coordination not only within MAS but also with other government agencies. For this reason, an inter-agency working group has been set up to promote sharing of surveillance findings and policy coordination across the relevant agencies.

The working group comprises representatives from MAS, the Ministry of Finance (MOF) and the Ministry of National Development (MND). MAS administers credit-based macroprudential tools such as the Total Debt Servicing Ratio (TDSR) framework, loan-to-value (LTV) ratios, and loan tenure limits; MOF is responsible for fiscal measures including the Additional Buyer's Stamp Duty (ABSD) and Seller's Stamp Duty (SSD), while MND implements supply side measures (eg government land sales). While each agency retains ultimate authority and accountability for its

respective tools, the working group provides a forum for the discussion of potential policy interactions and coordination of policy measures to achieve the common objective of a stable and sustainable property market.

Complementary policy tools to enhance effectiveness

Policy coordination enables the relevant agencies to implement policies that complement one another. This in turn allows more precise targeting of specific groups of buyers in the property market. It also helps to reduce the risk of overreliance on any particular policy tool, which may otherwise have to be set at a very tight level. For example, to dampen investment demand for properties, investors buying their second or subsequent properties have to pay higher stamp duties. Similarly, borrowers taking on their second or subsequent housing loans are subject to more stringent LTV limits.

Reducing the scope for circumvention is another way in which policies can complement one another so that their effectiveness is enhanced. For instance, the introduction of loan tenure limits prior to the TDSR framework has strengthened the latter's effectiveness. Without the loan tenure restrictions, borrowers could have stretched their loan tenures to reduce their monthly repayments to meet the debt servicing threshold under the TDSR.

Cross-border coordination

Beyond policy coordination domestically, one could also consider if policy coordination would be useful across borders. This is relevant as there is some evidence of spillovers from the implementation of macroprudential policies in one jurisdiction to another. For instance, in the early stage of the property market cycle in 2009–11, foreign demand featured prominently in Singapore's private residential property market. Some foreign investors from jurisdictions that had implemented macroprudential policies to cool their domestic property markets turned to Singapore. Similarly, as Singapore stepped up its macroprudential measures, there was increased interest in overseas property purchases by local buyers.

A number of considerations may be relevant in assessing the scope for cross-border coordination of macroprudential policies – the nature of risks, the policy instrument involved, and the type of spillover.

The extent to which systemic risk is driven by cross-border interconnectedness or domestic factors determines the nature of the risk. There could be greater scope for policy coordination in the case of risks that are cross-border in nature. For example, to address the risks posed by globally systemically important banks (G-SIBs), the Basel Committee on Banking Supervision (BCBS) has put in place a process to identify G-SIBs and to subject them to higher capital requirements and closer supervision. The latter includes setting up a data hub at the Bank for International Settlements to allow for the monitoring of G-SIB interconnectedness.

However, other macroprudential risks may be of a more local nature and can be dealt with adequately with domestic measures. For instance, Singapore imposed tight LTV limits on car loans in 2013 to address concerns that households were taking on too much leverage with their car purchases. The limits were effective in promoting a

prudent borrowing pattern, but would not have been appropriate for another jurisdiction with a different market structure and that faced a different constellation of risks.

The scope for cross-border coordination also depends on the policy instrument. Some policy tools require cooperation to be effective. For instance, the Basel countercyclical capital buffer requires reciprocity arrangements between the home and host supervisors because risks could be building up in the host market but capital requirements (especially for bank branches and cross-border lending) are set by the home supervisor. Aligning requirements across jurisdictions also helps minimise the risk of regulatory arbitrage.

On the other hand, there are policy measures, eg LTV ratios, exposure limits and transaction taxes, that can be implemented effectively by national authorities at a local level. There is less need for coordination in such cases.

While negative spillovers have often been cited as the main motivation for cross-border policy coordination, positive spillovers could arise from the implementation of macroprudential policies. For instance, steps taken to deal with domestic systemic risks (eg excessive credit growth) in one jurisdiction reduce the risk of financial instability in that jurisdiction, thereby lowering the probability of contagion risks to other jurisdictions. Further, whether spillovers are beneficial or detrimental may depend on how the financial cycles across jurisdictions are interlinked.

Conclusion

Macroprudential policy is a rather newer policy area than fiscal or monetary policy, even if it has seen increasing use as a tool to mitigate the build-up of systemic risks. Many issues in its realm raise challenges for policymakers, such as the appropriate institutional setup, the scope for coordination domestically and across borders, the choice of policy measures, and their settings and communication strategies.

In the conduct of further studies and research into the implementation of macroprudential policy, there are useful parallels that can be drawn from monetary, fiscal and other policy areas. For example, coordination in surveillance can help to bring to policymakers' attention macroprudential risks that may have a broad impact. The sharing of country experiences will help deepen our understanding of macroprudential risks and the appropriate policy response. Over time, such collaborative efforts will enable us to implement macroprudential policies more effectively to address systemic risk.

Appendix

Macroprudential policy measures taken in Singapore

Limits on loan-to-value ratios

Housing loans granted by financial institutions (FIs) to:

- Individual borrowers, first housing loan: lowered from 90% to 80% (2010).
- Individual borrowers, second housing loan: lowered over time from 90% to 50%² (2010–13).
- Individual borrowers, third or subsequent housing loans: lowered over time from 90% to 40%² (2010–13).
- Non-individual borrowers (eg corporates): lowered over time from 90% to 20% (2010–13).

Limits on debt service

- Interest-only loans: disallowed for housing loans granted by FIs (2009).
- Loan tenure: maximum of 35 years for housing loans granted by FIs (2012); reduced to maximum of 30 years for housing loans granted by FIs for the purchase of Housing Development Board (HDB) flats (2013).
- Mortgage Servicing Ratio: set at 30% for housing loans granted by FIs for HDB flats and executive condominium units purchased directly from property developers (2013). Housing loans granted by HDB for the purchase of HDB flats are also subject to a mortgage servicing ratio limit of 30%.
- Total Debt Servicing Ratio (TDSR): set at 60% for housing loans granted by FIs (2013).

Tax

- Seller's stamp duty: levied on all residential properties sold within one year of purchase at the rate of 1% for the first S\$180,000, 2% for the next S\$ 180,000 and 3% for the remaining balance (2010). Minimum holding period extended to four years with tax rates of 16% for sales within a year, decreasing gradually thereafter to 4% in the fourth year (2010–11).
- Additional buyer's stamp duty: levied at a rate of 10% for foreigners and non-individuals buying any residential property, and 3% for permanent residents buying second or subsequent residential property or Singapore citizens buying their third or subsequent residential property (2011). Tax rates increased to 15% for foreigners and non-individuals buying any residential property, and 10% for

² An LTV limit that is 20 percentage points lower is applicable if the loan tenure exceeds 30 years (or 25 years where the property purchased is a HDB flat) or loan period extends beyond the borrower's retirement age (65 years).

permanent residents buying second or subsequent residential property or Singapore citizens buying their third or subsequent residential property (2013). Tax levied at a rate of 5% for permanent residents buying their first property and 7% for Singapore citizens buying their second property (2013).

Bank lending limits

Cap on property exposures: property-related exposure of a bank capped at 35% of total eligible assets (2001).

Macroprudential frameworks, implementation and relationships with other policies

South African Reserve Bank

Abstract

This note outlines the South African Reserve Bank's proposed framework for achieving its new financial stability mandate. It sets out the institutional structure, the focus and objectives of macroprudential policy and the decision-making process to be applied. It identifies and describes three important stages in the process of implementing macroprudential policy, namely completing a systemic risk assessment, building a case for macroprudential intervention, and selecting and applying the macroprudential instruments.

Keywords: financial stability, macroprudential policy, systemic risk

JEL classification: E58, E60, G18, G28

Introduction

In line with a growing consensus among jurisdictions globally on the need for a stronger emphasis on systemic risk mitigation in the financial sector, South Africa launched a formal review of its financial sector regulatory framework in 2007.¹ This culminated in the publication of the Financial Sector Regulation Bill (FSR Bill), which is expected to be promulgated in 2017.² The FSR Bill assigns primary responsibility to the South African Reserve Bank (SARB) for protecting and enhancing financial stability, and seeks to ensure cooperation between supervisory bodies.

South Africa has had limited experience in implementing macroprudential measures, given the stage of development of the new framework and the current phase of the financial cycle. This note outlines the SARB's approach to executing its financial stability policy mandate, focusing on the institutional structure, the goals of macroprudential policy and the decision-making process to be applied when activating macroprudential instruments.

Institutional framework: who is in charge of macroprudential measures?

The FSR Bill confers on the SARB the mandate to protect and enhance financial stability.³ The SARB is tasked with monitoring the financial system for potential systemic risks. Moreover, if a systemic event is imminent or has occurred, the SARB is tasked with maintaining and restoring stability.⁴ The SARB must take steps to mitigate risks to financial stability, including advising financial sector regulators and any other organ of the state on the policies to be implemented to mitigate these risks. The SARB must also, at least every six months, publish and table in Parliament

¹ In February 2010, the Minister of Finance reaffirmed the role of the South African Reserve Bank in overseeing and maintaining financial stability in a letter to the Governor of the SARB. A year later, the National Treasury published a policy paper entitled "A safer financial sector to serve South Africa better", which stated that "the Reserve Bank is best placed to play the role of a macroprudential supervisor". This was followed by a paper in 2013 entitled "Implementing a twin peaks model of financial regulation in South Africa". The National Treasury has subsequently published several drafts of the FSR Bill since 2013.

² The FSR Bill was tabled in Parliament on 27 October 2015. Subsequent to this, the Standing Committee on Finance held a series of public hearings and invited public submissions on the FSR Bill. On 21 July 2016, the National Treasury published a comprehensive comments' matrix that responded to comments submitted, as well as a further draft of the FSR Bill that reflected proposed drafting changes. Following further comments by the Committee and stakeholders, a new comments matrix and revised draft of the FSR Bill were published on 21 October 2016. References here refer to this most recent draft.

