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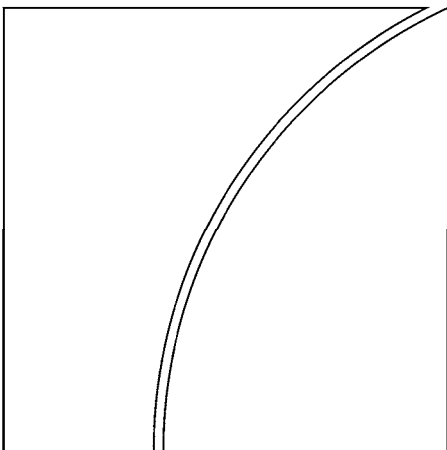
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Policymaking from a “macroprudential” perspective in emerging market economies

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Abstract

Recurrent capital inflows pose important challenges for authorities in emerging market economies seeking to preserve financial stability. Raising interest rates to dampen imbalances that could arise from capital flows can also attract more capital inflows and accentuate appreciation pressures. For this reason authorities have used a number of instruments to mitigate the effects of capital flows, all with financial stability implications. Many of these instruments (eg reserve requirements) may have been used for other purposes but the global financial crisis has raised interest in examining them from a financial stability, or “macroprudential” perspective. This paper reviews some of these instruments, drawing in part on material provided by central banks to the BIS. The instruments include foreign exchange market intervention and foreign reserve accumulation; measures to strengthen bank balance sheets and capital and measures to maintain the quality of credit or to influence credit growth or allocation, and capital controls. Certain implementation issues are also discussed, including signals to respond to, timing of prudential measures and procyclicality and effectiveness and calibration. An unresolved question is how the instruments described are to be used in conjunction with interest rate policy. Over the medium term, these instruments raise concerns because they may impair the development of the financial system.

Keywords: Capital flows, monetary policy, macroprudential

JEL classification: E44, E58, E61, F31, F32, F41

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Policymaking from a “macroprudential” perspective in emerging market economies

I. Introduction

The landscape for financial stability in emerging market economies (EMEs) has changed considerably since the first half of 2009. From having to deal with severe financial stress and the impact of a steep decline in global demand, EMEs now seem to be confronting issues similar to those they faced before the bankruptcy of Lehman Brothers in September 2008. Capital flows into EMEs are back, and given current account surpluses and (in some cases) efforts to manage exchange rates foreign reserves are rising.

This could have two effects, (i) an increase in aggregate demand with a concomitant risk of inflation; (ii) an increase in bank credit growth and asset prices, increasing financial fragility. Rapid credit growth can mean deterioration in credit quality over time, disguised by rapid economic growth that may prove transitory. Credit growth could also be associated with growing risks of spillovers or contagion, either due to common exposure to risky sectors (eg property markets) or networks linking financial institutions (eg the interbank market and payments system). The risks would be amplified by booms in the prices of leveraged assets.² Risks could materialise in the event of sudden capital inflow reversals

An important question is what tools are available to manage the two effects cited above. Raising interest rates is the standard response to deal with an increase in aggregate demand, but it could attract more capital inflows and lead to appreciation pressures, so it poses a dilemma. Furthermore, whether interest rate policy is an appropriate instrument to deal with the financial stability implications of bank credit growth and asset prices is still the subject of debate.

Partly in response to these considerations, EMEs have in the past used a number of tools to supplement interest rate policy. There seems to be a consensus that policy instruments used with a view to preserving the stability of the financial system as a whole - beyond those needed to assure the stability of individual institutions - may be considered “macroprudential”. Beyond that, however, views on the appropriate definition of macroprudential instruments differ. One view is that the definition should be relatively narrow. In many cases, authorities have used “micro prudential” instruments (eg in capital or loan-loss provisioning requirements, or loan-to-value ceilings) or monetary instruments (eg reserve requirements) in ways that seek to limit the build-up of systemic risk and preserve financial stability over the business cycle (rather than focusing on risks to individual banks). These policy measures can thus be seen as reflecting a “macroprudential” view.

II. Types of macroprudential policy instruments: pros and cons

As suggested earlier, experience has shown that three types of macroeconomic and financial risks are particularly relevant for small open emerging market economies. First, risks of spillovers and contagion from international markets (capital inflow reversals, interruptions in foreign currency liquidity, and financial effects of rising fiscal burdens). Second, domestic credit and market risks from rapid credit growth and booms in asset prices. Third, risks of

² Equity prices have rebounded strongly in EMEs since around the second quarter of 2009. Some jurisdictions, such as China, Hong Kong SAR or Singapore, also show distinct rebounds in property prices.

domestic contagion/spillovers arising from common exposures (eg possible fire sale externalities) and network links (see discussion below on signals to respond to).

Policymakers in EMEs have sought to limit these risks during the extended period of expansion in the 2000s by using what are traditionally seen as “monetary” or “micro prudential” tools but that are now applied with a “macroprudential” perspective (for examples, see Table 1). The consensus on what this means is still evolving but there appears to be a focus on

- financial stability or containing systemic risks, rather than risks to individual financial institutions (ie to improve financial system resilience in the face of shocks or during downturns).
- the interaction between macroeconomic conditions and the financial system
- the possibility of dampening procyclicality in the financial system.

The form of intervention broadly falls under the following four groups. (i) Measures to control capital inflows; (ii) Foreign exchange market intervention and foreign reserve accumulation; (iii) Measures to strengthen bank balance sheets and capital; (iv) Measures to maintain the quality of credit or to influence credit growth or allocation. Each may have a bearing on financial stability and thus have macroprudential dimensions but may also reflect other goals (eg stabilising the exchange rate or controlling inflation).

A. Foreign exchange market intervention and foreign reserve accumulation

Many central banks value a regime of floating exchange rates because it reminds financial markets of foreign exchange risk - and so creates the right incentives for risk management. Hence such a regime is seen as having macroprudential benefits. But even under floating, central banks intervene in foreign exchange markets to dampen exchange rate volatility, or to accumulate foreign reserves. This is also apparent in rapid accumulation of foreign reserves in this decade (Graph 1).

Foreign reserve accumulation poses tradeoffs. On the one hand, foreign reserves can be seen as a kind of macroprudential tool that increases resilience during episodes of financial stress. On the other hand, very large and persistent inflows and related increases in central bank foreign assets almost always expand the balance sheet of the banking system. This can support booms in credit and asset prices that could then be followed by collapses.

Assessing this trade-off depends in part on whether foreign reserve holdings are thought to be adequate. A complication is that in recent years there has been re-examination of criteria for reserve adequacy. The costs of foreign reserve holdings, and the feasibility of alternatives: (eg central bank swaps or the IMF FCL) are also relevant considerations.

B. Measures to strengthen bank balance sheets and capital

Steps taken have included: (i) limits to net open positions of financial institutions; (ii) more stringent requirements on foreign currency lending; (iii) rules for liquidity risks; (iv) rules re currency and maturity mismatches; (v) capital requirements; (vi) loan-loss provisioning requirements.