³ The definition of financial stability as presented in this paper stresses the importance of resilience and confidence, as discussed by Tucker (2011).

⁴ "A systemic event means an event or circumstance, including one that occurs or arises outside the Republic, that may reasonably be expected to have a substantial adverse effect on the financial system or on economic activity in the Republic, including an event or circumstance that leads to a loss of confidence that operators of, or participants in, payment systems, settlement systems or financial markets, or financial institutions, are able to continue to provide financial products or financial services" (extract from Chapter 1 of FSR Bill (2016)).

a financial stability review that identifies and assesses risks to financial stability, and provides an overview of subsequent steps taken by it and other financial sector regulators to address the risks identified.

The FSR Bill seeks to ensure cooperation, collaboration, coordination and consistency between the Financial Sector Conduct Authority, the Prudential Authority, the National Credit Regulator, the SARB and other organs of the state supporting financial stability. The Governor of the SARB may direct financial sector regulators, in writing, to provide the SARB with information and to assist the SARB in meeting its financial stability responsibilities by acting in accordance with the directive when exercising their powers.⁵

The FSR Bill also provides for the establishment of an advisory committee, the Financial Stability Oversight Committee (FSOC), to be chaired by the Governor of the SARB, and to include member representatives from the SARB, the National Treasury and financial regulators.⁶ The FSOC will meet at least every six months. Its primary objectives are to support the SARB when it performs its functions in relation to financial stability, and to facilitate cooperation and coordination of actions among financial sector regulators and the SARB in matters pertaining to financial stability.

The FSOC will serve as a forum for representatives of the SARB and the financial sector regulators to discuss their activities in pursuit of financial stability. It will also make recommendations to the SARB on the designation of systemically important financial institutions (SIFIs), and advise the Minister of Finance and the SARB on steps to be taken to promote and maintain financial stability, as well as on matters relating to crisis management and prevention. In addition, the FSOC will make recommendations to other organs of the state regarding appropriate steps for them to take to assist in promoting, protecting, or maintaining financial stability, or managing or preventing risks to financial stability.

Within the SARB, macroprudential policy formulation in pursuit of the financial stability mandate will be the responsibility of the Financial Stability Committee (FSC). The FSC was established in 2000 and was recently restructured in accordance with the SARB's enhanced mandate. The FSC has overlapping membership with the Monetary Policy Committee (MPC) of the SARB, which facilitates communication between the committees, and the coordination of macroprudential and monetary policies.⁷ In addition to MPC members, the FSC also includes senior SARB officials who represent relevant areas of the Bank. The FSC meets quarterly, or as frequently as required. Once the FSR Bill is promulgated, the FSC will issue a press statement following its meeting.

⁵ See section 18 of the FSR Bill (2016).

⁶ In terms of the draft Bill, the FSOC will consist of the following members: the Governor of the SARB; the Deputy Governor of the SARB responsible for financial stability matters; the Chief Executive Officer of the Prudential Authority; the Commissioner of the Financial Sector Conduct Authority; the Chief Executive Officer of the National Credit Regulator; the Director-General of the National Treasury; the Director of the Financial Intelligence Centre; and a maximum of three additional persons appointed by the Governor.

⁷ See, for example, the discussion in Kohn (2015).

What are the goals of macroprudential policy?

Macroprudential policy has two broad goals that are not mutually exclusive: first, to strengthen the resilience of the financial system to economic downturns and other adverse aggregate shocks; and second, to lean against the financial cycle and prevent the buildup of excessive financial risks, and reduce the likelihood or extent of a financial crisis. For macroprudential policy to be successful intermediate policy objectives must be identified, such as:

- preventing excessive⁸ growth of credit, asset prices and leverage;
- reining in excessive lending and funding maturity mismatches;
- limiting direct and indirect concentrations of exposure to the same markets, products and institutions; and
- reducing moral hazard by avoiding situations where financial institutions increase their exposure to risk in the expectation that the government will bail them out in the event of an adverse outcome.

The focus of the macroprudential policy framework presented here is on the prevention of risk build-up and its propagation,⁹ while the framework for the resolution of financial institutions is presented elsewhere (National Treasury, SARB and FSB (2015)). A sound macroprudential policy increases the resilience of the financial system against adverse aggregate shocks by establishing buffers that help to cushion the impact of such shocks on financial institutions while sustaining the provision of financial services and credit to the economy. It focuses on the interactions between financial institutions, infrastructure, markets and the real economy. By contrast, microprudential policy assesses the risks individual institutions are exposed to without taking into account the state of the financial system and the economy.

Macroprudential policy focuses on the risks that are generated endogenously. It aims to mitigate the build-up of systemic risks over time (cyclical dimension) by limiting the procyclical feedback effects that can emerge between excessive credit growth and asset prices and by discouraging unsustainable increases in leverage and risky funding strategies. Macroprudential policy tools are also aimed at holding back the build-up of systemic vulnerabilities within the financial system (structural dimension) by reducing concentration risks that arise from common exposures or direct balance sheet linkages. It is important for macroprudential policy to keep its focus on limiting systemic risks and vulnerabilities, and not on broader objectives.

⁸ The Bank will use its discretion in deciding what it considers to be excessive growth. In the case of credit, a sustained period above the trend growth rate would be a starting point. With respect to asset prices, different valuation metrics will be used to assess whether growth rates are significantly above their historic average.

⁹ See the discussion in Goodhart and Perotti (2013).

How are decisions concerning macroprudential policy made?

Three key steps can be identified in the policy process leading up to the activation of macroprudential tools: (i) completing a systemic risk assessment; (ii) building the case and establishing the motivation for policy intervention; and (iii) choosing and implementing the macroprudential instruments.

Systemic risk assessment

The first step requires monitoring of the financial system and completion of a systemic risk assessment. The monitoring efforts focus on vulnerabilities that facilitate the propagation of adverse shocks rather than on the shocks themselves (eg Adrian et al (2015) and Bernanke (2013)), and comprise a risk analysis of SIFIs, as well as of so-called “shadow banks”, asset markets and the non-financial sector. The risk assessment uses indicators that confirm the build-up of imbalances in the financial system.

The following are examples of indicators used for assessing systemic risk:

- Macroeconomic: assessment and monitoring of the level of leverage and general credit market conditions.
- Financial sector: measures related to maturity and currency mismatches that point to funding vulnerabilities in the financial sector. Changes to lending standards are assessed to determine the level of risk appetite. The resilience of the financial sector to severe adverse market conditions is also assessed through periodic stress tests.
- Market-based: assessment of asset market conditions using residential and commercial property prices and stock valuations in equity markets. Government and corporate bond spreads, credit default swap spreads and measures of risk premiums could be used to assess funding and credit market conditions.
- Qualitative information: assessment of data such as credit underwriting standards, asset quality and credit conditions.

According to the Bank for International Settlements’ guidelines,¹⁰ such indicators should provide useful signals relating to the build-up of vulnerabilities ahead of a crisis. However, they are imperfect in that they could also issue false signals. Therefore, the indicators should be interpreted with caution when used for policy formulation. The set of indicators used by the SARB may vary over time as circumstances dictate. An analysis of these indicators is published in the biannual *Financial Stability Review* of the SARB.

The case for macroprudential policy

Following a systemic risk assessment, the next step is to determine whether there is a case for policy intervention. The SARB would need to satisfy itself that, even with

¹⁰ Bank for International Settlements (2012).

appropriate prudential supervision and monetary policy, the level of risk and its distribution across the financial system could intensify if it remained unattended. In this regard, an assessment of the suitability of monetary and/or microprudential policy would precede any decision on the need for macroprudential intervention.

Price stability and financial stability are mutually dependent policy objectives. Price stability is a necessary condition for financial stability, but it is not sufficient by itself. The effectiveness of monetary policy in addressing financial vulnerabilities arising from leverage and maturity transformation is not well established; prudential or supervisory action is likely to be more targeted. The promotion of financial stability by means of interest rate changes may increase the volatility of inflation and employment, more so if high interest rates are required. There is evidence that low interest rates contribute to higher leverage and increased reliance on short-term funding. Though higher interest rates may mitigate such vulnerabilities, prudential limits on leverage and short-term funding, as well as tighter underwriting standards are likely to be a better targeted and more effective method for addressing them.¹¹

In building the case for macroprudential policy intervention, it is important to conduct a cost-benefit analysis and to weigh the possible trade-offs involved in failing to anticipate a crisis that is building up and implementing measures that are not needed (Freixas et al (2015)). While macroprudential tools have costs, so too does inaction (the Great Financial Crisis serves as a reminder of this). Timing policy action is also important. A belated policy intervention is often ineffective as there is insufficient time for measures to take effect, resulting in a further deterioration of financial conditions. Similarly, a badly timed deactivation of the tools could lead to undesirable outcomes, with a deleterious policy signal effect to markets and the potential to amplify procyclicality.

Selection and deployment of macroprudential instruments

Macroprudential policy tools are intended to target the sources of systemic risk, such as liquidity and maturity mismatches, leverage and interconnectedness. Although the discussion here is focused mainly on the banking sector, it is clear that systemic vulnerabilities could also arise from non-bank SIFIs, the emerging 'shadow banking' sector, asset markets or the non-financial corporate sector. The macroprudential policy framework would have to consider this. It is important to confirm the appropriateness of tools before implementing them and to evaluate whether it is feasible to assess their possible impact. Each instrument should be related to an intermediate policy target(s) in order to track its success, or lack thereof, in reducing either procyclical or structural risks. The purpose of such instruments is to respond to the financial cycle. During an upward phase of the financial cycle, the macroeconomic backdrop should be able to support a tightening in financial conditions if a vulnerability is identified. Macroprudential instruments could be applied with a view to targeting a specific sector. The successful implementation of macroprudential instruments will depend on the ability to identify and assess systemic vulnerabilities, and on an appropriate and well-timed

¹¹ Speech by Federal Reserve Chair, Janet Yellen (2014).

intervention. Poor implementation timing could have undesirable and unintended consequences.

An important subset of macroprudential instruments is microprudential tools that target specific sectors of the economy with a macroprudential focus. The generic design of some of these instruments stems from supervisory and regulatory agreements crafted at the multilateral level. One example is the Basel III countercyclical capital buffer that should be introduced when the economy is in an upswing (and the ratio of credit to GDP is above its long-term trend) and could be de-activated when the cycle turns. This instrument, designed at the multilateral level, is susceptible to being adapted to local conditions and applied to the domestic banking sector using national credit growth and GDP data.¹²

The selection of macroprudential instruments and their implementation will be guided by three main criteria, namely effectiveness, efficiency and transparency.¹³ First, effective implementation of macroprudential instruments demands a focus on instruments with well-understood transmission mechanisms. Despite idiosyncratic elements and still limited and preliminary econometric evidence on their effectiveness,¹⁴ a better understanding of the transmission mechanisms could be gained from other countries' experiences.¹⁵ The phase of the financial cycle may also be relevant in selecting macroprudential instruments as policy instruments may well work differently in different phases. Some research shows that macroprudential tools may be less effective in their response to a downturn in the wake of an adverse event than when mitigating risks during upswings (eg Claessens et al (2014)). Decision-making under macroprudential policy is largely an uncharted territory but its effectiveness should improve over time.

Second, efficiency is to be assessed against the instrument's ability to avoid any unintended consequences and adverse effects. The effects of credit flows and economic activity are important in this regard. An ex post assessment based solely on the implementation of a single policy instrument could encounter difficulties, as episodes of financial instability do not occur as frequently as other events, eg price instability. The list of instruments available will probably evolve over time as new events develop and experience is gained.

Third, policy-making, decision-making and implementation actions demand effective transparency. In selecting the instruments, the focus should be on instruments with applications characterised by transparency, simplicity and predictability. This would enhance the understanding, communication and operation of macroprudential policies.

¹² See Schoenmaker and Wierds (2011).

¹³ Bank for International Settlements (2012).

¹⁴ See the survey by Galati and Moessner (2013).

¹⁵ See Lim et al (2011) and Cerutti et al (2015 and 2016).

What is the relationship between macroprudential and other policies?

Coordinating policies that have a bearing on financial stability is challenging. Macroprudential policy clearly overlaps and interacts with monetary policy. Both are aimed at economic stability and maximising sustained long-term growth. However, coordination between those two policies and with other policies is also important. For example, when international capital mobility is high, some recent literature suggests that macroprudential capital flow management measures – controls aimed at mitigating externalities to reduce the risk of financial crises – may be considered. There are also both complementarities and possible conflicts with fiscal, microprudential, capital control, bank insolvency resolution and competition policies. Furthermore, cross-border operations make the assessment of systemic risk more difficult, while requiring bilateral and multilateral coordination agreements and consultation with authorities in other jurisdictions. Well-established mechanisms that facilitate consultations between different authorities need to be in place to ensure the effective coordination of policies. Research into policy coordination issues is part of the SARB’s current research agenda, as is the case in many other jurisdictions.

Conclusion and the way forward

The promulgation of the FSR Bill will provide the SARB with the necessary legal powers to pursue its financial stability mandate. This note outlines the SARB’s approach to achieving that mandate. It identifies and describes three important steps in the process of making active use of macroprudential instruments, namely assessing systemic risk, building the case for macroprudential intervention, and selecting and applying the relevant macroprudential instruments.

Further information regarding policy instruments, their use and impact on financial system stability will be published in a regular section in the biannual *Financial Stability Review*. Additional details will also be communicated in press releases and regular speeches by the Governor and Deputy Governors of the SARB.

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Macroprudential framework – the case of Thailand

Bank of Thailand

Abstract

This note provides an overview of Thailand's macroprudential framework. While the Bank of Thailand (BOT) takes the lead role in safeguarding financial stability, it works in close coordination with two other regulators, namely the Securities and Exchange Commission and the Office of Insurance Commission, to assess and contain systemic risks in a consolidated manner. The BOT views macroprudential policy as part of its overall policy package; it is designed to complement rather than substitute for sound monetary policy. To date, the BOT has implemented three main macroprudential policies: (i) measures on loan-to-value ratios; (ii) dynamic loan loss provisioning; and (iii) credit limits on credit card and personal loans. The BOT and other regulators are increasing coordinated efforts to oversee systemic risks, enhance the effectiveness of its existing macroprudential policy as well as explore additional measures going forward.

Keywords: macroprudential framework, institutional arrangement

JEL classification: E58, E02

Introduction

The use of macroprudential policy has been an integral part of the policy package in Thailand for the past decade. While lessons from the Asian financial crisis highlighted the importance of a strong microprudential framework, the Global Financial Crisis (GFC) reminded regulators to carefully assess and limit systemic risk through the use of macroprudential policy. In response to these crises, the Bank of Thailand (BOT) strengthened its microprudential policy framework – resulting in substantially more resilient financial institutions – and implemented macroprudential policies in the light of increasing interconnectedness within the financial system.

The main objectives of Thailand’s macroprudential framework are aligned with the definition of macroprudential policy used by the Bank for International Settlements (BIS), the Financial Stability Board (FSB) and the World Bank (WB); in particular, to increase the resilience of the financial system and contain the build-up of systemic vulnerabilities. With this in mind, macroprudential policy has been used periodically – primarily in the forms of measures on loan-to-value (LTV) ratios, maximum credit limits on credit cards and personal loans, and dynamic loan loss provisioning. The BOT and other key regulators have also stepped up their coordinated efforts to oversee an increasingly interconnected financial system.

This note provides an overview of the macroprudential framework in Thailand, first outlining the institutional setup pertaining to financial stability, and then discussing the framework itself, the implementation of macroprudential policy and the communication strategy.

Institutional setup

Institutional framework

In Thailand, the BOT, the Securities and Exchange Commission (SEC) and the Office of Insurance Commission (OIC) are the three main regulators jointly responsible for maintaining financial stability through the supervision of financial institutions under their respective jurisdictions. Their roles and responsibilities with regard to financial stability are as follows:

- The BOT’s mandate for achieving financial stability (as can be inferred from Section 7 of BOT Act BE 2485 and BE 2551 (amended)) states that “the BOT’s objectives are to carry on such tasks as [they] pertain to central banking in order to maintain monetary stability, financial institutions stability and payment systems stability.” With such mandate, the BOT effectively takes a leading role in safeguarding the country’s overall financial stability,¹ the BOT is legally charged with the supervision of commercial banks, specialised financial institutions (SFIs),

¹ Three policy committees have been established to carry out the BOT’s objectives: the Monetary Policy Committee (MPC) for price stability, the Financial Institutions Policy Committee (FIPC) for financial institutions stability, and the Payment Systems Committee (PSC) for payment stability. A biannual joint MPC-FIPC meeting was established in 2012 to discuss and decide on cross-cutting macro-financial issues and potential policy responses.

finance and credit foncier companies, asset management companies, and credit card as well as personal loan companies.

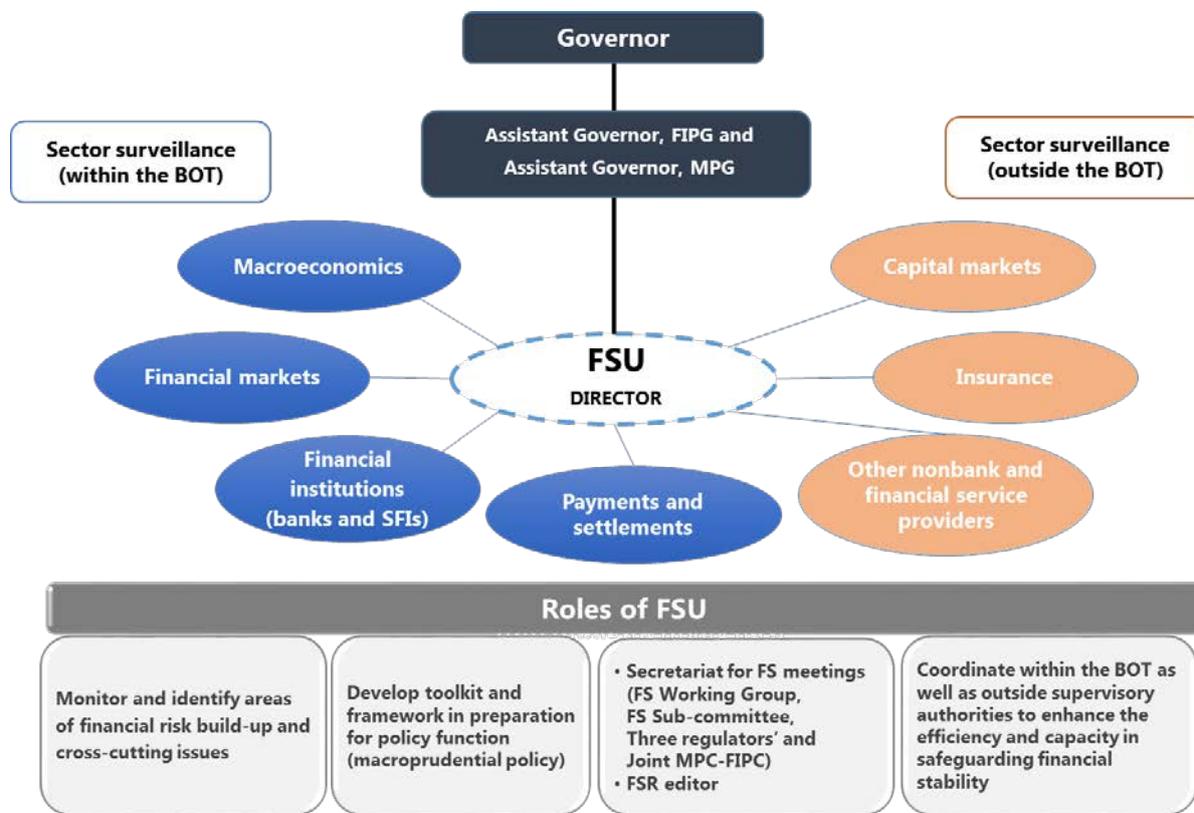
- The SEC is an independent public agency established in 1992 (under SEC Act BE 2535) and is tasked with the supervision and development of Thailand's capital markets. The SEC approves securities issuance for sale to the public and, following a listing, oversees an issuer's disclosure of information and supervises transactions, such as acquisitions or the disposal of assets, transactions with related persons and tender offers for business takeovers. Securities companies, asset management companies and derivatives business operators are supervised by the SEC.
- The OIC was established in 2007 (under Insurance Commission Act BE 2550) and is in charge of supervising the country's insurance industry. It regulates insurance companies, brokers and agents by governing the issuance of operating licenses and ensuring adherence to regulations.