Limits to net open positions of financial institutions. These are often defined as a ratio to capital, supplemented by allowance for forward transactions, at a point in time.³ However, a

³ In Mexico, a bank's net foreign currency liabilities are not to exceed 1.83 times a bank's core capital on any given day; this precludes borrowing short term to fund long-term credit (eg mortgages) in foreign currency.

key limitation is that borrowers may still be exposed; an example is borrowing by households in foreign currency (euros and Swiss francs) in central and eastern Europe;

More stringent requirements on foreign currency lending. This includes requiring higher creditworthiness from a customer that applied for a foreign currency housing loan than for a loan denominated in local currency; higher capital or loan loss provisioning for foreign currency lending exceeding certain thresholds to domestic residents such as households; prohibiting foreign currency borrowing by those borrowers with no foreign currency earnings or assets (eg in Argentina lending in foreign currency to borrowers outside the export sector is restricted);

Rules for liquidity risks. Foreign currency liquidity requirements are sometimes imposed, with higher liquid asset requirements on shorter-term liabilities. Estimates of foreign currency liquidity (both at individual bank and aggregate levels) can be supplemented by stress tests on the impact of currency fluctuations. Some countries have used differential reserve requirements to encourage local currency intermediation.⁴

Rules re currency and maturity mismatches. Goldstein and Turner (2004) argued that regulators, in addition to overseeing mismatches in individual institutions, must monitor aggregate mismatches in the banking system as a whole. There are two reasons for this. One is that those responsible for the detailed supervision of individual institutions need guidance as to what is important in quantitative terms. Another is that individual institutions acting in isolation may overestimate their ability to hedge foreign exchange or interest rate risk over a short period of time during a crisis. As for maturity mismatches, banks are often required to construct explicit “maturity ladders,” so that they can calculate excesses or deficits (liquidity gaps) at selected maturity dates – next day, next week, next month, next year.⁵ These estimates could be subject to stress tests. Aggregating the liquidity gap analysis of individual banks to construct maturity ladders for the whole economy can be very useful. This could help to analyse liquidity risk in the banking system as a whole, giving early warning of liquidity shortfalls at particular maturities for the entire banking system – this is the macroprudential dimension. But the extent to which this has been done has apparently been limited. Some authorities (eg Saudi Arabian Monetary Agency) have also required: (i) bank self assessments of liquidity risk under Pillar 2 of Basel II; (ii) the maintenance of high overall liquidity ratios; and (iii) limits on loan-to-deposit ratios. Liquidity risks also arise from fire sale externalities or network externalities, which could be addressed with higher liquidity or capital adequacy requirements.

*Capital requirements.*⁶ Traditionally, capital has been seen as a way to deal with unexpected losses, and the amount needed was estimated focusing on individual bank problems. More

Both Mexico and Turkey impose limits on the net open position in foreign currency (15% of Tier 1 capital in Mexico and 20% of equity in Turkey).

⁴ Differential reserve requirements (in which reserve requirements for foreign-currency deposits are higher for foreign currency than for local-currency deposits) have been used in Argentina, Croatia and Romania. See Turner (2009). One reason is that the central bank cannot supply foreign currency as readily as domestic currency in times of stress and it cannot be assumed that the central bank of a foreign-owned bank will supply liquidity assistance or allow the parent bank to pass on liquidity support to its subsidiaries.

⁵ Goldstein and Turner (2004) observe that banks will typically not hedge for very large exchange rate changes but will often cover themselves against small near term movements, counting on the existence of markets to put on new hedges should the rate move sharply against them. Individual banks may be unaware “that aggregate exposures mean that other banks will try to hedge at the same time, putting hedging markets under strain. This is likely to be a major risk in thin, comparatively underdeveloped foreign exchange markets” (p. 97).

⁶ See discussion below for perspective on how the Basel Committee on Banking Supervision is approaching these issues.

recently, there has been more emphasis on the need for capital buffers to take into account of systemic or macroeconomic risks.⁷ Two points may be highlighted:

First, EMEs have a great deal of experience with macroeconomic and financial sector volatility. This may explain why many EME authorities require much higher levels of capital than the 8% minimum traditionally set under Basel I (eg 11% in Brazil and 9.5% in South Africa), and actual capital ratios are often well above regulatory minima (Graph 2); eg until 2007 the ratio for Saudi banks averaged around 20%; it was still over 16% in 2009. High capital ratios appear to reflect the recognition that EMEs need to deal with volatile economic and financial conditions. In line with this, and as discussed below, there has been much emphasis on improved quantity and quality of capital and capital conservation in relation to Basel III.

Second, recent experience has highlighted the need to also take into account fire sale and network externalities when estimating capital adequacy. Gauthier, Lehar and Souissi (2010) find that systemic capital allocations that reflect such externalities can differ by as much as 50% from 2008Q2 capital levels.

*Loan-loss provisioning requirements.*⁸ Loan-loss provisions have in the past often been set too low to cover loan losses, particularly prior to crises, with significant macroprudential implications. However, provisioning and loan loss reserves have increased considerably since the 1990s. The median ratio of provisions to nonperforming loans (NPLs) in a set of EMEs was 120% in 2007, before the crisis significantly affected EMEs. This compares to 66% at the beginning of the decade and 146% for the US. Issues of cyclicity of loan-loss provisioning are discussed in the next section. One factor has been convergence with international norms (eg improved loan grading and provisioning and convergence towards international accounting standards such as IAS39). Another is discretionary increases that bring provisioning closer to expected loss. For example, in Asia provisioning increased starting around the middle of the 2000s, during the period of credit growth (Graph 3).⁹

An important question (discussed below) is how various requirements to strengthen bank balance sheets (eg capital adequacy ratios, loan loss provisioning requirements, or maturity mismatches) need to be adjusted to take into account of macroprudential concerns, specifically procyclicality and contagion or network risks.

C. Measures to maintain the quality of credit or to influence credit growth or allocation

Loan-to-value (LTV) ceilings on mortgage loans have been used in a number of EMEs to limit credit risks, including in China, Hong Kong SAR, Korea, Malaysia, Singapore, Thailand and Turkey.¹⁰ Furthermore, LTV ceilings have in some cases been imposed or lowered during periods of booming property markets, thus tending to dampen the procyclicality of LTV ratios. For example, starting in October 2009 the HKMA reduced the ceiling on the LTV ratio for high-value properties twice, from 70% to 50%, in the context of sharp increases in property prices.

⁷ See BCBS (2010).

⁸ Loan-loss provisions often are classified as general provisions and specific provisions pertaining to each credit risk category.

⁹ See Angklomkiew, George and Packer (2009).

¹⁰ In Singapore, banking legislation also limits the property sector exposure of a bank to no more than 35% of its total non-bank loans, debt instruments and contingent liabilities.

Debt-to-income or debt service-to-income rules, that would tend to ensure credit flows to those with a greater ability to repay, have also been used by China, Korea and Thailand in the 2000s and by Malaysia in the 1990s.

Direct measures to limit credit. Since the mid-1980s, most direct controls on bank lending have been dismantled because they undermined the efficiency of financial intermediation. Nevertheless, several countries have used credit ceilings more recently (eg Indonesia), and China has used window guidance (involving consultations between the authorities and the banks) to curtail lending. Korea maintains a so-called aggregate credit ceiling (set by the Monetary Policy Committee) targeting credit to small and medium enterprises. This ceiling was lowered from KRW 9.6 trillion until end 2006 to KRW 6.5 trillion by July 2007 and was then raised in response to the crisis to KRW 10 trillion.

Reserve requirements. Although there are well-known drawbacks,¹¹ reserve requirements are less costly to authorities and are less distortionary than controls on bank lending. Furthermore, reserve requirements can be increased when capital inflows and large foreign reserve accumulation lead to a strong rise of the liquid assets of the banking system. For example, in China, reserve requirements were raised by 10 percentage points to a peak of 17.5% between July 2006 and June 2008. They were subsequently lowered starting in October 2008 to 15% but were later raised once more (Graph 4) In India, starting in December 2006, reserve requirements rose 4 percentage points, to a peak of 9% in October 2008. They then fell to 5% but were raised in February 2010 to 6%. A similar pattern of rising or falling reserve requirements counter to the credit cycle was also observed in this decade in Brazil and Saudi Arabia.¹²

Taxes on lending. At least one country (Turkey) has resorted to (indirect) taxes on lending, specifically on consumer loans (and also short-term commercial loans from abroad). This tax, known as the Resource Utilization support Fund (RUSF) has been used countercyclically and is set by taking into account the level of capital inflows and credit conditions in the market. For example, in order to reduce credit growth in Turkey the RUSF rate on consumer loans granted by banks and financial institutions was increased to 15% from 10% on 15 August 2004. It was lowered back to 10% on 16 March, 2009, in order to boost consumption. Other taxes related to financial services may also be used in a similar way.