Financial stability work at the BOT

Several departments within the BOT help to oversee financial stability risks. The Monetary Policy Group (MPG) is directly responsible for the macroeconomic aspects of financial stability; in particular, the vulnerabilities faced by the household, corporate and fiscal sectors, and developments in the real estate market and the external sector. The Financial Markets Operations Group (FMOG) oversees the functioning of financial markets – primarily money, bond and foreign exchange (FX) markets. The Financial Institutions Policy Group (FIPG) and the Supervision Group (SVG) monitor and safeguard financial institutions' stability, while the Payment Systems Policy and Financial Technology Group supervises and maintains the stability of payments. The FIPG, SVG and FMOG issue regulations pertaining to the operations of financial institutions and exchange controls.

In April 2016, the BOT established the Financial Stability Unit (FSU) as the central point of its financial stability functions. The FSU monitors and identifies areas of financial risk build-up and cross-cutting issues, drawing on sectoral surveillance conducted by different departments within the BOT as well as from the SEC and OIC. In addition, it is in charge of developing the tools and capacity for financial stability assessments, undertaking the design of macroeconomic scenarios for stress testing, and developing a macroprudential toolkit and framework in preparation for policy functions. The FSU also acts as secretariat for financial stability meetings and is the editor of the *Financial Stability Report*.

The FSU and line departments meet regularly to discuss and assess financial stability issues. In addition, the Financial Stability Working Group and the Subcommittee of Financial Stability hold formal, quarterly meetings chaired by the BOT Governor, during which risk assessments are discussed.



Inter-agency forums and coordination

Different types of financial institutions are supervised separately by the relevant agencies, and because interlinkages often exist between them, ensuring close coordination among supervisory agencies is critical. Such inter-agency cooperation is also relevant to non-bank financial institutions, especially considering that, as of 2016, the asset size of commercial banks accounted for only around half of the total financial system.

Inter-agency forums and the cross-directorship of the various regulators provide important channels for inter-agency coordination. Risks to financial stability are discussed at three-regulators' meetings– which the BOT coordinates with the SEC and OIC in an effort to consolidate key issues. Issues are then escalated to the Joint Meeting of the Monetary Policy Committee (MPC) and the Financial Institutions Policy Committee (FIPC), the latter of which comprises representatives from the BOT, SEC, OIC and the Fiscal Policy Office (FPO).

Furthermore, cross-directorships within the BOT, SEC and OIC serve as an ongoing channel for coordinating policy actions related to financial stability.

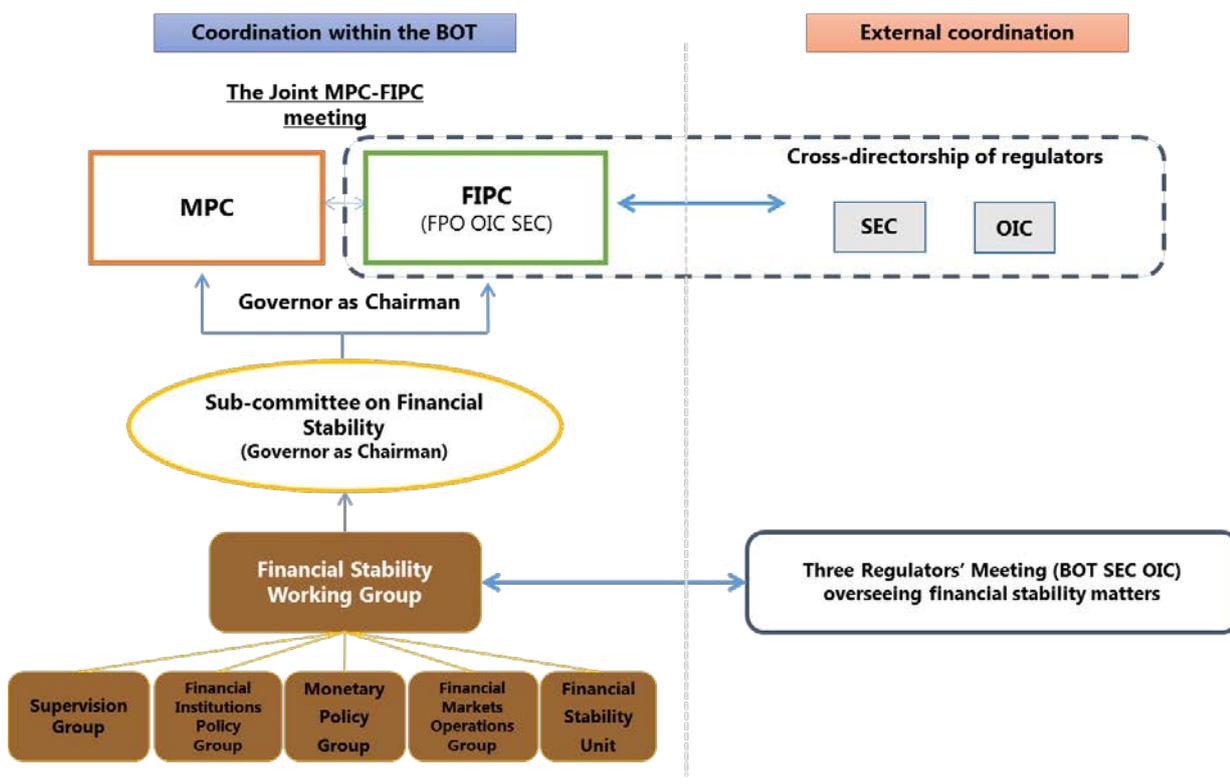
Inter-agency forums

Table 1

Inter-agency arrangement	Agencies involved	Objectives	Frequency of meetings
Three regulators' meeting	Representatives from BOT SEC OIC	Provide an avenue for the exchange of views, information, experiences as well as risk assessments in a consolidated manner before submitting relevant financial stability issues to the joint meeting of the MPC and FIPC.	Bi-annual (and when necessary)
Joint Meeting of the MPC and FIPC	Top executives from BOT SEC OIC FPO	Assess financial stability issues and formulate as well as coordinate macroprudential policy action and, if necessary, communication strategy.	Bi-annual

Work process and policy coordination

Graph 2

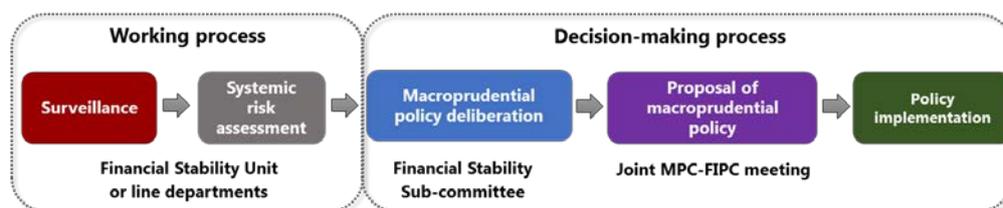


Macroprudential policy framework

Policy deliberation

The BOT has the jurisdiction to implement both macroprudential and microprudential policies on financial institutions under its supervision. As noted earlier, interconnectedness across different types of institution in the financial system prompted the need for inter-agency cooperation. Thus, while the BOT has the authority over the design and implementation of macroprudential policy,² other regulators are consulted in the policy formulation process. This helps to ensure transparency and policy consistency.

In assisting with macroprudential policy decisions, the Financial Stability Sub-committee presents risk assessments and reviews policy options during the Joint MPC-FIPC meeting. This meeting functions as a platform for the exchange of information and discussion.



Macroprudential policy as part of the policy package

The design and implementation of the overall policy package at the BOT, particularly in terms of policy consistency, is enhanced by the cross-membership setup of certain committees. All policy committees, i.e. the MPC, FIPC and PSC, are chaired by the BOT's Governor. The Deputy Governor for Financial Institutions Stability is a vice chairman of both the FIPC and PSC, while the Deputy Governor for Monetary Stability is a vice chairman of the MPC and a member of the FIPC. This overlapping setup allows the BOT to take a holistic approach in developing macroprudential, microprudential and monetary policies – all the while taking into account fiscal policy.

Macroprudential and monetary policies work in tandem in safeguarding overall financial stability. In Thailand, while financial markets are becoming increasingly important as a source of financing, the financial system is primarily bank-based – meaning that the interest rate channel plays a crucial role in monetary policy transmission. This paves the way for the use of monetary policy in addressing financial stability concerns. The MPC views macroprudential policy as a complement rather than a substitute to sound monetary policy. That is, macroprudential policy would be

² The BOT has the power to employ macroprudential measures as stipulated in the Financial Institutions Business Act (Section 5), which states: "If the undertaking of any business in the manner of mobilization of funds from the public by accepting deposits of money or by any other means, granting of credits, or financial business affects the overall economy of the country and there is no law that specifically controls the undertaking of such business, the Bank of Thailand may propose an enactment of a Royal Decree prescribing business undertaking in such manner to be subject to the provisions of this Act in whole or in part including the relevant penal provisions. In this regard, the Royal Decree may also specify rules for the supervision of the undertaking of such business." (unofficial translation)

less effective after a prolonged period of low interest rates, because in this environment the underpricing of risks by investors could not be fully resolved by tighter regulation alone. At the same time, the use of macroprudential policy has been more specifically targeted, particularly on the real estate and household sectors. Increasing sector-specific vulnerability would generally be addressed by macroprudential policy to avoid potential trade-offs between macroeconomic and financial stability, which could arise from a change in the monetary policy stance.

As the FIPC is responsible for the implementation of macroprudential and microprudential policies, supervisory insights are taken into account prior to choosing macroprudential tools. To that effect, microprudential policy can be used to complement macroprudential policy, especially in cases where sectoral policy implementation is being considered.

The implementation of macroprudential policy also takes on board existing fiscal measures. A good example of this is in the property sector, where fiscal measures, in general, have thus far helped to revive the market during a slowdown. Macroprudential measures, meanwhile, helped to contain potential systemic risks and tended to be more targeted.

Implementation of macroprudential policy

The implementation of macroprudential policy rests upon a holistic systemic risk assessment framework and process. The BOT plays an instrumental role in providing key inputs to macroprudential policymaking, including building the necessary tools/quantitative models and calibration techniques, and setting up the process regarding the overall systemic risk assessments as well as stress testing.

At present, the BOT has made progress in developing a systematic framework for the assessment of the effectiveness of macroprudential policy. The framework takes into account the interactions between macroprudential policy and other policies (i.e. monetary and fiscal), as well as spillovers from the effects of cross-border policies. This is to ensure that the prescription of macroprudential policy yields the intended outcome.

Thus far, the BOT has implemented three main forms of macroprudential policies: measures on the LTV ratio, dynamic loan loss provisioning, and maximum credit limits on credit cards and personal loans.

Implementation of LTV measures

Table 2

LTV measure	motivation	action	status
2003: first imposition of LTV limit	Prevent speculation in the property market and to mitigate the build-up of risk in the high-value segment	Imposing a 70% LTV limit on high-value residential properties (≥ 10 mln THB)	removed
2009: increase in LTV limit and imposition of higher risk-weighted capital charge on high-value mortgages (≥ 10 mln THB)	Support activities in property market in times of global economic slowdown*	Increasing LTV limit for high-value mortgage from 70% to 80% and imposing higher risk-weighted capital charge of 75% for loans with LTV greater than 80%, otherwise risk-weighted capital charge of 35%	still in place
2011 and 2013: imposition of risk-weighted capital charge on low-value mortgages (less than 10 mln THB)	Ensure consistency across different segments of the property market	<p>2011: high-rise property</p> <ul style="list-style-type: none"> Imposing risk-weighted capital charge of 75% for loans with LTV greater than 90%, otherwise risk-weighted capital charge of 35% <p>2013: low-rise property (single house, duplexes and townhouses)</p> <ul style="list-style-type: none"> Imposing risk-weighted capital charge of 75% for loans with LTV greater than 95%, otherwise risk-weighted capital charge of 35%. 	still in place

* During this time, concerns over risk build-up in the high-value segment subsided. To add flexibility to banks' strategies and business model in line with risk management practice and international standard, instead of a strict limit on the LTV ratio at 80%, loans with LTV ratios greater than 80% were subject to a higher risk-weighted capital charge.

Measures on LTV ratios

A measure on LTV ratio was first applied in 2003 as a pre-emptive measure against speculation in the property market and to mitigate a build-up of risk in the market. The LTV ratio could, for instance, be lowered (tightened) to rein in an acceleration of asset prices and mortgage credit growth during the upswing, and raised (eased) to help revive demand and alleviate an oversupply of residential property during an economic slowdown. The LTV measure implemented has been somewhat sectoral in that it has been applied unevenly to different segments of residential mortgages. The LTV ratio was tightened in December 2003, January 2011 (high-rise property such as apartment buildings) and January 2012 (low-rise property such as houses). Following the GFC, the LTV ratio was eased in March 2009. Planned tightening on the low-rise property was postponed from January 2012 to January 2013 due to severe flooding at the end of 2011, which seriously impaired the economy.

Dynamic loan loss provisioning

Since 2012, commercial banks have been asked to implement extra loan loss provisioning on higher risk loans to ensure an adequate buffer during times of distress, eg during an economic slowdown. At the time of its introduction, the measure was deemed appropriate for banks to build up extra loan loss provisions as bank profitability was sufficiently high. This was in spite of banks already having a

non-performing loan (NPL) coverage ratio in excess of 100% (which was higher than regulatory requirements).

Maximum credit limits on credit cards and personal loans

An increasing role of credit cards in facilitating households' transactions has prompted concerns over its potential impact on household debt. At the same time, wider participation of providers in the credit card market has raised issues regarding consumer protection and calls for a common set of standards in the industry. In light of this, in 2004 the BOT mandated financial institutions to take into consideration borrowers' ability to repay debt, and tightened regulations of the industry by:

- increasing the minimum monthly payment from 5% to 10%;
- setting a minimum income for credit card holders to at least 15,000 THB per month;
- setting a combined credit line limit for every credit card provider to no greater than five times the average monthly income; and
- requiring the cancellation of a credit card after three months of nonpayment on an outstanding balance.

To align the standard practice on personal loans with that of the industry, the BOT implemented in 2005 a measure on personal loans that sets overall credit limits to no greater than five times the average monthly income.

In 2017, due to concerns over potential spillovers from high level of household debts, the BOT further tightened regulations on credit cards and personal loans by:

- Lowering a credit line limit for credit card holders with monthly income lower than 50,000 THB per month – from 5 to 1.5 times the average monthly income times (if card holders' monthly income is less than 30,000 THB per month) and to 3 times (if card holders' monthly income is between 30,000 – 50,000 THB per month).
- Lowering a credit line limit for personal loan borrowers with monthly income lower than 30,000 THB per month – to 1.5 times the average monthly income with restrictions on the number of personal loan providers not to exceed three companies.

Communication strategy

The BOT communicates its assessment of financial stability and policy actions through various channels. A flagship publication on financial stability is the annual *Financial Stability Report*. The report provides in-depth analyses and assessments of risks to financial stability and other issues of concern (eg key risks) as well as an outlook for financial stability. In addition to the *Financial Stability Report*, the quarterly *Monetary Policy Report* also addresses the BOT's most recent assessment of financial stability. Press releases on the outcome of joint MPC-FIPC meetings also provide a brief overview of key risks and assessments on financial stability.

For those issues requiring timely announcements, BOT executives can voice their immediate concerns through the media or during speeches. In addition, press conferences are typically held following each policy committee meeting.

Conclusion

This note has outlined the design and implementation of the macroprudential framework in Thailand, which has been influenced by the institutional setup. The BOT, as the primary authority in safeguarding financial stability, is tasked with implementing sound macroprudential policy, all the while embracing interlinkages among financial entities and regulators to assess and contain systemic risks in a consolidated manner.

The BOT and other regulators are in the process of stepping up coordinated efforts to oversee systemic risks, enhance the effectiveness of existing macroprudential policy as well as explore additional measures going forward. Furthermore, the existing institutional arrangement is currently under review to ensure its agility in providing adequate safeguards and surveillance on financial stability in an increasingly volatile, complex and interconnected environment.

Financial stability and macroprudential policy in Turkey

Murat Uysal¹

Abstract

In the aftermath of the global financial crisis, the Central Bank of the Republic of Turkey (CBRT) designed and adopted a policy mix where reserve requirements, an asymmetric interest rate corridor and a reserve options mechanism (ROM) were used alongside the policy rate to reduce the negative effects of volatility in capital flows. This deployment of instruments helped to maintain the resilience of the Turkish financial system in the wake of external shocks. Authorities in Turkey have more recently implemented a coordinated policy mix of tight monetary policy along with accommodative macroprudential and fiscal policies to maintain price, financial and macroeconomic stability.

Keywords: Financial stability, macroprudential policy, monetary policy, Turkey

JEL classification: E58, E44, E61

¹ Deputy Governor, Central Bank of the Republic of Turkey.

Introduction

In the aftermath of the global financial crisis, emerging market economies (EMEs) experienced a surge in capital inflows. In many EMEs, this put appreciation pressure on the domestic currency, encouraging excessively high credit growth by historical standards and leading to a deterioration in the current account balance and financial stability challenges. Hence, EME central banks have looked to macroprudential instruments to support financial stability.²

Turkey was no exception in this episode, as a strong Turkish lira coupled with rapid credit growth boosted imports. Export growth could not keep pace, due to the appreciation in the domestic currency and the sluggish European recovery. Past experience shows that direct curbs on capital inflows are only partially effective on this type of incoming capital and they are not really effective in stemming the volume of inflows. Therefore, to broaden its range of objectives and expand its policy instrument set, the Central Bank of the Republic of Turkey (CBRT) has adopted a policy mix since late 2010 that is designed to manage short-term and volatile capital flows.

After the global financial crisis, the CBRT followed a policy of lower policy rates and a wider interest rate corridor combined with higher reserves requirements on deposits to support price stability and financial stability. Recently, a coordinated policy mix has been adopted: the CBRT tightened monetary policy in pursue of its price stability objective while the regulatory and government authorities have taken comprehensive measures to support the credit channel. These concerted efforts have contributed to price, financial and macroeconomic stability.

Macroprudential objectives and frameworks

The primary objective of macroprudential policy is to maintain the stability of the financial system, so that the financial system can contribute sustainably to economic growth.³ The macroprudential authority can also specify intermediate goals to make macroprudential policy more operational, transparent and accountable.⁴

Turkey has set the primary and intermediate objectives of macroprudential policies as follows:

- *The primary objective* is to preserve and strengthen the stability of the financial system as a whole by bolstering its resilience and preventing potential systemic risks and mitigating current ones; and

² Fendođlu (2017) evaluates how macroprudential instruments have performed in major EMEs in containing excessive credit cycles.