Targeting certain sectors. Authorities in some jurisdictions have increased loan loss provisioning requirements (and in at least one case risk weights for computing capital adequacy) to target certain sectors in a number of EMEs. For example, selective adjustments of risks weights for housing loans, consumer credit and commercial real estate were implemented in 2005 in India. Furthermore, risk weights and loan loss provisioning requirements were raised in 2007 on banks' exposure to systemically important nonbank financial institutions. In Brazil, reserve requirements have been eased in such a way as to target priority sectors. Lower reserve requirements following the Lehman bankruptcy released an estimated R\$116 billion, or 4% of GDP (2009 prices).¹³ An innovation was the use of rebates in reserve requirements to encourage purchases of bank assets and of

¹¹ If remunerated at below market rates (or not remunerated at all), such requirements act as a tax on commercial banks. The resulting increase in the cost of bank financing encourages borrowers to seek financing elsewhere (including abroad), thus eroding the effectiveness of the measure over time.

¹² In the case of Brazil, movement in nominal reserve requirements has been relatively limited; however changes in effective reserve requirements have been much larger because of exemptions noted below. Graph 4 shows data on effective reserve requirements provided by the Central Bank of Brazil.

¹³ The bulk of the released funds referred to drawdowns of the so-called "additional requirements" (that had been introduced in the 2002 crisis), R\$42bn, and of requirements on time deposits (R\$62bn).

foreign currency (as a way of offsetting the contractionary impact on liquidity of US dollar sales by the central bank). Specifically, deductions of reserve requirements on deposits from leasing companies and on time deposits were allowed if these were used to buy assets from other banks subject to certain restrictions, or to buy US dollars¹⁴. An interesting feature of the use of reserve requirements to encourage asset purchases is that they are an alternative to having the central bank expand its own balance sheet to undertake asset purchases.

D. Measures to control capital inflows

Sudden changes in capital inflows have been a major contributor to financial instability in the EMEs over several decades. Detailed country experiences are discussed in BIS (2008). Capital controls have therefore been justified (rightly or wrongly) on financial stability grounds.

While foreign currency borrowing has generally been liberalised, a number of EMEs still impose restrictions. For example, in the 2000s, Argentina has maintained a number of controls on foreign currency borrowing, including minimum holding periods and unremunerated reserve requirements. Similar measures have been implemented in Colombia and had been used in the past in Chile. India traditionally has maintained restrictions that seek to encourage FDI and limit external borrowing, particularly short-term.¹⁵ More recently, in order to curb portfolio inflows, the Brazilian government reintroduced a financial transactions tax on foreign capital investment, to apply to local bonds and equities (but not on foreign direct investment), setting it at 2%. However, some central banks see disadvantages in capital controls (eg economic distortions, reductions in availability of financing, and higher costs of international trade) or do not consider them feasible (eg in the EU).

As is well known capital controls involve significant tradeoffs. On the one hand, they can help contain financial stability risks (eg exchange rate volatility, capital inflows and credit booms, risks of capital inflow reversals); on the other hand they can cause distortions and impair financial development. In particular, less onerous (or more market friendly) measures are more likely to be circumvented.

Relevant questions include (i) whether capital controls are in fact macroprudential tools or motivated by other considerations; (ii) what factors determine whether countries apply controls or not. Policymakers in EMEs appear to disagree on the relative merits of capital controls and these views appear to vary over time; understanding the reasons can be instructive.

¹⁴ See details in Mesquita and Toros (2010).

¹⁵ In Colombia, starting in May 2007, authorities reactivated the reserve requirement on external debt used in the 1990s to discourage short-term foreign borrowing. Borrowers must deposit in the central bank 40% of external loans for a period of six months. The deposit can be denominated in US dollars or Colombian pesos and may be withdrawn at a discount determined by the central bank. Similar restrictions were imposed on portfolio investment. A ceiling was also set on the ratio of the gross amount of foreign exchange derivatives to the commercial banks' net worth (Vargas and Varela, 2008). In India, controls have involved strict regulation of external commercial borrowing, especially short-term debt; discouraging volatile flows from non-resident investors and gradual liberalisation of outflows (Mohan, 2008). See also IMF (2009)

III. Implementation issues

A macroprudential view introduces an additional dimension to the discussion of economic stabilisation policies by focusing not only on inflation, but also considering the possible effects of capital inflows on credit, asset prices, risk-taking behaviour and ultimately financial stability.

These effects tend to be related to business and financial cycles, so many issues that arise in discussions of monetary policy also are relevant for the use of supplementary instruments. It may be noted further that supplementary instruments sometimes directly influence the quantity of financing as well as its cost, which may imply that they may be less “market-friendly” as well as more effective than interest rate policy. The issues we will consider here are (1) What signals to respond to; (2) timing of prudential measures and cyclical; (3) effectiveness and calibration.

A. What signals to respond to?

Experience with crises has led to a number of indicators or analysis that can guide policy responses by shedding light on resilience, imbalances and systemic risks.

Indicators of resilience of financial system. Starting in this decade a set of Financial Soundness Indicators (including capital adequacy ratios, loan-loss provisions, and bank profits) covering a large number of countries is now regularly reported, although these indicators tend to be backward looking.

Indicators of macroeconomic or financial imbalances that could lead to crises. The predictive ability of some of these indicators has been tested in empirical models of early warning systems of crises.¹⁶ In some cases, authorities have developed monitoring systems to assess the possible build-up of imbalances in the short-run. For example, some authorities have systems to monitor capital movements, or monitor statistics that highlight specific areas of banking system exposure to currency and maturity mismatches as well as repayment capacity. Along these lines, one Asian EME has made efforts to establish a balance of payments risk warning system, to assess the trend and the risks of cross-border capital movements and develop contingency plans to deal with possible extreme circumstances. The authorities (foreign exchange, tax and customs, and public securities authorities) have also developed a coordinated “abnormal capital flows” monitoring mechanism. In some cases, tracking mechanisms are quite elaborate; for example in one Latin American country foreign exchange transactions involving the banking sector are registered electronically, and FDI and portfolio transactions are captured in real time.

Indicators of systemic risks. Recent research at central banks has clarified certain types of risks to the financial system that traditionally are not the focus of micro prudential regulation. In time this could facilitate interpretation and systematic monitoring of common exposures and network links that could have systemic implications. Key topics include:

- *The impact of (extreme) macroeconomic shocks on the financial sector;* Some recent work by the central bank of Brazil and the central bank of Mexico using macro stress-testing suggests that the impact can be large even if these events are rare.¹⁷ The capacity to assess this kind of impact has recently been enhanced by

¹⁶ For example, see Hawkins and Klau (2000), which is the basis for the vulnerability indicators used by the CGFS, Bussiere and Fratzscher (2006) and Borio and Drehmann (2009).

¹⁷ Gaglianone and Schechtman (2010) and Martínez-Jaramillo et al (2010).

advances in incorporating a banking sector in general equilibrium models, such as in work at the Bank of Canada.¹⁸

- *Common exposures.* This could lead to a simultaneous weakening of the financial system that could increase vulnerability to the failure of one bank. It could also imply fire sale externalities, because efforts by a bank to meet its obligations could prompt it to sell assets at fire sale prices, prompting (under mark-to-market accounting) sharp reductions in the value of other financial institutions holding similar assets.
- *Network externalities,* arising because a bank is exposed (eg in the interbank market) to a counterparty who might be unable to pay its liabilities.

Some of this work reveals new areas of vulnerability that were less obvious before the recent global financial crisis. For example, a recent study by the Bank of Mexico suggests that under some stress scenarios, the failure of a small bank as a result of market risk could trigger widespread disruption in the financial system.¹⁹ This implies that it is not enough to worry about “too big to fail” institutions; smaller institutions that are highly networked could pose risks too. In line with this, in work by economists at the Bank of Canada, Gauthier et al (2010) find that systemic capital allocations that reflect fire sale and network externalities can differ by as much as 50% from 2008Q2 capital levels and are not related in a simple way to bank size or individual bank default probability.²⁰

While there has been some progress, the performance of empirical models of imbalances or early warning systems is mixed and there are a number of difficulties of interpretation of data. For example, it is hard to tell when precisely deviations from the trend of credit raise major vulnerability concerns given that rapid credit growth is desirable in fast-changing economies with large profit opportunities and as part of financial deepening (eg Latin America). To clarify these issues requires more systematic research and a better understanding of the nature of systemic risks and how these are related to macroeconomic outcomes.