³ See ESRB (2013) and also Borio (2003), Caruana (2010) and Hanson et al (2011) for further insights on the goals of macroprudential policy.

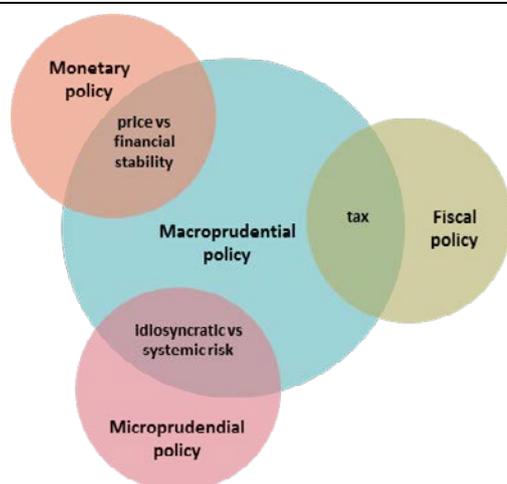
⁴ See ESRB (2013) and Schoenmaker and Wiertz (2011).

- *The intermediate objectives* are to contain excessive credit growth and improve the quality of current account deficit financing.⁵

Aside from macroprudential policy, monetary, fiscal and microprudential policies can also affect the financial system, and the linkages between macroprudential policy and other policies may create synergies or tensions (Graph 1). For example, in achieving its primary objective of price stability, monetary policy may have undesirable side effects on financial stability in the short run,⁶ or a favourable tax treatment may encourage over-indebtedness and make borrowers more vulnerable to potential shocks,⁷ or while strengthening individual institutions, some microprudential policies may increase the vulnerability of the financial system as a whole to systemic risks.⁸ Therefore, coordination across policies is vital if potential conflicts among different policy spheres are to be mitigated and optimal policy responses formulated.

Interconnectedness among policies

Graph 1



Source: Modified from IMF (2013b, p 9).

Within this framework, the Financial Stability Committee (FSC) was established in June 2011 to ensure coordination, cooperation and exchange of information among member institutions and contribute to their efforts in strengthening financial stability and preventing systemic risks. The FSC is chaired by the Deputy Prime Minister responsible for Economic and Financial Affairs and comprises the heads of five leading institutions safeguarding financial stability (Graph 2): the CBRT, the Banking Regulation and Supervision Agency (BRSA), the Undersecretariat of Treasury (UT), the Capital Markets Board (CMB), and the Savings Deposit Insurance Fund (SDIF).

⁵ See Kara (2016a). In addition to these two intermediate objectives, “bolstering safety nets against external financial shocks” and “dampening the financial amplification mechanisms triggered by cross border flows” may be considered as the third and the fourth intermediate objectives, respectively, according to remarks by Kara (2015b).

⁶ See Vinals (2011), IMF (2013a,b) and Caruana (2014).

⁷ See IMF (2013b).

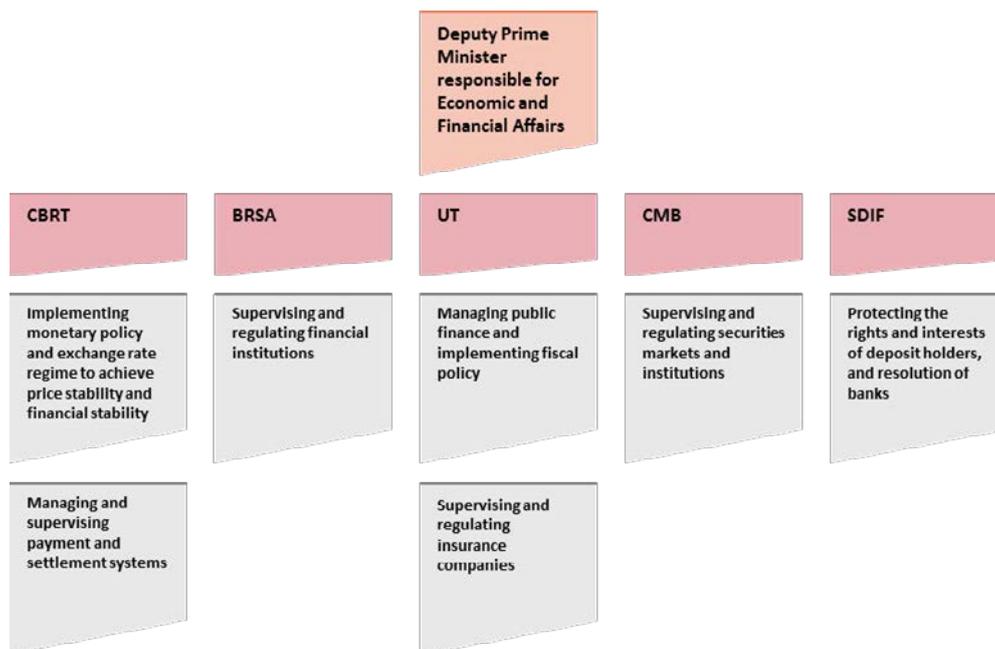
⁸ See Borio (2014).

The FSC's main duties are to monitor and prevent systemic risks and to ensure the coordination of systemic risk management. These duties can be summarised as follows:

- to assess systemic risks and determine measures and policy proposals to moderate these risks;
- to warn the relevant institutions about systemic risks and supervise the implementation of policy proposals;
- to review systemic risk management plans developed by the relevant authorities;
- to ensure coordination of systemic risk management;
- to gather all data and information from public institutions with regard to their activities and carry out coordination of the policies and their implementations among institutions; and
- to make decisions related to other issues as authorised by legislation.

Members of the FSC and their main responsibilities

Graph 2



Source: CBRT.

Each institution in the FSC employs policy instruments in accordance with its main responsibilities under the coordination of the FSC.⁹ The FSC meets on an as-needed basis. Over the past five years, the FSC has met 33 times, most recently on

⁹ The macroprudential instruments used in Turkey have mainly targeted the banking sector. Other sectors are affected by macroprudential measures via the banking sector. For example, the macroprudential instruments on consumer loans (risk weights, provisioning and maturity restrictions) are used to limit the rapid growth of consumer loans and the build-up of vulnerabilities in the household sector. Credit card restrictions are imposed with a similar intention.

2 August 2017. In these meetings, the topics of discussion have included the national and global economic outlook, including the effects of international markets and country-specific developments in the domestic markets; the compliance of the banking and insurance sectors with Basel and other international standards; and savings and investment proposals to develop the financial sector and strengthen financial stability.

To support the FSC, a Systemic Risk Assessment Group (SRAG) was formed in October 2012 to work on more specific and technical issues, identify the threats to financial stability and warn the FSC about them. The SRAG consists of deputies of the FSC member institutions and works on stress tests to quantify how a financial shock can affect financial stability. A heat map framework is used to show risk accumulation (in financial institutions, financial markets and real economy) with an integrated systemic perspective.

The Financial Sector Commission, established in 2006, also helps facilitate the coordination and cooperation among the related authorities and institutions. This commission comprises a broader set of financial sector representatives, including the BRSA, the Ministry of Finance, the UT, the CBRT, the CMB, the SDIF, the Competition Board, the Ministry of Development, Borsa İstanbul and the Banks Association of Turkey and Participation Banks Association of Turkey. The Commission ensures an exchange of information, as well as cooperation and coordination among institutions, and proposes joint policies and expresses views regarding the matters that relate to the future of the financial sector, with a view to establishing and maintaining confidence and stability as well as the development of the financial markets. The Financial Sector Commission convenes at least twice every year and briefs the Council of Ministers on the outcomes of its meetings.

Implementation of macroprudential frameworks: Strategy, actions and tactics

Before the establishment of the FSC in mid-2011, the CBRT had already taken important steps towards ensuring financial stability and implementing macroprudential policy in the wake of the global financial crisis. At the end of 2010, the CBRT designed a policy mix based on a multiple-objectives and multiple-instruments framework to limit the potentially undesirable effects of capital flows on the exchange rate and loans. The perspective of the CBRT on financial stability is summarised in Table 1.

The CBRT's perspective on financial stability

Table 1

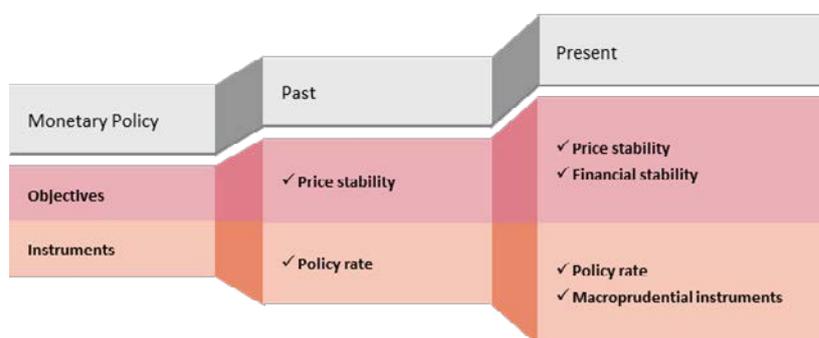
Describe as	the existence of a sound and efficiently functioning financial system
Consider as	an important constituent of its primary objective of achieving price stability
Approach from	a macro perspective unlike other institutions in charge of supervision and regulation
Attaches importance to	<ul style="list-style-type: none"> ✓ identifying structural and macroeconomic developments that could pose a systemic threat to financial stability and taking measures against them in cooperation with relevant authorities when it deems necessary; ✓ monitoring the soundness of the financial system as a whole; and ✓ following international financial developments and evaluating these developments with regard to their potential impact on the Turkish economy.

Source: CBRT.

Within this perspective, the CBRT augmented its inflation targeting policy regime by adding financial stability as a supplementary objective and developed additional policy instruments.¹⁰ The monetary policy stance, therefore, is reflected not only in the current level and the expected path of the short-term policy rate, but also in other policy instruments such as the interest rate corridor, reserve requirements and macroprudential policies. The policy framework is depicted in Graph 3.

Monetary policy framework

Graph 3

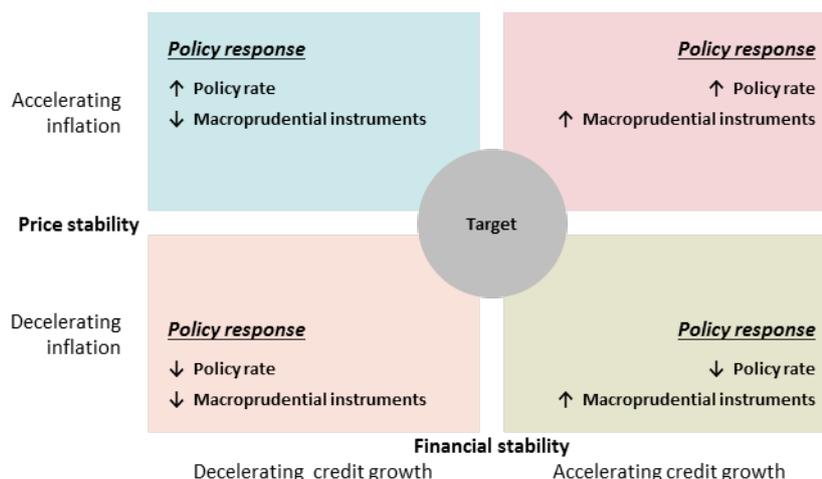


Source: Modified from Kara (2016a, p 127).

Under this policy framework, Graph 4 illustrates how the CBRT sets monetary and macroprudential instruments to support price and financial stability:

- Tighten the conventional monetary policy (eg by raising the policy rate) when inflation rises or its outlook deteriorates.
- Use broad-based or sector-specific macroprudential instruments in the tightening direction when financial stability risks rise (as reflected by, eg, rapid credit growth and deterioration in the current account balance).

¹⁰ For an overview on the policy mix adopted by the CBRT after 2010, Kara (2012).



Source: Modified from CBRT (2010).

Given the advantages and disadvantages of rules and discretion in macroprudential policy listed in Table 2, the CBRT has adopted a mainly rule-based approach with some degree of constrained discretion to preserve some room for manoeuvre in adjusting policies and taking additional measures while maintaining transparency, predictability and accountability.¹¹

Rules versus discretion in implementing macroprudential policies

Table 2

	Rules	Discretion
Advantages	<ul style="list-style-type: none"> ✓ transparent, lower risk of inaction ✓ provide pre-commitment ✓ provide regulatory certainty 	<ul style="list-style-type: none"> ✓ adaptable and flexible ✓ takes into account different types of risk and structural change
Disadvantages	<ul style="list-style-type: none"> ✓ not dynamic and flexible ✓ susceptible to circumvention 	<ul style="list-style-type: none"> ✓ less transparent ✓ limited regulatory predictability ✓ subject to forbearance in favour of wrongdoers

Source: This table is based on remarks by Çetinkaya (2013).

Under this regime, the CBRT has deployed three instruments to support financial stability: (i) differentiated reserve requirements implementation based on currency, maturity, and leverage; (ii) an asymmetric interest rate corridor; and (iii) a reserve options mechanism.

¹¹ According to the remarks by Çetinkaya (2013), a rule-based approach with constrained discretion at certain phases of the cycle seems to be the best approach in conducting macroprudential policies.

Reserve requirements

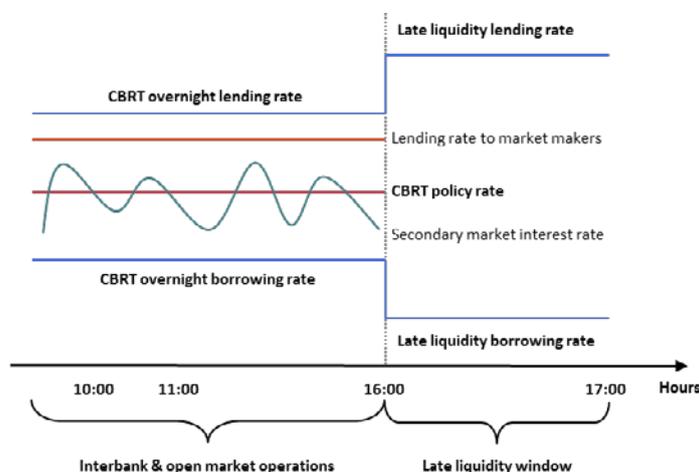
The CBRT has made active use of reserve requirements as a macroprudential instrument since the end of 2010. A key motivation was to smooth the credit cycle and increase the maturity of liabilities. Starting from late 2014, the CBRT has intensively used reserve requirements to encourage banks to fund themselves with core liabilities rather than non-core liabilities, and with long-term rather than short-term liabilities. The CBRT raised the reserve requirements ratio on short-term, non-core liabilities significantly and adjusted the remuneration rates for reserve requirements to tilt banks' incentives towards having a higher share of core liabilities.¹² With these arrangements, the share of non-core short-term liabilities in total liabilities dropped significantly and the rising trend of the credit-to-deposit ratio started to reverse in 2015.¹³

Asymmetric interest rate corridor¹⁴

At the end of 2010, the CBRT started operating an asymmetric interest rate corridor – the differential between the overnight lending and borrowing rates charged by the CBRT on its operations – as a macroprudential instrument. The motivation was to smooth out the adverse effects of capital flow volatility. This framework allowed short-term interest rates to temporarily deviate from the policy rate in both directions if deemed necessary (Graph 5).

Asymmetric interest rate corridor

Graph 5



Source: CBRT

The interest rate corridor can be widened downwards to discourage short-term speculative capital inflows, relieve the appreciation pressure on the domestic currency and contain excessive credit growth when capital inflows surge. The corridor can be

¹² Remuneration based on core liabilities has been abolished starting from 1 January 2017, as the remuneration rate will be the same for all institutions.

¹³ See Kara (2016a).

¹⁴ For detailed description and thorough analyses, see Kara (2012, 2015a), Binici et al (2013).

widened upwards, if need be, to reduce depreciation pressure on the domestic currency during capital flow reversals. The CBRT has actively used the width and asymmetry of the interest rate corridor. For example, following the Fed's second round of quantitative easing, the CBRT lowered the floor of corridor to discourage short-term capital inflows at the end of 2010. It then opted for a higher ceiling from late 2011 through 2012 to prevent a reversal in capital flows as the euro area sovereign debt problems intensified, lowering the ceiling gradually after mid-2012 on dissipating tail risks in the euro area.

Reserve options mechanism¹⁵

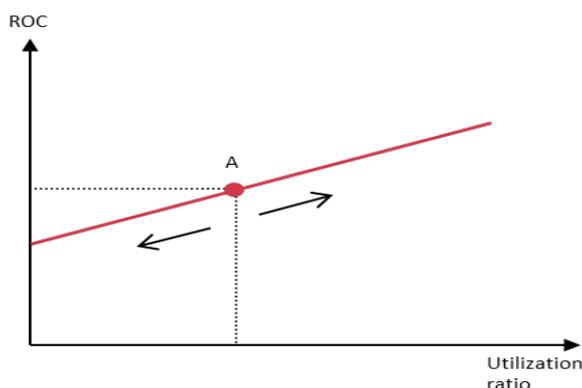
At the end of 2011, the CBRT also deployed the reserve options mechanism (ROM), a novel macroprudential instrument that allows banks to voluntarily hold a certain portion of their mandatory reserve requirements for Turkish lira liabilities in a foreign currency, specifically in US dollars and euros,¹⁶ or gold.¹⁷ The purpose was to offset the adverse impact of excessive volatility in capital flows on macroeconomic and financial stability. The amount of foreign exchange or gold that banks must hold to meet one unit of domestic currency reserve requirements is called the reserve options coefficient (ROC). The level of ROC is a significant parameter for utilization ratio of ROM¹⁸. The idea behind the ROC mechanism is that it should act as a market-friendly automatic stabiliser (Graph 6). During periods of strong capital inflows, point "A" shifts to the right along the line because relatively low borrowing costs in foreign currency prompt banks to keep a higher portion of their reserve requirements in foreign currency. When capital flows reverse, banks need to convert foreign currency-denominated requirements into domestic currency due to relatively higher borrowing costs in foreign currency, and thus point "A" shifts to the left of the diagram. In sum, the ROM can mitigate exchange rate volatility supported by market forces, reducing the need to intervene in the foreign exchange market.

¹⁵ The concept of ROM is elaborated in Küçüksaraç and Özel (2012).

¹⁶ Foreign currencies that can be maintained against Turkish lira reserve requirements have been restricted to the US dollar since the maintenance period of 15 August 2014.

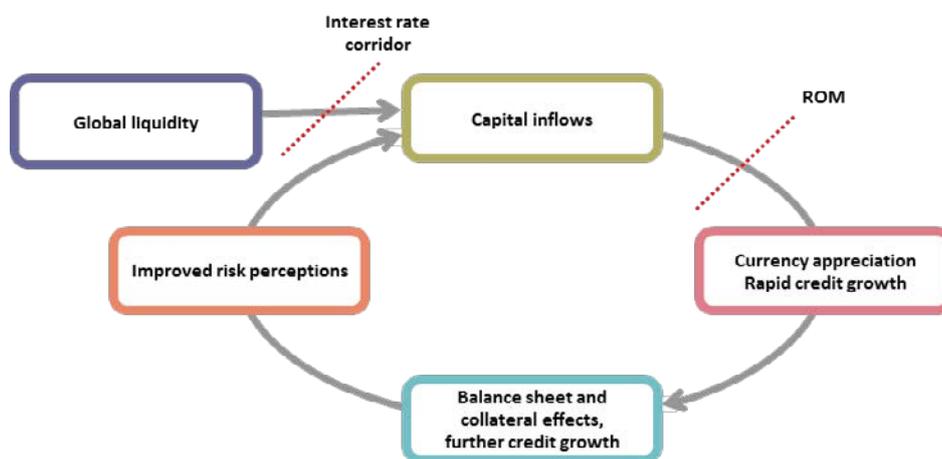
¹⁷ On 3 October 2016, to bring out residents' gold savings and increase foreign exchange reserves, a new separate tranche of 5% for wrought or scrap gold collected by banks from residents was introduced, in addition to the existing facility of 30%, allowing reserve requirements to be maintained as "standard gold" within the context of the ROM.