Interpreting data and assessing risks in EMEs also poses challenges. For example, there are still difficulties in assessing credit risk in individual financial institutions, notably from fast-growing sectors, such as consumer and mortgage lending, due to incomplete default history data. Furthermore, systemic risks are not fully understood. Information on interbank exposures may also be limited or not easily analysed.

Deregulation and deepening of financial markets further accentuate these challenges. In this setting, detailed data on capital flows or the operation of the financial system can become harder to interpret or may still be insufficient to pinpoint risks. One reason is that changing risk exposures associated with financial innovations (eg through use of derivatives) or the use of over the counter transactions may not immediately show up in statistics. To illustrate, during the recent crisis corporations suffered large losses from derivatives exposures in foreign exchange markets in Mexico, Brazil and Korea.

EME central banks at BIS meetings have indicated that they relied on “market intelligence” to help interpret available data. Which data collection needs to be better focused or reduced remains an important question. Whether certain types of regulation to limit financial innovations (eg limits to derivatives transactions such as those imposed on Colombia) are

¹⁸ See Meh (2010) or Montoro and Tovar (2010). Both papers illustrate how shocks are transmitted to the financial sector. For another example of an equilibrium model with a banking sector, see Gertler and Kiyotaki (2010).

¹⁹ Martinez-Jaramillo et al (2010) have sought to assess network risks by analysing interbank exposures, including net loans, securities, credit lines, foreign exchange transactions and net positions in over the counter (OTC) forwards.

²⁰ Fire sale externalities are also analysed by Cifuentes, Shin and Ferrucci (2005).

needed due to difficulties in assessing risks associated with such innovation is also a relevant question.

B. Timing of prudential measures and procyclicality

Much of the discussion regarding the timing of macroprudential measures pertains to how these measures should be applied over the cycle. This is partly because regulatory provisions (eg capital requirements, loan-loss provisions and LTV ratios) are often procyclical. For example, loan-loss provisions tend to decline as measured NPL ratios tend to fall during periods of expansion. The market itself is procyclical as risk spreads tend to narrow during the expansionary phase of the business cycle – and then widen, sometimes abruptly, in downturns. In this setting, from a risk-management perspective, supplementary tools ideally would be imposed early and in a manner that takes into account risks should economic conditions deteriorate (ie they should “see through the cycle”). Some argue that measures should be applied countercyclically, ie tightening during periods of expansion and easing during periods of contraction.

Illustrating the recent thinking of regulators on this issue, and in response to the crisis, the Basel Committee on Banking Supervision is taking a number of steps (in the context of Basel III)²¹ to mitigate procyclicality. These include (i) assessing and dampening the cyclicity of minimum capital requirements; (ii) encouraging forward-looking provisioning; (iii) adopting a regulatory framework for capital conservation and countercyclical buffers; (iv) introducing a minimum leverage ratio.

Dampening cyclicity of minimum capital requirements. Apart from steps taken to deal with procyclicality taken previously in the context of Basel II (eg the requirement to use long-term data horizons to estimate probabilities of default, or the use of so-called downturn loss-given-default estimates), the Basel Committee has been monitoring the impact of the Basel II framework on member countries over the cycle and will initiate steps to counter procyclicality if it is found to be excessive. The Committee also adopted a requirement that banks calculate a stressed value-at-risk, which will help reduce the procyclicality of the minimum capital requirements for market risk. Other measures have also been examined, including the use of supervisory review (Pillar 2) to take into account that during benign periods probability of default estimates used in the internal-ratings based approach might understate actual default probabilities.

Forward-looking provisioning. The Basel Committee is supporting a move towards an expected loss approach in accounting standards. This is in line with risk management considerations that suggest that loan-loss provisions should be forward looking, ie take into account expected credit losses over the medium term. In contrast, accounting standards (notably IAS 39) traditionally require banks to provision based on specific “incurred loss” not expected loss. While the adoption of international accounting standards contributes to financial stability by limiting the scope for arbitrary earnings manipulation, in a number of cases it has implied lower loan-loss provisioning than many supervisors would have considered prudent during the expansion phase of the cycle.²² In practice the ratio of loan loss provisions to NPLs appears to have moved countercyclically in some EMEs (eg in Latin America, Russia and Korea), rising during the period of expansion in the 2000s, and falling as the full impact of the financial crisis hit EMEs following the Lehman bankruptcy (Graph 3).

²¹ See Basel Committee on Banking Supervision (2010b), Caruana (2010a and 2010b) and Hannoun (2010).

²² As a result, a number of supervisors (eg in Brazil, Korea, the Philippines and Hong Kong SAR) have imposed prudential provisioning requirements that are higher than those implied by IAS 39. Spain and Colombia, and more recently Peru, have gone further, and adopted dynamic loan loss-provisioning rules that are designed to operate countercyclically.

Capital conservation and buffers: Basel III promotes the conservation of capital and the build up of buffers that can be drawn down (countercyclically) during periods of financial stress. One element of this framework involves a *capital conservation buffer* that will require banks to hold an additional 2.5 percentage points of common equity Tier 1 capital above the regulatory minimum capital requirements. Because it can be drawn as banks experience losses (unlike the minimum requirement), it reduces pressure to cut credit during downturns. However, restrictions on distributions (eg dividends, share buybacks and discretionary bonuses) will be imposed on a bank when its capital level falls within a published range in order to conserve capital. An additional element of the framework involves a countercyclical buffer that would extend the conservation buffer by up to an additional 2.5 percentage points. During periods of expansion, and in response to certain reference indicators (eg unusually rapid growth in the ratio of credit to GDP), an increase in this buffer would be encouraged through the same restrictions on distribution that apply to the conservation buffer.²³ The buffer can then be released by authorities in response to incipient financial strains (eg aggregate losses or tighter credit terms). Drawdowns of this countercyclical buffer will not be subject to any restrictions on distribution, in order to encourage banks to use it when needed. There is also more discretion in the use of this tool: the buildup of this buffer is based on judgment rather than a rigid formula, and the decision to release the buffer would only involve meeting some general guidelines.

Minimum leverage ratio. A minimum tier 1 leverage ratio (the ratio of Tier 1 capital to the bank's total non-weighted assets plus off-balance sheet exposures) of 3% has been introduced. A supervisory monitoring process has already begun focusing on the development of templates to track in a consistent manner the underlying components of the ratio and results.²⁴ At the micro level, the leverage ratio can help counter possible deficiencies in risk measurement and weighting (the crisis-revealed that even highly-rated assets could experience large losses). At the macro level, the leverage ratio can help dampen procyclicality by avoiding a sharp build up of leverage in the system that is suddenly reversed, and by reducing the scope for circumventing risk-based requirements.

Apart from the steps taken by the Basel Committee, procyclicality can be further countered by supplementary macroprudential measures, particularly when capital has been at its maximum for an extended period and there are signs of continued booms in credit and asset prices. Indeed, some authorities have implemented macroprudential measures in a way that counters the cycle. One example is the countercyclical use of reserve requirements described previously (Graph 4).²⁵ Another example is lowering loan-to-value ratios during periods of increases in credit or property prices, as was done by the Hong Kong Monetary Authority in October 2009 (see above). A lower LTV ratio reduces procyclicality. Apart from this, regulation could attempt to make collateral valuations less sensitive to asset prices.²⁶

²³ In this context it may be noted that in Saudi Arabia, the Saudi Arabian Monetary Agency has encouraged banks to raise capital during periods of expansion. These measures in effect operate like taxes or subsidies, affecting the incentive to extend credit. Recognising this, and as noted earlier, taxes on consumer lending have been applied countercyclically in Turkey.

²⁴ Beginning in 2013, the Committee will test a minimum Tier 1 leverage ratio of 3% to monitor how banks' actual leverage ratios evolve during the economic cycle, the impact this can have on their business models, and how risk-based requirements and an overall leverage ratio interact. Bank level disclosure of the leverage ratio and its components will start in 2015. See BCBS (2010) and discussion in Hannoun (2010).

²⁵ For related discussions see CGFS (2009) and Mohanty and Turner (2006).

²⁶ See Borio and Shim (2007) for related discussion and CGFS (2009). But collateral valuations of EM assets are typically strongly procyclical not only because their market values respond strongly to the cycle but also because their price volatility rises sharply during downturns. In any event, supervisors do not typically set the parameters for collateral valuation or adjust them to reduce procyclicality (nor do they usually set LTV ceilings).

One difficulty is that if restrictions are eased during downturns, it may be difficult to reimpose them during periods of recovery. Resistance to tightening credit standards may be reinforced if such credit is seen as achieving social goals (eg providing low income housing).

Applying measures countercyclically thus requires a clear and convincing exposition of the risks to financial stability. It is also necessary to clarify that social goals are best achieved through explicit subsidies and ensuring that any risks to the financial system are avoided or contained.

Relying on rules, rather than discretion, could also facilitate the use of countercyclical prudential measures. As is well known, there are strong arguments for a rules-based framework (eg an inflation or monetary target) to guide decisions about monetary policy, because of inherent inflation bias. Further analysis is needed to determine how far the implementation of supplementary (macroprudential) tools should be rules-based.

A number of other issues pertaining to the use of prudential measures countercyclically may be highlighted.²⁷

First, the weight to be given to stabilising the economic cycle (eg GDP) as opposed to some form of financial cycle (eg bank credit, asset prices, borrowing conditions in capital markets and so on.) One question, in this context, is whether it is possible to extract in a timely manner the financial cycle (ie “excesses” of credit growth, “overshooting” of asset prices, “overabundant” liquidity etc) from normal cyclical variation and longer-term trends. Financial innovation and the rise of new industries makes this particularly difficult.²⁸

Second, who should judge the cycle (eg public versus private sector)? The cycle is unobservable, and current methods for estimating it are associated with a great deal of uncertainty. It could be argued that diversity of opinion is more likely to be stabilising than uniformity, and that there is some presumption against having a single official body judge the cycle. One solution is for authorities to rely on a group of independent experts, an approach that has been used in Chile (to define trend GDP and long run copper prices) in implementing its fiscal rule.²⁹

Third, timeliness of actions. Implementation lags could mean that measures taken could have procyclical rather than countercyclical effects.

Fourth, whether prudential ratios should be fixed or move with the cycle. An intermediate solution is to define quite wide “corridors of stability” for the target (eg GDP) to be stabilised. When the target is within that corridor, the ratio would remain fixed. Only when the target goes outside that corridor would a cyclical change in the ratio be considered. Judgement could still be required to set aside a rule or to calibrate policy action.

C. Effectiveness and calibration

The appropriate calibration of measures would in part depend on their effectiveness. But, with the possible exception of capital controls, where some of the evidence is unfavourable,³⁰ little is known about the effects of the various supplementary instruments in practice. In

²⁷ See Turner (2010).

²⁸ For research relating to the credit cycle, see Borio and Drehmann (2009).

²⁹ For a discussion of this rule, see Garcia, Garcia and Piedrabuena (2005).

³⁰ An important concern is that less direct controls (eg reserve requirements on inflows rather than prohibitions) are less effective or more easily circumvented, while more direct controls may be more effective but can be highly distortionary.

contrast to the analysis of monetary policy transmission, there is no well-developed theoretical framework or robust empirical results to guide calibration exercises.

Supplementary tools are generally seen as enhancing banking sector resilience to shocks, but their perceived effectiveness in curbing credit growth appears to vary. For example lower LTV ratios in Hong Kong SAR in 1991 and 1997 did not prevent a bubble. However, they did limit bank losses and helped avoid bank failures during the 1997–98 crash in property markets.³¹ Similar conclusions appear to have been reached regarding the effects of dynamic provisioning in Spain. In line with this, credit did not appear to slow significantly prior to the Lehman bankruptcy in some of the larger EMEs (Graph 4), even if several of them have used supplementary tools such as higher reserve requirements. CGFS (2010) discusses the effectiveness of some specific instruments in the Asian EMEs.

Partly reflecting uncertainties about the effects of supplementary or macroprudential instruments, the authorities appear to behave pragmatically when applying such tools. In particular, they appear to assess the effectiveness of measures adopted (eg unremunerated reserve requirements on capital inflows, or reserve requirements on domestic deposits) and adjust rates or coverage if this appears to be necessary. In some cases, however, the settings for what are increasingly recognised as possible macroprudential tools are still based on microprudential norms. It will be difficult to change this until theoretical and empirical research clarifies how these settings should be adjusted to take into account macroprudential risks. Some steps in this direction have been taken in research at central banks (eg Meh and Moran (2010), Torres (2010), Gauthier et al (2010)) and also at the BIS (Montoro and Tovar (2010)).

Two recent studies shed some light on the implications of more stringent capital adequacy and liquidity requirements for economic activity in the aftermath of the recent financial crisis. In the medium term, a Basel Committee study (BCBS (2010a)) finds that there are clear long term net economic benefits from increasing the minimum capital and liquidity requirements from their current levels, as the benefits from reduced probability of financial crisis and the output losses associated with such crises substantially exceed the potential output costs.³² Regarding the short run effects, the Macroeconomic Assessment Group (MAG, 2010) evaluation of the macroeconomic transition costs to stronger capital and liquidity standards concludes that the transition is likely to have a modest impact on aggregate output.

IV. Supplementary or macroprudential tools and interest rate policy

The use of macroprudential instruments raises the question of how these instruments might be related to interest rate policy. Both interest rates and macroprudential instruments are ways to influence (ease or tighten) financial conditions. Macroprudential instruments do this by influencing the incentives and robustness of the financial sector and directly affect on the monetary policy transmission mechanism. Such instruments can strengthen or weaken how the policy rate is ultimately reflected in the availability and cost of financing faced by borrowers (private and public). From this point of view, they can be seen as complements. For example, in the face of rising inflation pressures, rapid credit growth and higher asset prices, policymakers would want to tighten monetary policy and use supplementary tools

³¹ See Borio and Shim (2007), Table 3.

³² The study estimates that an increase in the banking sector's common equity ratio from 7% to 8% reduces the probability of a banking crisis by at least 1 percentage point, which in turn implies an expected annual GDP benefit of between 0.2 and 0.6%. For a discussion of how Basel III would affect bank capital see BCBS (2010c) and Caruana (2010b).

countercyclically. In this case, both policy interest rates and macroprudential instruments reinforce each other to tighten financial conditions.

However, as both ultimately affect the availability and cost of financing, they can also be viewed as substitutes. In particular, it can be shown that interest rates and macroprudential tools may both be adjusted to deal with the same macroeconomic or financial shock – for instance, the authorities can raise interest rates or capital requirements.³³ How much interest rates and macroprudential instruments will be used will depend in part on the extent to which macroeconomic and financial stability considerations coincide, and the relative effectiveness of these instruments.

For example, an important question is how to deal with possible policy dilemmas, eg when inflation of goods and services prices is low and both credit growth and asset price increases are rapid. One possibility is that interest rate policy could be assigned to deal with inflation, while macroprudential policies (eg capital adequacy ratios, reserve requirements) are assigned to deal with financial stability risks. Under this interpretation interest rates might be left unchanged because inflation is not rising, while reserve requirements could be raised to dampen rapid credit growth and asset price increases. One possible advantage is that raising reserve requirements might not attract capital inflows in the same way raising policy rates might. However, whether this “policy assignment” is in fact optimal requires further analysis.³⁴

In some situations, such as under a fixed exchange regime, policymakers will have no interest rate tool and would have to rely exclusively on supplementary tools. The development or condition of the financial system may also have a bearing on the types of instruments used. For example, in some cases where domestic interbank markets are less developed the authorities may find it more effective to set bank lending rates (eg as in China) directly rather than rely exclusively on open market operations to set interbank rates.