¹⁸ Küçüksaraç and Özel (2012).



Source: CBRT.

The CBRT used its asymmetric interest rate corridor and the ROM to mitigate the amplification effects of capital flows.¹⁹ Currency appreciation due to capital inflows strengthens the balance sheets of firms and raises the value of collateral. In the process, improved risk perceptions stimulate further capital inflows. Therefore, the CBRT used its interest rate corridor to deal with volatility in capital inflows and the ROM to diminish the effect of capital flows on domestic macroeconomic variables (Graph 7).



Source: Modified from Kara (2016a,b).

Policy measures are calibrated based on scenario analysis, and the CBRT has relied on the liquidity provided to the market or liquidity absorbed from the market, which is an important indicator for calibration. The effectiveness of macroprudential

¹⁹ See Kara (2013, 2015a,b).

instruments used by the CBRT has also been evaluated by several studies, which are categorised into three groups (Table 3): (i) studies based on an analytical framework; (ii) studies based on indicators, simple analysis or descriptive statistics; and (iii) studies based on empirical research or calibration. Generally, these studies indicate that macroprudential instruments employed by the CBRT have contributed to the resilience of Turkey's financial system.

Some studies on the effectiveness of macroprudential instruments used by the CBRT

Table 3

Studies	Main findings
<i>Studies based on analytical framework</i>	
Kara (2015a)	As well as the CBRT's short-term interest rates within the interest rate corridor, the composition of the central bank liquidity provision is an important component of the monetary policy stance.
<i>Studies based on indicators, simple or descriptive analysis</i>	
Küçüksaraç and Özel (2012)	The breakeven reserve options coefficients depend on the cost of foreign currency funds, Turkish lira swap rates, Libor and reserve requirement ratio for foreign currency and are highly sensitive to changes in external borrowing spreads.
Kara (2016a)	Macroprudential policies have improved external balances, weakened financial amplification channels and contained the sensitivity of Turkish economy to excessive volatility in capital flows.
<i>Studies based on empirical research and calibration</i>	
Binici (2013)	By using an asymmetric interest corridor policy together with an active liquidity management strategy, the CBRT can influence the spread between lending and deposit rates and therefore help to smooth business cycle fluctuations.
Küçük et al (2016)	Several factors, which are directly or closely related to the liquidity policy of the CBRT, have influenced the spread between the Borsa İstanbul overnight repo interest rate and the CBRT average funding rate.
Aslaner et al (2015)	The systematic strategy of increasing short-term interest rates during capital outflows using the flexible interest rate corridor may disrupt the automatic stabilising characteristics of the ROM since the higher funding cost in the domestic currency induces banks to hold more reserves in foreign currency.
Binici et al (2016)	The CBRT average funding rate and interbank overnight market rates, which are not officially announced as policy rates but determined indirectly by the CBRT, have been taken into account in pricing loans and deposits.

Source: CBRT.

Another key institution in implementing macroprudential policy is the BRSA, which contributed to the containment of rapid credit growth and household debt. The BRSA took a set of measures in two steps in 2011 and late 2013–early 2014 for consumer loans to increase savings by reversing the upward trend in consumer loans and channel savings into more productive investments. To support these objectives, the CBRT integrated financing companies into the reserve requirement system in 2013. This measure specifically targets consumer lending. Macroprudential instruments and measures for consumer lending are reported together with their transmission channels in Table 4.²⁰

²⁰ CBRT (2014) assesses the effectiveness of these measures taken by the BRSA.

Macroprudential regulations on consumer lending and transmission channels

Table 4

Instruments	Measures	Transmission channels
Credit limits and restrictions	<i>For credit cards</i>	
	Increasing minimum payment ratios for credit cards	Reduces unpaid portion of the period debt; raises payment rates by altering the payment habits of credit card users; reduces household indebtedness.
	Restricting credit card limits based on income level	Limits credit supply; ensures households borrow in proportion to their income; alleviates the default risk of consumers, and thus NPLs at banks.
	Disallow credit card usage for specific sectors	Limits credit supply; reduces the indebtedness of households; constrains borrower default risk, and thus NPLs at banks.
	Limiting the instalment period of credit card debt ¹	Restricts credit demand; reduces household indebtedness; encourages use of credit cards as a means of payment instead of a means of credit.
	<i>For consumer loans</i>	
	Maturity restriction for consumer loans except housing loans ¹	Restricts credit demand; reduces household indebtedness; increases the default risk of consumers who do not reduce their credit demand but have higher monthly instalment payments than their payment capacity, and thus NPLs at banks (effect is expected to be limited).
	Loan-to-value ratio for housing and vehicle loans ¹	Reduces the amount of loanable funds; reduces credit demand directly and asset prices indirectly; alleviates the default risk of consumers, and thus NPLs at banks.
Capital adequacy	Increase in risk weights for credit cards and consumer loans ²	Reduces capital adequacy ratios and credit supply, if banks are willing to compensate for this reduction.
General provisions	Incremental general provision ratios for consumer loans ³	Reduces net profit of banks, increases Tier 2 capital, so does not affect total capital adequacy ratio, but reduces Tier 1 capital ratio and core capital ratio. If banks are willing to compensate for the decrease in ratios, assuming that they do not cut the dividends and do not add capital, they may reduce risk-weighted assets, so that the quantity channel affects credit supply, and may increase loan rates. Eventually, the price channel affects credit demand.
Reserve requirements	Inclusion of financing companies in the reserve requirement system	Leads to a reduction in loanable funds via the quantity channel and increase in credit interest rates via the price channel; slows growth in vehicle loans by financing companies.

¹ It was slightly loosened on 27 September 2016. ² It was abolished at the end of March 2016 due to full compliance with Basel standards. ³ It was abolished on 27 September 2016.

Source: CBRT (2014, p 60).

Along with a tighter monetary policy stance, measures in Table 4 above have helped restrain rapid loan growth and thus to slow the growth in household indebtedness. The annual growth rate of consumer loans dropped from 45% in mid-

2011 to less than 15% in 2015, while commercial loan growth, which is not strictly targeted, remained relatively more robust.²¹

Recently, Turkey has adopted a policy mix that combines tight monetary policy with accommodative macroprudential and fiscal policies. Focusing on inflation and foreign exchange developments, the CBRT has tightened liquidity supply and implemented a new swap facility. In doing so, the CBRT has contained volatility and excessive depreciation of the domestic currency in the foreign exchange market. As part of this coordinated policy mix, other authorities have taken a series of measures to support the credit channel and economic activity. The BRSA has contributed by releasing some of the buffers accumulated in recent years. The government has launched a stimulus package to contain a possible adverse feedback loop between economic activity and loan supply. Thanks to the room provided by the fiscal discipline of recent years, the fiscal position is sound with low gross financing needs and a moderate debt-to-GDP ratio.

Communication

As a strong component of the central bank tool set, communication can increase transparency, accountability and predictability of monetary policy decisions and it can also help to manage market expectations. Communication plays an important role in strengthening the effectiveness of macroprudential policies and enhancing the resilience of financial stability since such policies, and their aims, need to be well understood by all market participants.

The CBRT pays particular attention to effective communication to enhance public understanding of how macroprudential policy works. To this end, the CBRT uses a range of communication tools, including the Inflation Report, the Financial Stability Report (FSR), speeches, interviews, press releases and meetings to foster transparency and accountability.²² The most important communication channel regarding macroprudential policy is the FSR, by which the CBRT publishes its assessment of the main risks and vulnerabilities in the financial system.²³

The CBRT uses direct communication by speeches and press releases. Taking into account the diversity of the target groups, the CBRT has recently revised its communication strategy and introduced new arrangements for meetings.²⁴ Meetings

²¹ See Kara (2016a).

²² For the effects of communication on financial stability by means of the FSR and other written report, and through speeches and interviews, statements and press conferences, minutes and voting records, see Knütter et al (2011) and Born et al (2014).

²³ The first issue of FSR was released in August 2005. From 2006 onwards, it has been published on a semiannual basis in the spring and fall. FSR includes four main chapters. The first chapter provides a detailed analysis of international and domestic developments that presumably affect domestic financial stability. The second and the third chapters are dedicated to developments in the non-financial and financial sectors, respectively. The last chapter is devoted to special topics that discuss the latest research by the CBRT staff on financial stability issues.

²⁴ Recently, the communication strategy of the CBRT has been revised, recategorising meetings as follows: (i) technical meetings with investors and analysts; (ii) regular meetings with foreign investors; (iii) meetings with chambers of industry and commerce and other corporate sector representatives;

with real and financial sector representatives and the media are seen as important venues for the CBRT in explaining its macroprudential measures and managing expectations. The CBRT also uses social media to raise public awareness about macroprudential measures. Working papers, research notes in economics, booklets, conferences and workshops are also major components of the CBRT's communication strategy.

Conclusion

Following the global financial crisis, expansionary monetary policies in advanced economies have led to rapid and excessive credit growth and weakening current account balances in EMEs. In order to preserve financial stability, many EME central banks have adopted new policy frameworks and intensively employed macroprudential instruments. In this regard, the CBRT incorporated financial stability into its inflation targeting framework at the end of 2010, redesigning policy instruments and their deployment to support price and financial stability. This policy mix has helped maintain the resilience of the Turkish financial system against external shocks. Recently, Turkey has adopted a policy mix of tight monetary policy along with accommodative macroprudential and fiscal policies. This combination of policies has helped to strengthen price, financial and macroeconomic stability.

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