V. Medium term concerns

Over the medium term, the use of supplementary and macroprudential tools raises issues of financial development and efficiency. On the one hand, many supplementary tools discussed here have been abandoned in advanced economies because of the heavy costs imposed on the financial system and distortions in resource allocation. On the other hand, recent experience showed clearly that market discipline is not enough to guarantee financial stability. The crisis has prompted a reassessment of how these two competing considerations should be balanced.

Another concern is that the focus on supplementary tools, including capital controls, could draw attention away from the need for sound macroeconomic policies. A number of central banks take the view that there is no substitute for conservative fiscal, monetary and regulatory policies in order to prevent fluctuations in global capital flows from causing severe disruptions in EMEs.

³³ See Cecchetti (2009).

³⁴ For further discussion of how changes in reserve requirements are transmitted and a comparison to interest rate policy, see Vargas et al (2010) and Montoro and Tovar (2010).

References

- Angklomkiew, S, J George and F Packer (2009): "Issues and developments in loan-loss provisioning: the case of Asia. *BIS Quarterly Review*. December. Available at http://www.bis.org/publ/qtrpdf/r_qt0912h.pdf
- Bank for International Settlements (BIS, 2000): *Managing foreign debt and liquidity risks*, BIS Policy Papers no 8, September. Available at <http://www.bis.org/publ/plcy08.htm>.
- Bank for International Settlements (BIS, 2008): *Financial globalisation and emerging market capital flows*, BIS Papers No.44. December. Available at <http://www.bis.org/publ/bppdf/bispap44.htm>.
- Bank for International Settlements (BIS, 2010), *The International Banking Crisis and Domestic Financial Intermediation in Emerging Economies*, BIS Papers 54. Available at <http://www.bis.org/publ/bppdf/bispap54.htm>.
- Basel Committee on Banking Supervision (BCBS, 2010a): "Calibrating regulatory minimum capital requirements and capital buffers: a top-down approach," October. Available at <http://www.bis.org/publ/bcbs180.htm>
- Basel Committee on Banking Supervision (BCBS, 2010b): "Basel III: A global regulatory framework for more resilient banks and banking systems," December. Available at <http://www.bis.org/publ/bcbs189.htm>
- Basel Committee on Banking Supervision (BCBS, 2010c): "Results of the comprehensive quantitative impact study," December. Available at <http://www.bis.org/publ/bcbs186.htm>
- Borio, C and M Drehmann (2009): "Assessing the risk of banking crises – revisited", *BIS Quarterly Review*, March. Available at http://www.bis.org/publ/qtrpdf/r_qt0903e.pdf.
- Borio C and I Shim (2007): "What can (macro-)prudential policy do to support monetary policy?", BIS Working Paper No. 242, December. Available at <http://www.bis.org/publ/work242.htm>.
- Bussiere, M and M Fratzscher (2006). "Towards a new early warning system of financial crises," *Journal of International Money and Finance*, Vol 25, pp 953–73.
- Caruana, J (2010a): "Basel III: towards a safer financial system". Speech at the 3rd Santander International Banking Conference, Madrid, 15 September 2010. Available at <http://www.bis.org/speeches/sp100921.htm>
- Caruana, J (2010b): "Macroprudential policy: could it have been different this time?". Speech at the People's Bank of China seminar on macroprudential policy, in cooperation with the International Monetary Fund, Shanghai, 18 October 2010. Available at <http://www.bis.org/speeches/sp101019.htm>.
- Cecchetti, S (2009): "On the similarities of capital adequacy and monetary policy". Presentation at the Thirteenth Annual Conference of the Central Bank of Chile, Santiago, Chile, 19 November. Available at <http://www.bcentral.cl/eng/conferences-seminars/annual-conferences/2009/Cecchetti.pdf>
- Cifuentes, Rodrigo, Hyun Song Shin, and Gianluigi Ferrucci (2005): "Liquidity Risk and Contagion," *Journal of European Economic Association* 3, 556–566.
- Committee on the Global Financial System (CGFS, 2009): *Capital flows and emerging market economies*, CGFS Papers No. 33, January. Available at <http://www.bis.org/publ/cgfs33.htm>
- Committee on the Global Financial System (CGFS, 2010): *Macroprudential instruments and frameworks: a stocktaking of issues and experiences*, CGFS Publications No 38, May 2010. Available at <http://www.bis.org/publ/cgfs38.htm>.

Gaglianone, W P and R Schechtman (2010): "Macro stress testing of credit risk focused on the tails." Paper presented at the BIS CCA-sponsored conference "Systemic risk, bank behaviour and regulation over the business cycle," hosted by Central Bank of Argentina, Buenos Aires, 18-19 March 2010. Manuscript, May. Available at http://www.bis.org/events/srbbrobc100318/agenda/pisch_paper.pdf

Garcia, M, P Garcia and B Piedrabuena (2005): "Fiscal and Monetary Policy Rules: The Recent Chilean Experience", Central Bank of Chile Working Papers N° 340, December. Available at <http://www.bcentral.cl/estudios/documentos-trabajo/pdf/dtbc340.pdf>.

Gauthier, C, A Lehar and M Souissi (2010): "Macroprudential regulation and systemic capital requirements." Paper presented at the BIS CCA-sponsored conference "Systemic risk, bank behaviour and regulation over the business cycle," hosted by Central Bank of Argentina, Buenos Aires, 18-19 March 2010. Available at http://www.bis.org/events/srbbrobc100318/agenda/galeso_paper.pdf

Gertler, M and N Kiyotaki (2010): "Financial Intermediation and Credit Policy in Business Cycle Analysis". Manuscript. Prepared for the *Handbook of Monetary Economics*. February.

Goldstein, M and P Turner (2004): *Controlling Currency Mismatches in Emerging Markets*. Washington, DC, Peterson Institute for International Economics, April.

Griffith-Jones, S, E Helleiner and Ngaire Woods (2010): The Financial Stability Board: An Effective Fourth Pillar of Economic Governance? CIGI Special Report, June. Available at <http://www.cigionline.org/publications/2010/6/financial-stability-board-effective-fourth-pillar-global-economic-governance>

Hannoun, H (2010): "The Basel III Capital Framework: a decisive breakthrough." Speech delivered at BoJ-BIS High Level Seminar on Financial Regulatory Reform: Implications for Asia and the Pacific Hong Kong SAR, 22 November 2010. Available at <http://www.bis.org/speeches/sp101125a.pdf>

Hawkins, J and M Klau (2000): "Measuring potential vulnerabilities in emerging market economies", BIS Working Paper No. 91, October. Available at <http://www.bis.org/publ/work91.htm>.

IMF (2009): *Annual Report on Exchange Arrangements and Exchange Restrictions: 2008*.

Macroeconomic Assessment Group (2010): "Assessing the macroeconomic impact of the transition to stronger capital and liquidity requirements - Interim Report", August. Available at <http://www.bis.org/publ/othp10.htm>

Martínez-Jaramillo, S, C López Castañón, O Pérez Pérez, F Avila Embriz and F López Gallo Dey (2010): "Systemic risk, stress testing and Financial Contagion: Their Interaction and Measurement." Paper presented at the BIS CCA-sponsored conference "Systemic risk, bank behaviour and regulation over the business cycle," hosted by Central Bank of Argentina, Buenos Aires, 18-19 March 2010. Available at http://www.bis.org/events/srbbrobc100318/agenda/mllpa_paper.pdf

Meh, Cesaire and Kevin Moran (2010): "The role of bank capital in the propagation of shocks." Manuscript. Paper presented at the BIS CCA-sponsored conference "Systemic risk, bank behaviour and regulation over the business cycle," hosted by Central Bank of Argentina, Buenos Aires, 18-19 March 2010. Available at: http://www.bis.org/events/srbbrobc100318/agenda/memo_paper.pdf

Mesquita, M and M Torós (2010): "Brazil and the 2008 panic". In BIS (ed), *The International Banking Crisis and Domestic Financial Intermediation in Emerging Economies*, BIS Papers 54. Paper contributed for a meeting of Emerging Market Deputy Governors in Basel in 2010. Available at <http://www.bis.org/publ/bppdf/bispap54.htm>.

Mohan, R (2008): "Capital Flows to India", in *Financial globalisation and emerging market capital flows*, BIS Papers 44. Available at <http://www.bis.org/publ/bppdf/bispap44.htm>.

Mohanty, M and P Turner (2006): "Foreign exchange reserves accumulation in emerging markets: what are the domestic implications?", BIS Quarterly Review, September. Available at http://www.bis.org/publ/qtrpdf/r_qt0609f.pdf.

Montoro, C and C Tovar (2010): "Reserve requirements in a liquidity constrained environment." Presented at the BIS-sponsored panel "Financial Stability Considerations in Monetary Frameworks," LACEA, Medellín, Colombia, 2010.

Torres, A (2010): "Monetary policy and financial stability: considerations for emerging market economies." Presented at the BIS-sponsored panel "Financial Stability Considerations in Monetary Frameworks," LACEA, Medellín, Colombia, 2010.

Turner, P (2009): "Currency mismatches and liquidity risk: diagnosis and reform". Presentation at EBRD High Level Workshop: Local currency lending and capital market development in emerging Europe and central Asia, 3 December.

Turner, P (2010) "Macroprudential policies and the cycle". In S Griffith-Jones, S, E Helleiner and Ngaire Woods (eds): *The Financial Stability Board: An Effective Fourth Pillar of Economic Governance?* CIGI Special Report, June. Available at <http://www.cigionline.org/publications/2010/6/financial-stability-board-effective-fourth-pillar-global-economic-governance>

Vargas, H and C Varela (2008): "Capital flows and financial assets in Colombia: recent behaviour, consequences and challenges for the central bank." In BIS (ed), *Financial globalisation and emerging market capital flows*, BIS Papers No 44. Available at <http://www.bis.org/publ/bppdf/bispap44.htm>.

Vargas, H, Y Betancourt, N Rodriguez and C Varela (2010). "Effects of Reserve Requirements in an Inflation Targeting Regime: The Case of Colombia". In BIS (ed), *The International Banking Crisis and Domestic Financial Intermediation in Emerging Economies*, BIS Papers 54. Available at <http://www.bis.org/publ/bppdf/bispap54.htm>.

Table 1

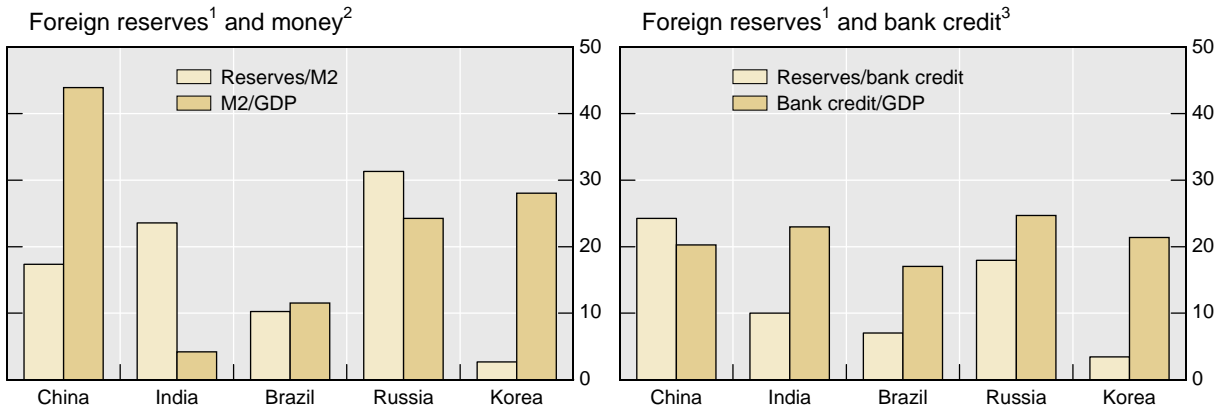
Examples of possible macroprudential instruments

Rules governing	Measures
Bank loans	<ul style="list-style-type: none"> Caps on loan-to-value for mortgages Caps on the ratio of debt-service-to-household income Rules on the reference interest rate used for mortgage lending Rules on currency mismatches
Bank balance sheets	<ul style="list-style-type: none"> Countercyclical capital ratios applying to capital Adjustment to risk weights Rules on loan-loss provisioning Caps on loan-to-deposit ratios, core funding ratio and other liquidity requirements Bank reserves deposited with the central bank
Collateral used in wholesale funding	<ul style="list-style-type: none"> Preventing procyclical variation in minimum margins or haircuts (or make such variation countercyclical)

Graph 1

Growth in foreign reserves, money and bank credit, 1Q2002-3Q 2010

Ratio



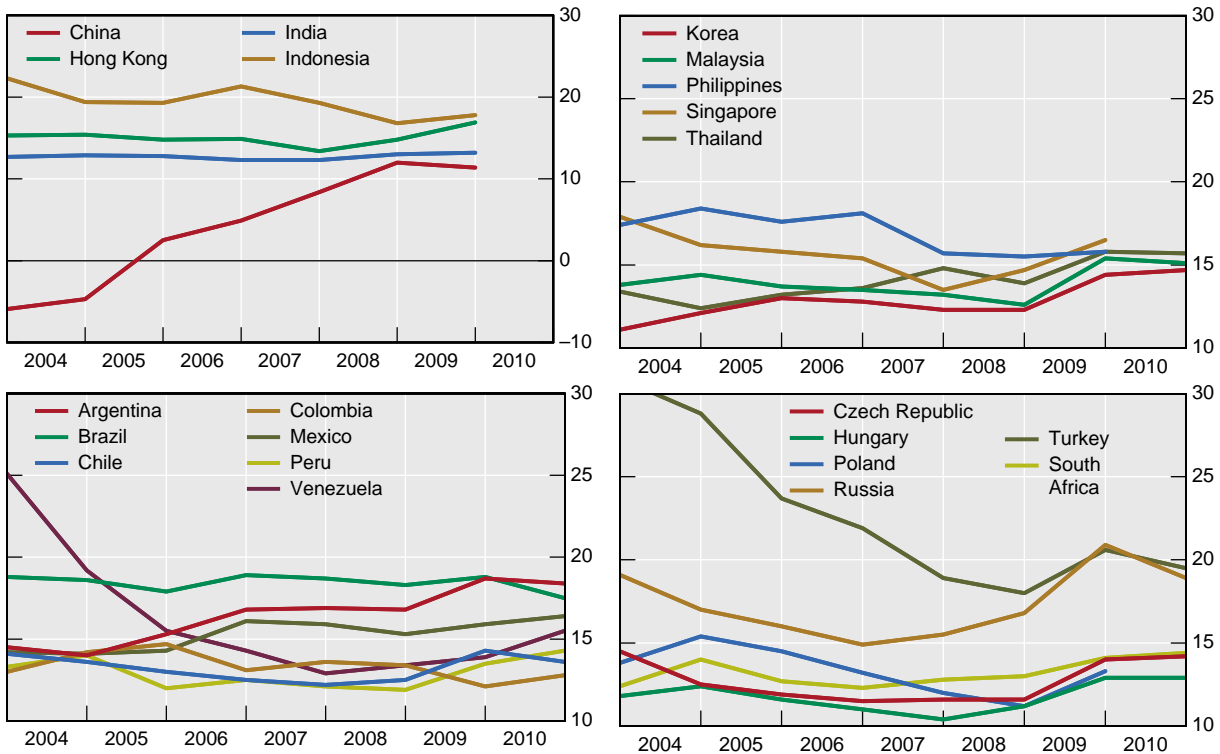
¹ Foreign reserves minus currency held by the public. ² M2, a broad measure of money comprising transferable deposits, currency outside deposit money banks, time deposits, savings deposits and foreign currency deposits of resident sectors other than the central government. ³ Bank credit to the private sector.

Sources: IMF; Datastream.

Graph 2

Capital adequacy ratios¹

In percent

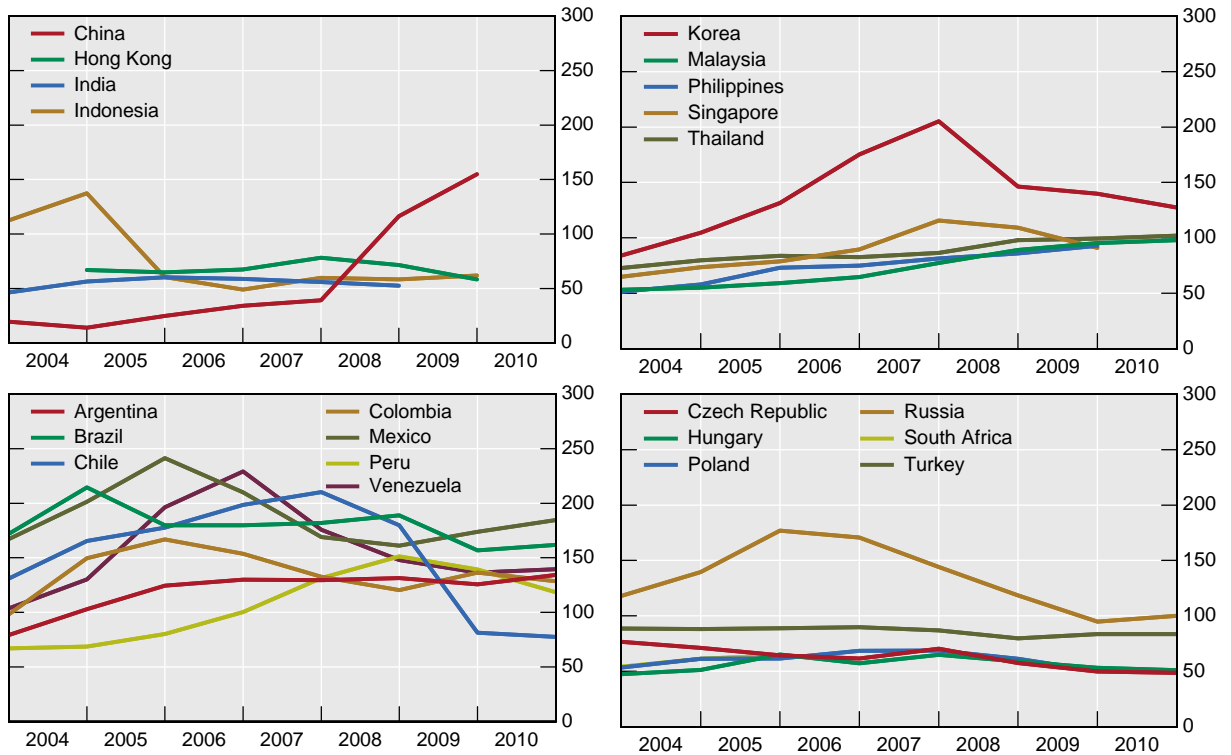


¹ For 2010, latest month available.

Source: IMF.

Graph 3
Provisions to NPLs¹

In percent



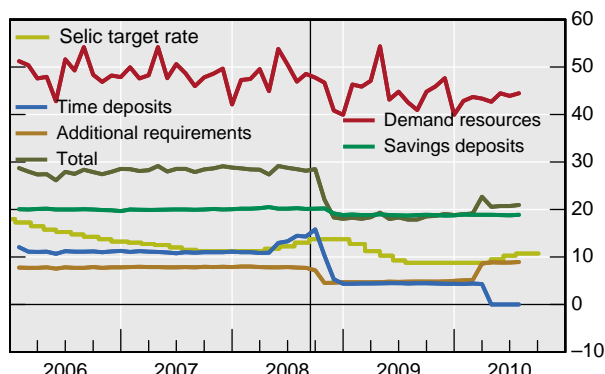
¹ For 2010, latest month available.

Source: IMF.

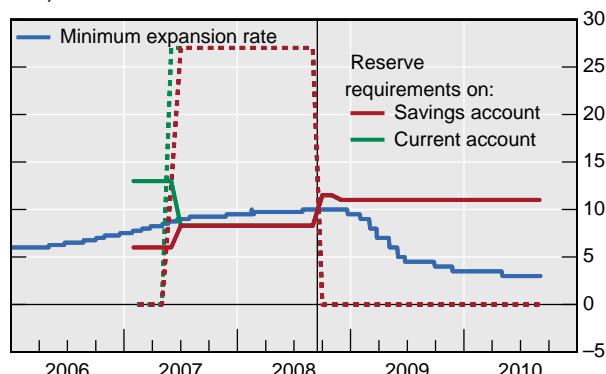
Graph 4

Domestic reserve requirements and policy rates or short-term rates

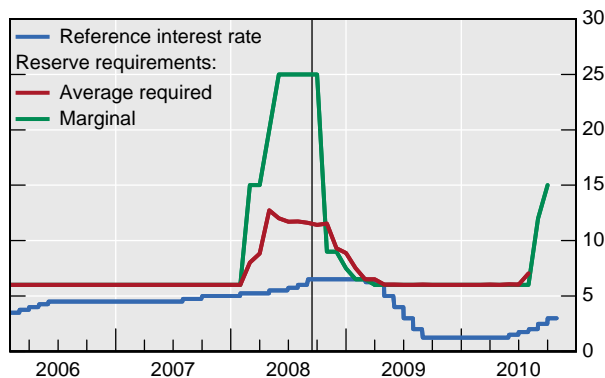
Brazil (effective reserve requirements)



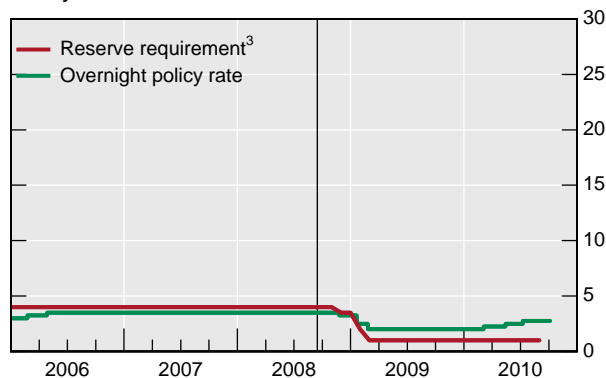
Colombia (marginal reserve requirements in dashed line)



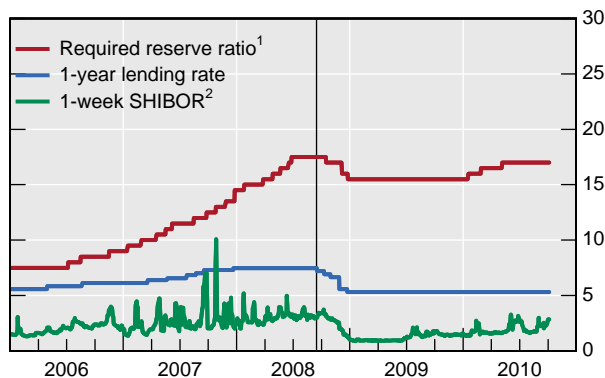
Peru



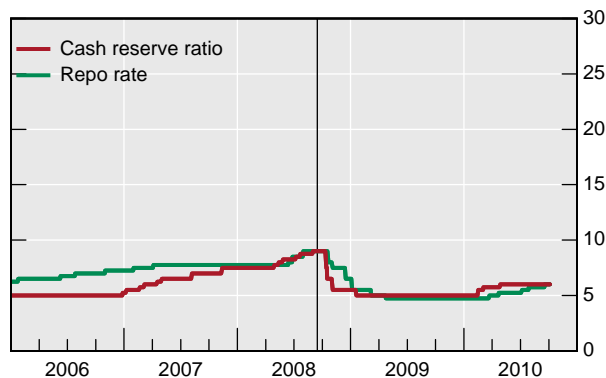
Malaysia



China



India



The vertical line marks the date of the Lehman Brothers bankruptcy on 15 September, 2008.

¹ For major banks. ² Repo rate prior to October 2006. ³ For commercial banks.

Sources: Bloomberg; CEIC; Central Bank of Brazil; Central Bank of Peru.